Mathletics
Australian Curriculum
Understanding Practice and Fluency (UPF)

Years 1 – 10

Mathletics

Australian Curriculum Years 1 – 10

Understanding Practice and Fluency (UPF)

Content

Thank you for using Mathletics.

We look forward to sharing the love of learning with your school.

Australian Curriculum Years 1 – 10

Understanding Practice and Fluency (UPF)

Content

Thank you for using Mathletics.
We look forward to sharing the love of learning with your school.

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Number and Algebra

Develop confidence with number sequences to and from 100 by ones from any starting point. Skip count by twos, fives and tens starting from zero (ACMNA012)		
Quest: Whole number – counting		
Learning Journey Count forwards and backwards to 100		
Steps	**Content**	**Detail**
1	Counting forwards in ones within 100	• count forwards in ones from any number up to 100 • identify missing numbers on a number line up to 100
2	Counting backwards in ones within 100	• count backwards in ones from any number within 100 • identify missing numbers on a number line up to 100
3	Counting forwards and backwards in ones within 100	• count forwards and backwards in ones from any number up to 100 • identify missing numbers on a number line up to 100
Learning Journey Find numbers before and after to 100		
1	Identifying numbers before and after up to 100	• identify the number that comes before a given number up to 100;- describe this number as 'one more than' • identify the number that comes after a given number up to 100;- describe this numbers as 'one less than' • identify the number that comes before or after a given number up to 100;- describe this number as 'one more than' or 'one less than'
Learning Journey Identify ordinal numbers up to 31st		
1	Using ordinal numbers up to 31st	• read, write and use ordinal numbers in everyday situations, eg when reading a calendar
Quest: Whole number – skip counting		
Learning Journey Skip count by 2s		
1	Using skip counting by 2s from zero up to 20	• use concrete materials, models, drawings, number lines/charts to skip count by 2s from zero
2	Using skip counting by 2s from any multiple of 2 up to 50	• use concrete materials, models, drawings, number lines/charts to skip count by 2s from any multiple of 2
Learning Journey Skip count by 5s		
1	Using skip counting by 5s from zero up to 20	• use concrete materials, models, drawings, number lines/charts to skip count by 5s from zero
2	Using skip counting by 5s from zero up to 50	• use concrete materials, models, drawings, number lines/charts to skip count by 5s from zero
Learning Journey Skip count by 10s		
1	Counting by skip counting forwards by 10s from zero up to 50	• use concrete materials, models, drawings, number lines/charts to skip count by 10s from zero
2	Counting by skip counting backwards by 10s from up to 50	• use concrete materials, models, drawings, number lines/charts to skip count backwards by 10s
3	Counting by skip counting forwards by 10s from zero up to 100	• use concrete materials, models, drawings, number lines/charts to skip count by 10s from zero • recognise an error in the skip counting sequence
4	Counting by skip counting backwards by 10s from up to 100	• use concrete materials, models, drawings, number lines/charts to skip count backwards by 10s • recognise an error in the skip counting sequence
5	Counting by skip counting forwards or backwards by 10s from zero up to 100	• use concrete materials, models, drawings, number lines/charts to skip count forwards ad backwards by 10s from zero • recognise an error in the skip counting sequence

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Number and Algebra

Develop confidence with number sequences to and from 100 by ones from any starting point. Skip count by twos, fives and tens starting from zero (ACMNA012)		
Quest: Whole number – skip counting		
Learning Journey Skip count by 2s, 5s and 10s		
Steps	**Content**	**Detail**
1	Counting by skip counting in 2s, 5s, 10s from zero to 50	• use concrete materials, models, drawings, number lines/charts to skip count by 2s, 5s, 10s from zero
2	Finding 'how many' objects using skip counting by 2, 5 or 10 up to 50	• use skip counting by 2, 5 or 10 to determine 'how many' when objects are grouped or shared equally
3	Counting by skip counting in 2s, 5s, 10s from zero to 100	• use concrete materials, models, drawings, number lines/charts to skip count by 2s, 5s, 10s from zero
4	Finding 'how many' objects using skip counting by 2, 5 or 10 up to 100	• use skip counting by 2, 5 or 10 to determine 'how many' when objects are grouped or shared equally
Count collections to 100 by partitioning numbers using place value (ACMNA014)		
Quest: Whole number – counting collections		
Learning Journey Count collections 0 to 100		
1	Counting collections 0 to 100	• count everyday concrete materials using one-to-one correspondence
Learning Journey Use groups of 10 to count large collections		
1	Using groups of ten to count large collections	• count by systematically organising collections into groups of tens and then skip counting in tens • record and describe the count, eg 'there are 4 groups of ten and 3 left over'
Learning Journey Identify place value up to 2 digits		
1	Identifying the place value of digits in 2-digit numbers	• write the numeral for a 2-digit number modelled using place value equipment • identify the digit in the tens or ones column for a given 2-digit number
Learning Journey Solve problems using place value up to 2 digits		
1	Solve problems using place value with 2-digit numbers	• identify, record and model a number using place value clues, eg 'a 5 in the tens and a 2 in the ones' as 52 • create the smallest and largest possible number using 2 digits
Learning Journey Partition 2-digit numbers (standard)		
1	Using place value to partition 2-digit numbers	• use place value equipment and models, eg tens frames, to partition a given 2-digit number into tens and ones • model and describe a 2-digit number in both words and numerals, eg 53 as '5 tens and 3 ones' or '50 and 3' • model a number expressed in words, eg '6 tens and 2 ones'
Learning Journey Partition 2-digit numbers (standard)		
1	Partitioning 2-digit numbers using non-standard partitioning	• use place value equipment and models, eg tens frames, to partition a given 2-digit number using non-standard partitioning, eg 35 as 2 tens and 15 ones • model and identify a number from non-standard partitioning, eg recognise 4 tens and 13 ones as 53

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Number and Algebra

Steps	Content	Detail
Recognise, model, read, write and order numbers to at least 100; locate these numbers on a number line (ACMNA013)		
Quest: Whole number – place value		
Learning Journey Model, read, write and count 2-digit numbers		
1	Representing 2-digit numbers using words, numerals and objects	• write the numerals and words, eg 'fifty three' for a 2-digit number represented using place value equipment or using pictures, drawings
2	Counting in tens and ones	• count in tens and then ones along a partially labelled number line to place a number, up to 100 • use clues to identify a number on a number line, eg 3 tens and 7 ones as 37 • count in tens and ones on a partially labelled number chart to position a number up to 100
Learning Journey Compare and order numbers to 100		
1	Comparing numbers to 100	• model and compare two 2-digit numbers using place value equipment • compare two 2-digit numbers
2	Ordering numbers to 100	• order up to 4 consecutive numbers within 100 from smallest to largest or largest to smallest;- explain the reason for the order given • order up to 4 non-consecutive numbers within 100 from smallest to largest or largest to smallest;- explain the reason for the order given
Learning Journey Round numbers up to 100		
1	Rounding numbers up to 100 to the nearest 10	• model a 2-digit number and recognise which ten it is nearer to;- explain reasoning • round a 2-digit number to the nearest 10;- explain reasoning
Learning Journey Solve problems with 2-digit numbers on number lines		
1	Solving place value problems with 2-digit numbers	• use clues to identify numbers on a number line, eg use a number line to find out how many jumps of 10 from 12 make 52 • use clues to identify a number on a number chart starting from any number, eg starting from 14 count on 4 groups of 10 to identify the new number
Recognise, describe and order Australian coins according to their value (ACMNA017)		
Quest: Whole number – money		
Learning Journey Recognise Australian coins		
1	Recognising coins | Australia	• recognise the monetary value of Australian coins • order Australian coins by value
Represent and solve simple addition and subtraction problems using a range of strategies, including counting on, partitioning and rearranging parts (ACMNA015)		
Quest: Addition and subtraction		
Learning Journey Model and record combinations that make 5 – 9		
1	Modelling and recording combinations that add up to 5	• model and record with numerals, the patterns of numbers that add to 5 • find the missing number to add to 5 when one number is given
2	Modelling and recording combinations that add up to 6	• model and record with numerals, the patterns of numbers that add to 6 • find the missing number to add to 6 when one number is given
3	Modelling and recording combinations that add up to 7	• model and record with numerals the patterns of numbers that add to 7 • find the missing number to add to 7 when one number is given
4	Modelling and recording combinations that add up to 8	• model and record the patterns of numbers that add to 8 • find the missing number to add to 8 when one number is given
5	Modelling and recording combinations that add up to 9	• model and record the patterns of numbers that add to 9 • find the missing number to add to 9 when one number is given

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Represent and solve simple addition and subtraction problems using a range of strategies, including counting on, partitioning and rearranging parts (ACMNA015)		
Quest: Addition and subtraction		
Learning Journey Model and record combinations that make 11 – 20		
Steps	**Content**	**Detail**
1	Modelling and recording combinations that add to numbers from 11 to 20	• model and recognise the relationship between numbers to 10 and numbers to 20 using models eg tens frames eg 5 + 4 = 9 and 15 + 4 = 19 • use the additions to 10 to record the combinations of numbers that add to between 11 and 20
Learning Journey Recognise and recall bonds to 10		
1	Recognising and recalling bonds to 10	• recognise pairs of numbers that add to 10 • find the missing number to add to 10 given one number • recall and record the bonds that add to 10
Learning Journey Add zero to a number (up to 20)		
1	Adding zero to a number (up to 20)	• investigate and recognise the effect of adding zero to a number;- generalise that adding zero does not change the number
Learning Journey Introduce the commutative property of addition		
1	Introducing the commutative property of addition	• represent and solve an addition problem both ways using concrete materials and models eg 5 + 4 or 4 + 5 • swap an addition problem around so the larger number comes first and add by counting on (within 20)
Learning Journey Add and subtract by counting on/back up to 100		
1	Counting on and back to add and subtract up to 100	• count on or back to add and subtract with numbers up to 100
Learning Journey Add doubles up to 20		
1	Recalling doubles up to 10	• recall doubles and add doubles to 10 fluently
2	Adding doubles up to 20	• add doubles with and without using models (up to 20)
Learning Journey Add and subtract near doubles		
1	Adding doubles or near doubles	• solve addition problems using doubles, eg 4 + 3 + 4 as 4 + 4 + 3 • model and solve addition problems with near doubles, eg 5 + 7 as 5 + 5 + 2 = 12
2	Subtracting using doubles	• model and solve subtraction problems using doubles, eg 14 - 7 as 7 + 7 = 14 or 15 - 8 as 7 + 7 + 1 = 15
Learning Journey Find the difference between 2 numbers (to 20)		
1	Finding the difference between 2 numbers (up to 20)	• represent two numbers using concrete materials and a number line eg place value equipment and a number line;- compare the materials and count from the smaller number to find the difference • find the missing number in an addition problem eg 4 + ? = 9 • solve word problems which involve finding the difference between two numbers
Learning Journey Add compatible numbers (doubles or bonds to 10)		
1	Adding using compatible numbers and manipulatives for support	• find compatible numbers (bonds to 10 or doubles) to add a list of 1-digit numbers, eg 6 + 3 + 4 + 3

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Represent and solve simple addition and subtraction problems using a range of strategies, including counting on, partitioning and rearranging parts (ACMNA015)		
Quest: Addition and subtraction		
Learning Journey Add and subtract using bridging to 10 up to 100		
Steps	**Content**	**Detail**
1	Bridging to ten to add a 1-digit and 1-digit number using models and diagrams	• add to the nearest ten first then add the rest, using models for support, eg 8 + 7 as 8 + 2 = 10 and 10 + 5 = 15 • record the strategy of bridging to ten using numbers and/or models, eg number lines
2	Bridging to ten to add a 2-digit and 1-digit number using models and diagrams	• add to the nearest ten first then add the rest, using models for support, eg 28 + 7 as 28 + 2 = 30 and 30 + 5 = 35 • record the strategy of bridging to ten using numbers and/or models, eg number lines
3	Bridging to ten to subtract a 1-digit number from a 2-digit number using models and diagrams	• subtract to the nearest ten first then subtract the rest, using models for support, eg 32 - 6 as 32 - 2 = 30 and 30 - 4 = 26 • record the strategy of bridging to ten using numbers and/or models eg number lines
4	Bridging to ten to mentally add or subtract a 1-digit and 2-digit number	• use bridging to ten to solve addition and subtraction problems with 1- and 2-digit numbers • use bridging to ten to solve addition and subtraction problems with 1- and 2-digit numbers where the change is unknown, eg 25 + ? = 32
Learning Journey Add using place value up to 100		
1	Adding 2-digit and 1-digit numbers using place value partitioning with models (split strategy)	• model and solve the addition of a 2-digit and 1-digit number using place value equipment, eg use base 10 blocks to show 25 + 8 as 20 + 5 + 8 and then 20 + 13 = 33
2	Adding 2-digit and 1-digit numbers using place value understanding (split strategy)	• mentally solve the addition of a 2-digit and 1-digit number using place value partitioning
Learning Journey Solve addition and subtraction word problems		
1	Creating and solving simple addition and subtraction word problems in context (within 20)	• represent a word problem as an addition or subtraction number sentence • solve a variety of simple addition and subtraction word problems in context, eg find the difference, find the sum, change unknown, start unknown simple addition and subtraction word problems
Learning Journey Explore equality and inequality up to 10 and 20		
1	Exploring equality and inequality (up to 10)	• create a set in which the number of objects is greater than, less than or equal to the number of objects in a given set • determine if 2 given concrete sets are equal or unequal and explain the process used
2	Exploring equality and inequality (up to 20)	• create a set in which the number of objects is greater than, less than or equal to the number of objects in a given set • determine if 2 given concrete sets are equal or unequal and explain the process used
3	Recognising equality in addition and subtraction number sentences using objects and models for support	• determine if equations involving addition or subtraction are true or false, eg 6 = 6, 7 = 8 - 1, 5 + 2 = 2

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Steps	Content	Detail
Recognise and describe one-half as one of two equal parts of a whole (ACMNA016)		
Quest: Fractions and decimals		
Learning Journey Find half of a set or quantity (no symbols)		
1	Finding half of a set or quantity (no symbols)	• find half of a set using equal sharing • find halves of quantities (up to 10) • find the whole from a half
Learning Journey Find half of a set or quantity (symbols)		
1	Finding half of a set or quantity (symbols used)	• find half of a set using equal sharing • find halves of quantities (up to 10) • find the whole from one half • use the symbols to represent the fraction 1/2
Investigate and describe number patterns formed by skip counting and patterns with objects (ACMNA018)		
Quest: Patterns and algebra		
Learning Journey Explore repeating numeric patterns		
1	Identifying, extending and describing repeating numeric patterns	• identify and extend through investigation, numeric repeating patterns, eg 1, 2, 1, 2, 1, 2, • describe numeric repeating patterns in a hundreds chart
Learning Journey Explore repeating patterns with objects		
1	Recognising and describing repeating patterns with objects and symbols	• recognise and describe repeating patterns using objects and symbols;- recognise and correct errors in patterns
2	Copying repeating patterns using objects and symbols	• copy repeating patterns using objects and symbols
3	Continuing repeating patterns with objects and symbols	• continue repeating patterns using objects and symbols
Learning Journey Relate number and object patterns		
1	Relating patterns with objects and symbols to number patterns	• describe and relate a pattern to the corresponding number pattern, eg circle, square, circle, square ... is a 'two pattern' • skip count to count the total objects in a pattern, eg count the total number of objects in a 'two pattern' by skip counting the groups of objects in 2s
Learning Journey Explore number patterns (1, 2, 5, 10)		
1	Exploring skip counting patterns with multiples of 1s, 2s, 5s and 10s using concrete materials	• identify and describe patterns when skip counting forwards or backwards by 1s, 2s, 5s and 10s from any starting point, eg 'all these numbers end in five or zero' • investigate and solve problems based on number patterns
2	Representing and describing number patterns (2s, 5s or 10s)	• represent number patterns (skip counting in multiples of 1s, 2s, 5s or 10s from any number) on a number line or number chart • describe the number pattern represented, eg 'this number pattern goes up in 5s'
Learning Journey Additive and subtractive patterns (within 5)		
1	Recognising and describing additive and subtractive number patterns (within 5)	• recognise and describe given number patterns that increase or decrease, eg 'the numbers are going up'
2	Copying additive and subtractive number patterns (within 5)	• copy given number patterns that increase or decrease, eg 1, 2, 3, 4, ... 20, 18, 16, 14, ...
3	Extending additive and subtractive number patterns (within 5)	• continue given number patterns that increase or decrease, eg 1, 2, 3, 4, ... 20, 18, 16, 14, ...

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Number and Algebra

Investigate and describe number patterns formed by skip counting and patterns with objects (ACMNA018)		
Quest: Patterns and algebra		
Learning Journey Odd and even number patterns (up to 20)		
Steps	**Content**	**Detail**
1	Modelling odd and even number patterns up to 20	• model odd and even numbers using objects such as counters paired in 2 rows • describe the pattern created using the terms 'odd' or 'even' numbers

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Steps	Content	Detail
Measure and compare the lengths and capacities of pairs of objects using uniform informal units (ACMMG019)		
Quest: Length		
Learning Journey Explore informal units of length and distance		
1	Exploring uniform informal units of length and distance	• identify appropriate uniform informal units to measure lengths and distances, eg paper clips instead of craft sticks to measure a pencil;- explain the relationship between the size of a unit and the number of units needed, eg more paper clips than craft sticks will be needed to measure the length of the desk • record lengths using informal units, eg the pencil is __ units long • recognise the need for uniform units and the need to place the units end-to-end without gaps or overlaps
2	Measuring length using unit iteration	• record lengths and distances by referring to the number and type of uniform informal unit used
3	Measuring lengths and distances with uniform informal units	• identify the length of an object or shape • record lengths and distances by referring to the number and type of uniform informal unit used
Learning Journey Explore volume and capacity using informal units		
1	Describing volume and capacities	• use the terms 'full', 'empty' and 'about half-full', 'quarter full', 'more than', 'less than' to describe the amount of substance in a container
2	Exploring and explaining volume and capacity with uniform informal units	• use uniform informal units to measure the volume of containers;- pack cubic units (eg blocks) into rectangular containers so that there are no gaps • recognise and select appropriate uniform informal units to measure the volume/ capacity of containers, eg using cups rather than teaspoons to fill a bucket • explain the relationship between the size of a unit and the number of units needed, eg more cups than ice cream containers will be needed to fill a bucket
Learning Journey Measure volume and capacity (informal units)		
1	Estimating, measuring and recording volume and capacity with informal units	• record volumes/capacities by referring to the number and type of uniform informal unit used
Tell time to the half-hour (ACMMG020)		
Quest: Time – telling the time		
Learning Journey Tell time to the hour and half hour (analogue)		
1	Telling time to the hour and half hour (analogue)	• observe and describe the coordinated movements of the hands on an analogue clock as time progresses in half-hour intervals • describe the position or draw of the hands of an analogue clock when reading time to the half hour • read time on analogue clocks to the half hour using the terms 'o'clock' and 'half past' • position or draw the hands on an analogue clock to show time to the half-hour where the time is given using the terms 'o'clock' or 'half-past' • relate hour and half hour times and the duration of a half hour to everyday events;- develop a personal reference for a half hour
Learning Journey Tell time to the hour and half hour (digital)		
1	Telling time to the hour and half hour (digital)	• read time on 12-hour digital clocks to the half-hour using the terms 'o'clock' and 'half past' • connect 12-hour digital displays for times to the half-hour to their corresponding display on an analogue clock • record times on analogue clocks to the half-hour in 12-hour digital format • relate hour and half hour times and the duration of a half hour to everyday events;- develop a personal reference for a half hour • position or draw the hands on an analogue clock to show time to the half-hour where the time is given in 12-hour digital format

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Steps	Content	Detail
Describe duration using months, weeks, days and hours (ACMMG021)		
Quest: Time – describe duration		
Learning Journey Describing duration (hours)		
1	Introducing formal units for time: hours	• identify situations where hours are an appropriate unit for measuring the duration of time • identify the relationship between half hours and hours • compare durations in hours
Recognise and classify familiar two-dimensional shapes and three-dimensional objects using obvious features (ACMMG022)		
Quest: Two-dimensional shapes		
Learning Journey Sort quadrilaterals from other 2D shapes		
1	Introducing quadrilaterals	• recognise all regular and irregular closed 4-sided shapes as quadrilaterals • sort quadrilaterals from other two-dimensional shapes
Learning Journey Identify, sort and name octagons		
1	Introducing octagons	• identify, sort and name octagons in different orientations, including octagons in their environment
Learning Journey Identify, sort and name pentagons		
1	Introducing pentagons	• identify, sort and name pentagons in different orientations, including pentagons in their environment
Learning Journey Identify, sort and name hexagons		
1	Introducing hexagons	• identify, sort and name hexagons in different orientations, including hexagons in their environment
Learning Journey Identify and name simple 2D shapes		
1	Identifying and naming two-dimensional shapes	• identify and name two-dimensional shapes including octagons, pentagons, circles, hexagons, triangles and quadrilaterals by their number of sides • select a shape from a description of its features, eg number of sides or vertices • identify and name shapes in pictures, designs and the environment
2	Identifying and naming shapes embedded in pictures, designs and the environment	• Identify shapes embedded in pictures
Learning Journey Compare, describe and sort simple 2D shapes		
1	Comparing and describing two-dimensional shapes	• manipulate, compare and describe similarities and differences between two-dimensional shapes including octagons, pentagons, circles, hexagons, triangles and quadrilaterals • identify and describe the number of sides
2	Sorting two-dimensional shapes	• sort regular and irregular two-dimensional shapes in various orientations including octagons, pentagons, circles, hexagons, triangles, quadrilaterals using a given attribute, eg number of sides or vertices
Learning Journey Identify vertical and horizontal lines		
1	Introducing vertical and horizontal lines	• identify and name vertical and horizontal lines in pictures and the environment
Learning Journey Identify parallel lines		
1	Introducing parallel lines	• identify and name parallel lines in pictures and the environment • recognise that parallel lines can occur in orientations other than vertical and horizontal

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Recognise and classify familiar two-dimensional shapes and three-dimensional objects using obvious features (ACMMG022)		
Quest: Three-dimensional objects		
Learning Journey Explore surfaces and faces		
Steps	**Content**	**Detail**
1	Introducing surfaces	• manipulate three-dimensional objects and identify the type and number of flat and curved surfaces, eg 'The prism has eight flat surfaces' • sort three-dimensional objects by the type and number of flat and curved surfaces
2	Introducing faces	• identify and describe the number and shape of faces on a cube, rectangular prism or triangular prism • select a three-dimensional object from a description of its faces, eg '6 square faces'
Learning Journey Recognise and describe spheres		
1	Introducing spheres	• recognise spheres in the environment and drawings • select spheres from other three-dimensional objects using a description, 'round and rolls';- name the shape
Learning Journey Recognise and describe cones		
1	Introducing cones	• recognise cones in the environment and drawings, including different orientations • manipulate and describe cones as having 1 flat surface and 1 curved surface • select cones from other three-dimensional objects using a description, '1 flat surface and 1 curved surface';- name the shape
Learning Journey Recognise and describe cubes		
1	Introducing cubes	• recognise cubes in the environment and drawings, including different orientations • select cubes from other three-dimensional objects using a description, eg '6 square faces';- name the shape
Learning Journey Recognise and describe cylinders		
1	Introducing cylinders	• recognise cylinders in the environment and drawings, including different orientations • manipulate and describe cylinders as having 2 flat surfaces and 1 curved surface • select cylinders from other three-dimensional objects using a description, eg '2 flat surfaces and 1 curved surface', name the shape
Learning Journey Recognise, sort and name 3D objects		
1	Recognising and naming three-dimensional objects	• recognise common three-dimensional shapes in the environment and drawings, including different orientations • name common three-dimensional shapes
2	Sorting familiar three-dimensional objects — cones, cubes, spheres, cylinders, prisms	• sort familiar three-dimensional objects using given attributes
3	Comparing three-dimensional objects to everyday objects	• identify common three-dimensional objects in everyday objects, eg cans, balls, boxes
Learning Journey Recognise and describe prisms (no formal names)		
1	Introducing prisms	• recognise prisms in the environment and drawings, including different orientations • manipulate and describe prisms as having identical bases and rectangular faces • select prisms from other three-dimensional objects using a description, eg 'rectangular faces';- name the shape (as prism only)

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Give and follow directions to familiar locations (ACMMG023)		
Quest: Position		
Learning Journey Position using left, right and ordinal numbers		
Steps	**Content**	**Detail**
1	Describing position using more than 1 descriptor	• describe the location of objects in a given structure using more than 1 descriptor, including 'from the left' and 'from the right' and ordinal number words • locate objects in a given structure given a description involving more than 1 descriptor, including 'from the left' and 'from the right' and ordinal number words
2	Establishing and understanding left and right from opposite direction	• describe the position of an object as to the left or right of a person facing in the same direction as themselves • describe the position of an object as to the left or right of a person facing in the opposite direction to themselves
4	Following given directions	• follow directions to position an object in a structure or picture
5	Describing the path from one location to another on drawings.	• Use a diagram to give simple directions. • Create a path from one location to another.

Australian Curriculum Year 1

Understanding Practice and Fluency (UPF)

Statistics and Probability

Steps	Content	Detail
Identify outcomes of familiar events involving chance and describe them using everyday language, such as 'will happen', 'won't happen' or 'might happen' (ACMSP024)		
Quest: Chance		
Learning Journey Use the everyday language of chance		
1	Exploring possible outcomes of familiar events and activities	• use everyday language to describe the possible outcomes of familiar activities and events, eg 'will happen', 'might/could happen', 'won't happen', 'probably'
Choose simple questions and gather responses and make simple inferences (ACMSP262)		
Quest: Gathering data		
Learning Journey Ask suitable questions for data collection		
1	Asking questions and collecting simple data with support	• choose a suitable question for a given matter of interest involving category data, eg 'How did the children in Room 3 come to school?'
Learning Journey Complete tally charts		
1	Introducing and completing tally charts	• collect and sort data using a simple given tally chart
Represent data with objects and drawings where one object or drawing represents one data value and describe the displays (ACMSP263)		
Quest: Representing data		
Learning Journey Represent data in a simple display		
1	Representing category or discrete data using simple displays	• use concrete materials or pictures of objects as symbols to create data displays where 1 object or picture represents 1 data value (one-to-one correspondence), eg use different-coloured blocks to represent different-coloured cars • record data in prepared graphic organisers such as simple block charts, pictograms or other diagrams
Learning Journey Read simple data displays using objects		
1	Interpreting basic data displays including tally charts, tables and data displays with concrete materials	• describe information presented in tables, lists or other simple data displays using comparative language such as 'more than' and 'less than', eg 'There were more black cars than red cars'

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Number and Algebra

Investigate number sequences, initially those increasing and decreasing by twos, threes, fives and tens from any starting point, then moving to other sequences (ACMNA026)		
Quest: Whole number – counting		
Learning Journey Count in ones up to 1000		
Steps	**Content**	**Detail**
1	Counting forwards in ones within 1000	• count forwards in ones between 100 and 1000, starting from any number • identify missing numbers in the hundreds on a number line up to 1000
2	Counting backwards in ones within 1000	• count backwards in ones between 100 and 1000, starting from any number • identify missing numbers in the hundreds on a number line up to 1000
3	Counting forwards and backwards in ones within 1000	• count forwards and backwards in ones between 100 and 1000, starting from any number • identify missing numbers in the hundreds on a number line up to 1000
Learning Journey Identify numbers before and after up to 1000		
1	Identifying numbers before and after within 1000	• identify the number that comes before a given 3-digit number up to 1000;- describe this number as 'one more than' • identify the number that comes after a given 3-digit number up to 1000;- describe this numbers as 'one less than' • identify the number that comes before or after a given 3-digit number up to 1000;- describe this number as 'one more than' or 'one less than'
Quest: Whole number – sequences		
Learning Journey Identify, describe and continue number sequences		
1	Identifying and describing number patterns (1s, 2s, 5s, 10s, 25s) up to 100	• identify and describe growing and shrinking patterns generated by the repeated addition or subtraction of 1s, 2s, 5s, 10s or 25s on a number line or number chart
2	Counting forwards and backwards by 2s, 3s and 5s from any starting point	• count forwards and backwards by 2s from any starting point • count forwards and backwards by 5s from any starting point • count forwards and backwards by 3s from any starting point • identify sequences in 2s, 3s, or 5s in a number chart
Learning Journey Count in tens with 2- and 3-digit numbers		
1	Counting in tens with 2-digit numbers, on the decade, using number lines and charts	• count forwards and backwards in tens, on the decade, with 2-digit numbers using number lines • count forwards and backwards in tens, on the decade, with 2-digit numbers using number charts
2	Counting in tens with 3-digit numbers using number lines and charts	• count forwards and backwards in tens, on the decade, with 3-digit numbers using number lines and number charts • count forwards and backwards in tens, on the decade, with 3-digit numbers using number charts
3	Counting in tens from any number with 2-digit numbers	• count forwards and backwards in tens, off the decade, with 2-digit numbers using number linea count forwards and backwards in tens, off the decade, with 2-digit numbers using number lines • count forwards and backwards in tens, off the decade, with 2-digit numbers using number charts s
4	Counting in tens from any number with 3-digit numbers	• count forwards and backwards in tens, off the decade, with 3-digit numbers using number lines • count forwards and backwards in tens, off the decade, with 3-digit numbers using number charts
Learning Journey Find numbers 10 before and 10 after up to 1000		
1	Finding numbers 10 before and 10 after a 2-digit number on the decade	• find the number '10 before' or '10 after' a given 2-digit on the decade number using number lines and number charts
2	Finding numbers 10 before and 10 after a 2-digit and 3-digit number off the decade	• find the number '10 before' or '10 after' a given 2-digit or 3-digit number off the decade, using number lines and number charts

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Number and Algebra

Recognise, model, represent and order numbers to at least 1000 (ACMNA027)		
Quest: Whole number – place value		
Learning Journey Read and represent 3-digit numbers		
Steps	**Content**	**Detail**
1	Reading and writing 3-digit numbers using numeral only	• read a given 3-digit number in words, eg 456 says 'four hundred and fifty-six'
2	Reading and writing 3-digit numbers using words and numerals	• write a given 3-digit number in words, eg 456 as four hundred and fifty-six • write the numerals for a 3-digit number given in words
3	Representing 3-digit numbers using words, numerals and objects	• model a given 3-digit number using concrete materials, pictures or drawings • write the numerals and words, eg 'two hundred and fifty-three' for a 3-digit number represented using place value equipment or using pictures and drawings
Learning Journey Compare and order numbers to 1000		
1	Comparing numbers to 1000	• model and compare two 3-digit numbers using place value equipment • compare two 3-digit numerals;- describe as 'more than' or 'less than', 'smaller than', greater than'
2	Ordering numbers to 1000	• order up to 4 consecutive numbers within 1000 in ascending order or descending order;- explain the reason for the order given • order up to 4 non-consecutive numbers within 1000 in ascending order;- explain the reason for the order given
Group, partition and rearrange collections of up to 1000 in hundreds, tens and ones to facilitate more efficient counting (ACMNA028)		
Quest: Whole number – partition and group		
Learning Journey Identify place value in 3-digit numbers		
1	Identifying the place value of digits in 3-digit numbers	• write the numeral for a 3-digit number modelled using place value equipment • identify the digit in the hundreds, tens or ones column for a given 3-digit number • recognise that the value of the digit is determined by its place value, eg in 689 the digit 8 has a place value of tens and a total value of 80 • identify, record and model a number using place value clues, eg 'a 5 in the hundreds and a 2 in the ones' as 502 • recognise the role of zero as a placeholder • create the smallest and largest numbers possible using 3 digits
Learning Journey Count in hundreds, tens and ones		
1	Counting in hundreds, tens and ones	• count in hundreds, tens and then ones along a partially labelled number line to place a number between 100 and 1000 • use clues to identify a number between 100 and 1000 on a number line, eg 3 hundreds, 5 tens and 7 ones as 357 • count in hundreds, tens and ones on a partially labelled number chart to position a number between 100 and 1000
Learning Journey Partition 3-digit numbers (standard)		
1	Using place value to partition 3-digit numbers	• use place value equipment to partition a given 3-digit number into hundreds, tens and ones • describe a 3-digit number using words, eg 523 as '5 hundreds, 2 tens and 3 ones' • write a 3-digit number in expanded notation, eg 523 as 500 + 20 + 3 • write the numeral for a number represented by expanded notation • recognise zero as a placeholder

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Group, partition and rearrange collections of up to 1000 in hundreds, tens and ones to facilitate more efficient counting (ACMNA028)		
Quest: Whole number – partition and group		
Learning Journey Partition 3-digit numbers (non-standard)		
Steps	**Content**	**Detail**
1	Partitioning 3-digit numbers using non-standard partitioning	• use place value equipment to partition a given 3-digit number using non-standard partitioning, eg 375 as 2 hundreds and 175 ones or 200 + 175 • model and identify a number from non-standard partitioning, eg recognise 3 hundreds, 4 tens and 27 ones or 300 + 40 + 27 as 367
Learning Journey Round numbers up to 1000 to the nearest 100		
1	Rounding numbers up to 1000 to the nearest 100	• model a 3-digit number and recognise which hundred it is nearer to;- explain reasoning • round a 3-digit number to the nearest 100, recognise the digit in the tens column as the key digit
Count and order small collections of Australian coins and notes according to their value (ACMNA034)		
Quest: Whole number – money		
Learning Journey Count and order Australian notes and coins		
1	Recognising notes and coins | Australia	• recognise the value of all Australian coins and notes • recognise that there are 100 cents in 1 dollar • recognise and generate combinations of the same and different denominations of coins that make $1
2	Counting totals using notes and coins of the same denomination| Australia	• determine the total amount of money by counting the value of notes of the same denomination
3	Using notes and coins to make amounts | Australia	• combine amounts of notes and coins to make a given amount of money shown in dollars and cents (no decimal point)
4	Calculating totals of notes and coins and record using symbols| Australia	• calculate the total value of a group of notes and coins and record this value in dollars and cents using the correct symbols (no decimal point)
5	Recognising that the same value can be created using different combinations of coins | Australia	• generate and recognise different combinations of coins that have the same value (combining coins of the same denominations and different denominations) and record these using the symbol c
	Recognising that the same value can be created using different combinations of notes | Australia	• generate and recognise different combinations of notes that have the same value (combining notes of the same denominations and different denominations) and record these using the symbol $
Explore the connection between addition and subtraction (ACMNA029)		
Quest: Addition and subtraction relationship		
Learning Journey Find fact families for addition and subtraction		
1	Finding fact families for addition and subtraction (between 10 and 20)	• find the other three facts given one fact, eg 12 + 5 = 17
2	Finding fact families for addition and subtraction (within 30)	• find the other three facts given one fact, eg 12 + 5 = 17

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Solve simple addition and subtraction problems using a range of efficient mental and written strategies (ACMNA030)		
Quest: Addition and subtraction strategies		
Learning Journey Use mental strategies to add and subtract (to 100)		
Steps	**Content**	**Detail**
1	Adding with 1 digit to/from 2-digit numbers using efficient mental strategies (max sum 100)	• select, use and record an efficient strategy to solve an addition problem, eg counting on, bridging to ten, split strategy, jump strategy, place value
2	Subtracting with 1 digit to/from 2-digit numbers using efficient strategies	• select, use and record an efficient strategy to solve the subtraction of a 1-digit number from a 2-digit number, eg counting back, bridging to ten, inverse relationship with addition, jump strategy (max sum 100)
3	Adding and subtracting 1 digit to/from 2-digit numbers using efficient strategies (max sum 100)	• select, use and record an efficient strategy to solve an addition or subtraction problem (max sum 100)
Learning Journey Add and subtract tens from a 2-digit number		
1	Adding tens to a 2-digit number using models and/or equipment for support	• add ten and multiples of ten to a give 2-digit number, eg 36 + 20 = 56 (max sum 100)
2	Subtracting tens from a 2-digit number using models and/or equipment for support	• subtract ten and multiples of ten to a give 2-digit number, eg 36 - 20 = 16 (max sum 100)
Learning Journey Introduce place value to add and subtract (to 200)		
1	Introducing the addition of two 2-digit numbers using place value partitioning on a number line (jump strategy)	• use an empty number line to model and solve the addition of two 2-digit numbers, eg solve 35 + 43 as 35 + 10 + 10 + 10 + 10 = 75 then 75 + 1 + 1 + 1 = 78 (max sum 100)
2	Introducing subtraction of two 2-digit numbers using place value partitioning on a number line (jump strategy)	• use an empty number line to model and solve the subtraction of two 2-digit numbers by counting back, eg solve 52 ? 23 as 52 ? 10 ? 10 = 32 then 32 ? 1 ? 1 ? 1 = 29 (max sum 100)
3	Introducing the mental addition and subtraction of two 2-digit numbers using place value understanding (jump strategy)	• mentally solve the addition or subtraction of two 2-digit numbers using place value partitioning (max sum 100)
Learning Journey Use place value to add and subtract (to 200)		
1	Adding two 2-digit numbers using place value partitioning on a number line (jump strategy)	• use an empty number line to model and solve the addition of two 2-digit numbers, eg solve 35 + 43 as 35 + 40 = 75 then 75 + 3 = 78
2	Subtracting two 2-digit numbers using place value partitioning on a number line (jump strategy)	• use an empty number line to model and solve the subtraction of two 2-digit numbers by counting back, eg solve 52 ? 23 as 52 ? 20 = 32 then 32 ? 3 = 29 (max sum 100)
3	Adding tens and ones using place value equipment and a split strategy (no crossing tens)	• model and solve the addition of two 2-digit numbers represented horizontally using place value equipment (not crossing ten), eg use base 10 blocks to model 34 + 12 as 30 + 10 and 4 + 2 (max sum 100)
4	Subtracting tens and ones using place value equipment and a split strategy (no crossing tens)	• model and solve the subtraction of two 2-digit numbers represented horizontally using place value equipment (not crossing ten), eg use base 10 blocks to model 34 ? 12 as 30 ? 10 and 4 ? 2
Learning Journey Use place value (no models) to add and subtract		
1	Adding and subtracting tens and ones mentally using place value understanding (no crossing tens)	• solve the addition or subtraction of two 2-digit numbers represented horizontally (no crossing ten) • check calculations by doing the inverse operation
2	Adding and subtracting two 2-digit numbers mentally using place value understanding	• mentally solve the addition or subtraction of two 2-digit numbers using a jump strategy, eg solve 35 + 43 as 35 + 40 = 75 then 75 + 3 = 78 (max sum 100) • check calculations by doing the inverse operation

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Number and Algebra

Steps	Content	Detail
Solve simple addition and subtraction problems using a range of efficient mental and written strategies (ACMNA030)		
Quest: Addition and subtraction strategies		
Learning Journey Use place value to add (crossing a 10)		
1	Adding two 2-digit numbers using place value models (split strategy)	• use place value equipment to model and solve the addition of two 2-digit numbers using standard partitioning, eg 37 + 45 as 30 + 40 and 5 + 7
Learning Journey Subtract using addition		
1	Subtracting two 2-digit numbers using addition	• recognise and model the inverse relationship between addition and subtraction • rearrange a subtraction problem into an addition problem with change unknown and then use an effective addition strategy to solve, eg using a jump strategy to solve 54 ? 38 as 38 + ? = 54 on a number line
Learning Journey Solve word problems with start or change unknown		
1	Solving addition and subtraction word problems where either the start or the is change unknown (1-digit and 2-digit numbers)	• solve word problems where the start is unknown, eg 'Anna had some plums. Sam gave her 5 more. Now she has 13 plums. How many did she have to start with?' • solve word problems where the change is unknown, eg 'Anna has 5 plums. How many more does she need to have 13?' or 'Anna had 13 plums. She gave some to Sam. Now she has 7 plums. How many plums did she give to Sam?' • solve word problems involving comparisons, eg Anna has 13 plums. Sam has 7 plums. How many more plums does Anna have? or Anna has 7 more plums than Sam. Sam has 5 plums. How many plums does Anna have?
Learning Journey Add and subtract using rounding and compensating		
1	Adding ten then compensating to add a single digit (7, 8 or 9) to a 1 or 2-digit number	• add ten first then subtract to compensate using models for support, eg 6 + 9 as 6 + 10 = 16 then 16 -1 = 15 • record the strategy adding ten then compensating to add a single digit (7,8 or 9) using numbers and/or models, eg number lines
2	Subtracting ten then compensating to subtract a single digit (7, 8 or 9) from a 2-digit number	• subtract ten first then add to compensate using models for support, eg 15 - 9 as 15 - 10 = 5 then 5 + 1 = 6 • record the strategy subtracting ten then compensating to subtract a single digit (7,8 o r9) using numbers and/or models, eg number lines
Recognise and represent multiplication as repeated addition, groups and arrays (ACMNA031)		
Quest: Mult/div – models, repeated addition		
Learning Journey Use repeated addition to multiply		
1	Using repeated addition to multiply	• recognise and describe the relationship between, eg 3 groups of 4 as 4 + 4 + 4 • use empty number lines and number charts to help solve multiplication problems using repeated addition (2s, 5s, 10s, 3s, 4s) • explore the use of repeated addition to count in practical situations • apply known facts, such as doubles, to repeated addition problems, eg 5 + 5 + 5 + 5 as 10 + 10
Learning Journey Explore arrays (no x symbol)		
1	Introducing arrays and describing arrays (no x symbol)	• describe simple multiplication problems represented in arrays using '_ groups of _' and use 'rows' and 'columns' to describe the parts of the array • represent simple multiplication problems using arrays (concrete materials, pictures or diagrams) • recognise and describe practical examples of arrays, eg seedling trays, seating arrangements

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Number and Algebra

Steps	Content	Detail
Recognise and represent multiplication as repeated addition, groups and arrays (ACMNA031)		
Quest: Mult/div – models, repeated addition		
Learning Journey Use the commutative property of multiplication		
1	Introducing the commutative property of multiplication	• use concrete materials or drawings of groups or arrays to model the commutative property, eg 3 groups of 2 is the same as 2 groups of 3
Represent division as grouping into equal sets and solve simple problems using these representations (ACMNA032)		
Quest: Mult-div – equal groups		
Learning Journey Divide by sharing and grouping		
1	Dividing by sharing (up to 50)	• model and solve division problems by equally sharing a collection into a given number of groups or number of columns/rows in an array • record answers to division problems using drawings, words and numerals;- complete stem sentences eg 'when _ is shared into _ equal groups there are _ in each group' • describe any parts left over when the collection is not able to be equally shared
2	Dividing by grouping (up to 50)	• model and solve division problems sharing a collection of objects into groups of a given size, and by arranging it into rows or columns of a given size in an array, eg determine the number of columns in an array when 20 objects are arranged into rows of 4 • record answers to division problems using drawings, words and numerals;- complete stem sentences, eg 'when _ is shared into _ equal groups there are _ in each group' • describe an parts left over when the collection is not able to be equally shared
Learning Journey Use repeated subtraction to divide		
1	Using repeated subtraction to divide	• solve division problems (group size known, number of groups unknown) using repeated subtraction and concrete materials, models or drawings of groups or arrays • use an empty number line or number chart to represent division problems as repeated subtraction (group size known ... number of groups unknown) • explore the use of repeated subtraction in practical situations
Learning Journey Solve simple multiplication problems (2,5,10x)		
1	Solving simple multiplication and division problems using models and manipulatives (2x, 5x, 10x)	• Solving simple multiplication and division problems using models and manipulatives (2x, 5x, 10x) • record answers to multiplication and division problems using drawings, words and numerals, eg '2 rows of 5 is 10'

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Number and Algebra

Recognise and interpret common uses of halves, quarters and eighths of shapes and collections (ACMNA033)		
Quest: Fractions and decimals		
Learning Journey Explore the meaning of fraction symbols		
Steps	**Content**	**Detail**
1	Understand the meaning of fraction symbols (no formal use of numerator or denominator)	• Recognise the top number tells how many parts are selected • recognise the bottom number tells how many parts the whole has been split into (the name of the fraction / size of the part) • recognise the larger denominator = smaller parts as the whole has been split into more pieces
Learning Journey Find quarters of sets or shapes (no symbols)		
1	Introducing quarters of objects, sets or shapes (no symbols)	• recognise objects, shapes or set shared into 4 equal parts • recognise that the same shape or object can be shared into 4 equal parts in different ways • find the whole given quarter(s) • use language 'one quarter', 'two quarters' and so on;- use words to describe fractions of sets and quantities eg 'one quarter of 12 is 3'
2	Find quarters by halving	• Find a quarter of a shape or region by halving and halving again • Find a quarter of a set by halving and having again, e.g. one quarter of 12 is 3, because 1/2 of 12 = 6 and 1/2 of 6 = 3
Learning Journey Find quarters of sets or shapes (symbols)		
1	Introducing quarters of objects, sets or shapes (symbols used)	• recognise objects, shapes or set shared into 4 equal parts;- recognise that the same shape or object can be shared into 4 parts in different ways • find 1/4, 2/4 and 3/4 of objects, shapes, lengths or sets • find the whole given quarter(s) • use symbols to represent fractions: 1/4, 2/4, 3/4, 4/4 • record quarters of sets as a number sentence, eg 1/4 of 12 = 3
Learning Journey Find halves and quarters (no symbols)		
1	Finding halves and quarters of objects, shapes or sets (no symbols)	• recognise equivalence • find halves and quarters of objects and shapes • find halves and quarters of sets • find the whole from a part • find halves and quarters of uneven partitioned shapes • use language 'one half', 'two halves', 'one quarter', 'two quarters' and so on
2	Recognising equivalence between halves and quarters of objects, shapes or sets up to 1 (symbols used)	• relate halves and quarters and know that 1/2 is the same as 2/4 • know that there are 2 quarters in 1 half • show equivalent halves and quarters using concrete materials and models.
Learning Journey Find halves and quarters (symbols)		
1	Finding halves and quarters of linear models or sets (symbols used)	• find halves and quarters of objects and shapes • find halves and quarters of sets • find the whole from a part • find halves and quarters of uneven partitioned shapes • use language 'one half', 'two halves', 'one quarter', 'two quarters' and so on • use symbols to represent fractions: 1/2, 2/2, 1/4, 2/4, 3/4, 4/4
2	Recognising equivalence between halves and quarters of linear models or sets (symbols used)	• relate halves and quarters and know that 1/2 is the same as 2/4 • know that there are 2 quarters in 1 half • show equivalent halves and quarters using concrete materials and models.

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Number and Algebra

Steps	Content	Detail
Recognise and interpret common uses of halves, quarters and eighths of shapes and collections (ACMNA033)		
Quest: Fractions and decimals		
Learning Journey Find eighths of objects or shapes		
1	Introducing eighths of objects or shapes (no fractional notation)	• find eighths of objects and shapes • recognise equivalence with halves and quarters
2	Introducing eighths of objects or shapes	• find eighths of objects and shapes • recognise equivalence with halves and quarters • use the language of 'one eighth', 'two eighths' and so forth along with standard fractional notation
Learning Journey Find halves, quarters and eighths of shapes		
1	Finding halves, quarters and eighths of objects or shapes (no fractional notation)	• recognise equivalence • estimate the size of a fractional part before using, eg paper folding to check or estimate the size of the whole from the part • find the whole from a part • find halves, quarters and eighths of uneven partitioned shapes • recognise that the larger number of parts means that the parts are smaller
Describe patterns with numbers and identify missing elements (ACMNA035)		
Quest: Patterns		
Learning Journey Number patterns (1, 2, 5, 10, 25 up to 100)		
1	Identifying and describing number patterns (1s, 2s, 5s, 10s, 25s) up to 100	• identify and describe growing and shrinking patterns generated by the repeated addition or subtraction of 1s, 2s, 5s, 10s or 25s on a number line or number chart
Learning Journey Add or subtract patterns (within 10) up to 100		
1	Extending, completing and describing simple additive or subtractive number patterns with 1 operation (within 10) up to 100	• determine a missing number in a number pattern, eg 3, 7, 11, _, 19 • describe a number pattern in words, eg 'It goes up by 3s'
Solve problems by using number sentences for addition or subtraction (ACMNA036)		
Quest: Patterns and algebra		
Learning Journey Write simple number sentences		
1	Finding the missing number to make an addition or subtraction number sentence true (up to 18)	• complete number sentences involving 1 operation of addition or subtraction by finding the missing number using a variety of tools, equipment and strategies, eg using guess and check, eg 5 + (box symbol) = 13 or 15 - (box symbol) = 9
2	Writing number sentences to solve word problems (1-digit and 2-digit addition and subtraction)	• represent a word problem as an addition or subtraction number sentence

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Steps	Content	Detail
Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units (ACMMG037)		
Quest: Length		
Learning Journey Compare and order lengths using informal units		
1	Comparing and ordering the lengths of shapes and objects using uniform informal units	• identify the length of an object or shape • compare and order 2 or more shapes or objects that cannot be moved or aligned, according to their lengths, using an appropriate uniform informal unit
Quest: Area		
Learning Journey Compare and order areas (informal units)		
1	Comparing and ordering areas using uniform informal units (indirect comparison)	• compare two areas by measuring using uniform informal units • order three or more areas by measuring using uniform informal units • make statements of comparison about the relative size of three areas, eg if A is larger than B and B is larger than C, then A is larger than C
Learning Journey Measure and estimate area using square units		
1	Measuring and estimating areas of rectangles using a square unit	• establish usefulness of using a square unit to find an area as it allows for an array structure and does not have gaps or overlaps • compare the same area measured using different sized square unit • understand that the larger the unit square, the smaller the number of units needed and likewise the smaller the square unit, the larger the number of units needed
2	Measuring and estimating areas of rectilinear shapes using a square unit	• establish usefulness of using a square unit to find an area as it allows for an array structure and does not have gaps or overlaps • compare the same area measured using different sized square unit • understand that the larger the unit square, the smaller the number of units needed and likewise the smaller the square unit, the larger the number of units needed
Quest: Volume and capacity		
Learning Journey Compare and order volume using blocks		
1	Comparing and ordering volumes of models made from blocks	• compare and order the volumes of 2 or more models by counting the number of blocks used in each model • recognise that models with different appearances may have the same volume
Learning Journey Compare and order volume using displacement		
1	Comparing and ordering volumes through displacement	• compare and order the volumes of 2 or more objects by marking the change in water level when each is submerged
Compare the masses of objects using balance scales (ACMMG038)		
Quest: Mass		
Learning Journey Compare and order mass using informal units		
1	Comparing and ordering masses using uniform informal units	• find differences in mass by measuring and comparing, eg 'The pencil has a mass equal to 3 blocks and a pair of plastic scissors has a mass of 6 blocks, so the scissors are 3 blocks heavier than the pencil' • compare masses using simple multiples, eg twice and heavy, half as heavy

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Steps	Content	Detail
Tell time to the quarter-hour using the language of 'past' and 'to' (ACMMG039)		
Quest: Time - telling the time		
Learning Journey Tell time to the half and quarter hour		
1	Relating halves and quarters to telling time	• identify quarters and halves on a clock face • relate 'past' and 'to' to the halves of a clock face
2	Telling time to the quarter hour (analogue)	• observe and describe the coordinated movements of the hands on an analogue clock as time progresses in quarter hour intervals • describe the position or draw of the hands of an analogue clock when reading time to the quarter hour • read time on analogue clocks to the quarter-hour using the terms 'o'clock', 'half past', 'quarter past' and 'quarter to' and relate to knowledge of fractions
3	Telling time to the quarter hour (digital)	• read time on 12-hour digital clocks to the quarter-hour using the terms 'o'clock', 'half past', 'quarter past' and 'quarter to' • position or draw the hands on an analogue clock to show time to the quarter-hour where the time is given using the terms 'o'clock' or 'quarter-past' • record times on analogue clocks to the quarter-hour in 12-hour digital format • position or draw the hands on an analogue clock to show time to the quarter-hour where the time is given in 12-hour digital format
Name and order months and seasons (ACMMG040)		
Quest: Time – months and seasons		
Learning Journey Months of the year		
1		• name and order the months of the year • determine the month before or after a given month
2	Months of the year	• recall the number of days there are in each month
Learning Journey Know the seasons		
1	Introducing the seasons	• know that there are 4 seasons in a year • name and order the seasons of the year • know and recall the months for each season • recognise that the seasons are opposite in the opposite hemisphere of the planet
Use a calendar to identify the date and determine the number of days in each month (ACMMG041)		
Quest: Time - using a calendar		
Learning Journey Use a calendar to identify the date		
1	Introducing calendars	• identify elements of a conventional calendar (month, day, date) • identify a day and date using a conventional calendar • relate calendars to the parts of a written date
2	Using a calendar to solve simple problems involving months	• locate any given month on a calendar • use a calendar to determine the number of months between events • use a calendar to determine which month comes before/after a given month
Learning Journey Use calendars to solve simple problems		
1	Using calendars to solve problems	• locate any given date, including today's date, on a calendar • use a calendar to locate the date to match a given description, eg if today is Monday 8th April, then what is the date on Thursday?;- find the date of the third Thursday in March • use a calendar to determine the number of days, weeks or months until a future event or between events • use a calendar to calculate and describe lengths of time in days/ weeks

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Steps	Content	Detail
Describe and draw two-dimensional shapes, with and without the use of digital technologies (ACMMG042)		
Quest: Two-dimensional shapes		
Learning Journey Represent and describe regular polygons		
1	Representing and describing regular polygons	• name two-dimensional shapes in different orientations, eg triangles, quadrilaterals, pentagons, hexagons octagons and describe the number of angles and/or sides • name two-dimensional shapes in different orientations, eg triangles, quadrilaterals, pentagons, hexagons octagons and describe the number of angles and/or sides
Describe the features of three-dimensional objects (ACMMG043)		
Quest: Three-dimensional objects		
Learning Journey Compare 2D shapes and 3D objects		
1	Building three-dimensional structures	• describe the two-dimensional shapes that the structure contains
Learning Journey Identify faces, edges and vertices on 3D objects		
1	Introducing edges on three-dimensional objects	• identify and count the edges on everyday objects and cones, cylinders, prisms, spheres and cubes
2	Introducing vertices on three-dimensional objects	• identify and count the vertices on everyday objects and cones, cylinders, prisms, spheres and cubes
3	Identifying faces, edges, vertices of cones, cubes, prisms, cylinders and spheres	• identify and count the faces, edges and vertices on everyday objects and cones, cylinders, prisms, spheres and cubes
Learning Journey Faces, edges, vertices and surfaces of 3D objects		
1	Describing the attributes of cones, cubes, cylinders, spheres and prisms	• manipulate and describe the attributes of basic three-dimensional objects using attributes such as faces, edges, vertices, number and type of surfaces • select a three-dimensional object from a description, eg '6 faces, 12 edges and 8 vertices' • recognise that flat surfaces of three-dimensional objects are two-dimensional shapes and name the shapes of these surfaces
2	Sorting three-dimensional objects (cubes, prisms, spheres, cylinders)	• sort three-dimensional objects according to particular attributes, eg the shape of the surfaces or number of edges
Investigate the effect of one-step slides and flips, with and without the use of digital technologies (ACMMG045)		
Quest: Translations of shapes		
Learning Journey Translations of shapes (slides, flips, turns)		
1	Introducing transformations of shapes: Slides (translations)	• identify and describe a one-step slide of a shape using the term 'slide'
2	Introducing transformations of shapes: Flips (reflections)	• identify and describe a one-step flip of a shape using the term 'flip'
3	Transformations of shapes: Flips and slides	• identify a one-step slide or flip of a single shape and use the terms 'slide' and 'flip' to describe the movement of the shape • identify a one-step slide or flip of a single shape and use the terms 'slide' and 'flip' to describe the movement of the shape • recognise that sliding or flipping a shape does not change its size or features • recognise that sliding or flipping a shape does not change its size or features

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Identify and describe half-turns and quarter-turns (ACMMG046)		
Quest: Turns of shapes		
Learning Journey Turns of shapes		
Steps	**Content**	**Detail**
1	Introducing transformations of shapes: Turns (rotations)	• recognise and describe turns as 'clockwise' or 'anti-clockwise' • Identify and describe half-turns and quarter-turns • Identify and describe half-turns and quarter-turns
Interpret simple maps of familiar locations and identify the relative positions of key features (ACMMG044)		
Quest: Reading maps		
Learning Journey Read simple maps		
1	Interpreting simple maps	• interpret simple maps of familiar locations and describe the location of specific features relative to other features • describe, using landmarks and directional language, a path from 1 feature to another on a simple map
2	Following pathways on simple maps	• follow and draw a path on a simple map given directions that use landmarks and directional language

Australian Curriculum Year 2

Understanding Practice and Fluency (UPF)

Mathletics

Statistics and Probability

Steps	Content	Detail
Identify practical activities and everyday events that involve chance. Describe outcomes as 'likely' or 'unlikely' and identify some events as 'certain' or 'impossible' (ACMSP047)		
Quest: Chance		
Learning Journey Use basic probability language		
1	Using the basic language of probability: impossible, possible, likely, unlikely	• Identify practical activities and everyday events that involve chance, eg 'I might play with my friend after school' • describe outcomes in everyday activities and events as being 'possible', 'impossible', 'likely' or 'unlikely' to happen
2	Using the language of probability: possible and impossible	• identify and distinguish between 'possible' and 'impossible' events • describe familiar events as being 'possible' or 'impossible', eg 'It is possible that it will rain today', 'It is impossible to roll a standard six-sided die and get a 7'
3	Using the language of probability: likely and unlikely	• describe possible outcomes in everyday activities and events as being 'likely' or 'unlikely' to happen • compare familiar activities and events and describe them as being 'likely' or 'unlikely' to happen
4	Using the language of probability: certain and uncertain	• identify and distinguish between 'certain' and 'uncertain' events • describe familiar situations as being certain or uncertain, eg 'It is uncertain what the weather will be like tomorrow', 'It is certain that tomorrow is Saturday'
Identify a question of interest based on one categorical variable and gather data relevant to the question (ACMSP048)		
Quest: Gathering data		
Learning Journey Answer questions related to simple data displays		
1	Conducting a well-supported and basic statistical investigation using category data	• answer questions and make simple statements related to the data gathered
Create displays of data using lists, tables and picture graphs and interpret them (ACMSP050)		
Quest: Creating displays of data		
Learning Journey Read and interpret simple picture graphs		
1	Introducing and reading picture graphs (up to 4 categories)	• read and interpret data represented in a picture graph;- pose and answer simple summative and comparative questions, eg 'Which is the least favourite season?' • choose an appropriate title for a display;- labels the axis • identify misleading representations of data in a picture graph, eg where the symbol used to represent one item is shown in different sizes or where symbols are not equally spaced
2	Representing and reading category data in a picture graph	• read and interpret data represented in a picture graph;- pose and answer simple summative and comparative questions, eg 'Which is the least favourite season?'
Learning Journey Represent and read data in tables or lists		
1	Representing and reading data displayed in tables or lists	• display category or numerical data using lists and tables • pose questions and answer one-step and two-step questions, eg 'How many more students like reading than art?';- identify basic similarities and differences between categories;- make simple conclusions
Use a tally chart, table, picture graph		
1	Introducing the statistical investigation process (tables, lists or picture graphs)	• represent category data in a table, list or picture graph (one-to-one correspondence)

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA051 Investigate the conditions required for a number to be odd or even and identify odd and even numbers		
Quest: Odd and even numbers		
Learning Journey Identifying odd and even numbers		
Steps	**Content**	**Detail**
1	Investigating odd and even numbers	• model odd and even numbers of up to 2 digits using arrays with 2 rows • compare and describe the difference between models of even numbers and models of odd numbers • recognise the connection between even numbers and the multiplication facts for 2
2	Identifying odd and even numbers	• recognise the significance of the final digit of a whole number in determining whether a given number is even or odd • identify even or odd numbers of up to 4 digits
3	Identifying odd and even number patterns (add in number lines and number charts)	• model even and odd numbers of up to 20 using arrays with 2 rows • compare and describe the difference between the models of odd and even numbers • recognise the connection between even numbers, doubles and the 2 times-tables;- demonstrate the connection with words, models or numerals • use the final digit of a whole number to determine whether a given number is even or odd (up to four digits)
ACMNA052 Recognise, model, represent and order numbers to at least 10 000		
Quest: Numbers to 10 000		
Learning Journey Identifying and counting numbers up to 4 digits		
1	Identifying numbers before and after up to 4-digit numbers (within 10000)	• identify the number that comes before a given 2-, 3- or 4-digit number up to 10000;- describe this number as 'one more than' • identify the number that comes after a given 2-, 3- or 4-digit number up to 10000;- describe this number as 'one less than' • identify the number that comes before or after a given 2-, 3- or 4-digit number up to 10000;- describe this number as 'one more than' or 'one less than'
2	Counting by tens and hundreds using models, number lines and charts	• count forwards and backwards in tens, on and off the decade, with 2-digit, 3-digit and 4-digit numbers using number lines and number charts • count forwards and backwards in hundreds, on the decade, with 3-digit and 4-digit numbers using number lines and number charts • count forwards and backwards in hundreds, on and off the decade, with 3-digit and 4-digit numbers using number lines and number charts
3	Counting by tens and hundreds	• count forwards and backwards in tens, on and off the decade, with 2-digit, 3-digit and 4-digit numbers • count forwards and backwards in hundreds, on the decade, with 3-digit and 4-digit numbers • count forwards and backwards in hundreds, on and off the decade, with 3-digit and 4-digit numbers
4	Finding numbers 10 or 100 before and after up to 1000	• find the number '10 before' or '10 after' a given 2-digit, 3-digit or 4-digit number on or off the decade using number lines and number charts • find the number '100 before' or '100 after' a given 3-digit or 4-digit number on or off the decade using number lines and number charts

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA052 Recognise, model, represent and order numbers to at least 10 000		
Quest: Numbers to 10 000		
Learning Journey Reading and representing numbers up to 4 digits		
Steps	**Content**	**Detail**
1	Reading and writing 4-digit numbers using words and numerals	• write a given 4-digit number in words, eg 4567 as four thousand, four hundred and sixty-seven • write the numerals for a 4-digit number given in words
2	Representing 4-digit numbers using words, numerals and objects	• model a given 4-digit number using concrete materials, pictures or drawings • write the numerals in words, eg 'seven thousand, three hundred and fifty three' for a 4-digit number represented using place value equipment or using pictures, drawings
Learning Journey Comparing and ordering numbers to 10 000		
1	Comparing numbers to 10000	• model and compare two 4-digit numbers using place value equipment • compare two numbers of up to 4 digits and describe using the terms and symbols: greater than (>) or less than (<);- explain the comparison using place value reasoning
2	Ordering numbers to 10000	• order up to 4 consecutive 2-digit, 3-digit or 4-digit numbers within 1000 in ascending order or descending order;- explain the reason for the order given • order up to 4 non-consecutive 2-digit, 3-digit or 4-digit numbers within 1000 in ascending or descending order;- explain the reason for the order given using place value reasoning
ACMNA053 Apply place value to partition, rearrange and regroup numbers to at least 10 000 to assist calculations and solve problems		
Quest: Place value and partitioning		
Learning Journey Place value up to 4-digits		
1	Using place value to partition 4-digit numbers	• use place value equipment to partition a given 4-digit number into thousands, hundreds, tens and ones • describe a 4-digit number using words, eg 9523 as '9 thousands, 5 hundreds, 2 tens and 3 ones' • write a 4-digit number in expanded notation, eg 7523 as 7000 + 500 + 20 + 3 • write the numeral for a number represented by expanded notation • recognise zero as a placeholder
2	Identifying the place value of digits in 4-digit numbers	• write the numeral for a 4-digit number modelled using place value equipment • identify the digit in the thousands, hundreds, tens or ones column for a given 4-digit number • identify, record and model a number using place value clues, eg 'an 8 in the thousands, 5 in the hundreds and a 2 in the ones' as 8502 • recognise the role of zero as a placeholder • create the smallest and largest numbers possible using 4 digits
3	Partitioning 4-digit numbers using non-standard partitioning	• use place value equipment to partition a given 4-digit number using non-standard partitioning, eg 2375 as 2 thousands, 1 hundred and 275 ones or 2000 + 100 + 275 • model and identify a number from non-standard partitioning, eg recognise 3 hundreds, 4 tens and 27 ones or 300 + 40 + 27 as 367
Learning Journey Rounding numbers: 4 digits		
1	Rounding numbers up to 10000 to the nearest 1000	• model a 4-digit number and recognise which thousand it is nearer to;- explain reasoning • round a 4-digit number to the nearest 1000;- recognise the digit in the hundreds column as the key digit
2	Rounding numbers up to 10000 to the nearest 10, 100 or 1000	• round a 4-digit number to the nearest 10, 100 or 1000;- explain the rounding • apply an understanding of place value to read numbers up to 5 digits

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA054 Recognise and explain the connection between addition and subtraction		
Quest: Addition and subtraction		
Learning Journey Relationship between addition and subtraction		
Steps	**Content**	**Detail**
1	Recognising and using the inverse relationship between addition and subtraction	• determine, through investigation, the inverse relationship between addition and subtraction • determine the missing number in addition and subtraction equations using a variety of tools and strategies, such as the inverse relationship between addition and subtraction (up to 2 digit with 2-digit addition or subtraction)
2	Recognising equivalent number sentences with 1-digit and 2- digit numbers	• complete number sentences involving addition and subtraction by calculating missing numbers using a variety of tools and strategies • use inverse operations to complete number sentences • justify solutions when completing number sentences
3	Judging the reasonableness of addition and subtraction answers (up to 3-digit answers)	• use benchmarks of 'more than or less than' to help judge the reasonableness of answers
ACMNA055 Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation		
Quest: Addition and subtraction facts and strategies		
Learning Journey Add/subtract: 2 and 3 numbers within 1000		
1	Recalling number bonds to 30	• use known facts and number patterns to recall bonds to 30 eg 18 + 2 = 20 so 28 + 2 = 30
2	Adding 3 or more single-digit numbers	• use appropriate strategies to add 3 or more single-digit numbers;- including changing the order, doubles if appropriate, bridging to a ten • explain and justify strategies used
3	Adding and subtracting 3 or more single-digit numbers using compatible numbers	• use compatible numbers , eg 4 + 2 + 8 − 6 as 6 + 8 − 6 = 8
4	Creating and solving addition and subtraction word problems (within 1000)	• represent a word problem as an addition or subtraction number sentence • solve simple addition and subtraction word problems in context including find the difference, find the sum, change unknown, start unknown • explain and compare strategies used to solve addition and subtraction word problems • create problems in contexts that involve addition and subtraction
Learning Journey Add/subtract: 2- & 3-digit using jump strategy		
1	Adding 2-digit and 3-digit numbers using place value partitioning on a number line (jump strategy)	• model and solve the addition of a 2-digit and 3-digit number using an empty number line, eg 823 + 56 as 823 + 50 = 873, 873 + 6 = 879
2	Subtracting a 2-digit number from a 3-digit number using place value partitioning on a number line (jump strategy)	• model and solve the subtraction of a 2-digit number from a 3-digit number using an empty number line, eg 823 − 56 as 823 − 50 = 773, 773 − 6 = 767
3	Adding and subtracting a 2-digit and 3-digit number using place value partitioning on a number line (jump strategy)	• model and solve the addition or subtraction of a 2-digit number from a 3-digit number using an empty number line, eg 823 − 56 as 823 − 50 = 773, 773 − 6 = 767

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA055 Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation		
Quest: Addition and subtraction facts and strategies		
Learning Journey Add/subtract: 2- & 3-digit using place value		
Steps	**Content**	**Detail**
1	Adding 2-digit and 3-digit numbers mentally using place value understanding (jump strategy)	• mentally solve addition problems involving 2-digit and 3-digit numbers using a jump strategy, eg 823 + 56 as 823 + 50 = 873, 873 + 6 = 879 • record and explain the use of the strategy • check calculations using the inverse operation
2	Subtracting a 2-digit number from a 3-digit number mentally using place value understanding (jump strategy)	• mentally solve subtraction problems involving 2-digit and 3- digit numbers using place value partitioning, eg 823 − 56 as 823 − 50 = 773, 773 − 6 = 767 • record and explain the use of the strategy • check calculations using the inverse operation
3	Adding and subtracting a 2-digit and 3-digit number mentally using place value understanding (jump strategy)	• mentally solve addition and subtraction problems involving 2-digit and 3- digit numbers using place value partitioning, eg 823 − 56 as 823 − 50 = 773, 773 − 6 = 767
Learning Journey Add/subtract: 2- & 3-digit using bridging to 10		
1	Bridging to ten to add two 2-digit numbers using models for support	• add to the nearest ten first then add the rest, using models for support, eg 28 + 17 as 28 + 2 = 30 and 30 + 15 = 45 • record and explain the use of the strategy
	Adding 2 numbers up to 3-digits using bridging to ten	• add up to two 3-digit numbers where the first number has a 7, 8, or 9 in the ones columns, by first adding to the nearest ten and then adding the rest, eg 368 + 25 as 368 + 2 + 23 • record and explain the strategy using numerals, models and/or diagrams
2	Bridging to ten to subtract two 2-digit numbers using models for support	• subtract to the nearest ten first then subtract the rest using models for support, eg 33 − 18 as 33 − 3 − 10 − 5 • record and explain the use of the strategy
	Subtracting 2 numbers up to 3-digits using bridging to ten	• subtract two numbers (up to 3-digits) where the first number has a 1, 2 or 3 in the ones columns, by first subtracting to the nearest ten and then subtracting the rest, eg 362 − 25 as 362 − 2 − 23 • record and explain the strategy using numerals, models and/or diagrams
3	Bridging to ten to mentally add and subtract two 2-digit numbers	• add or subtract to the nearest ten first then add or subtract the rest, using models for support, eg 28 + 17 as 28 + 2 = 30 and 30 + 15 = 45 • check calculations using the inverse operation
	Adding and subtracting 2 numbers up to 3-digits using bridging to ten	• add or subtract two numbers (up to 3-digits) where the first number has a 7, 8, or 9 in the ones columns, by first adding to the nearest ten and then adding the rest, eg 368 + 25 as 368 + 2 + 23, or 362 − 25 as 362 − 2 − 23 • record and explain the strategy using numerals, models and/or diagrams
Learning Journey Add/Subtract: Bridging with unknowns		
1	Using a bridging strategy with start unknown or change unknown problems	• use a bridging strategy to solve addition and subtraction problems where the change is unknown, eg 29 + ? = 81 • use a bridging strategy to solve addition and subtraction problems where the start is unknown, eg ? + 29 = 81 becomes 29 + ? = 81

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA055 Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation		
Quest: Addition and subtraction facts and strategies		
Learning Journey Add/subtract: 3-digits using partitioning		
Steps	**Content**	**Detail**
1	Adding two 3-digit numbers using place value partitioning on a number line (jump strategy)	• model and solve the addition of two 3-digit numbers using an empty number line, eg 823 + 356 as 823 + 300 = 1123, 1123 + 50 = 1173, 1173 + 6 = 1179
2	Subtracting two 3-digit numbers using place value partitioning on a number line (jump strategy)	• model and solve the subtraction of two 3-digit numbers using an empty number line, eg 823 − 356 as 823 − 300 = 523, 523 − 50 = 473, 473 − 6 = 467
3	Adding and subtracting two 3-digit numbers using place value partitioning on a number line (jump strategy)	• model and solve the addition or subtraction of two 3-digit numbers using an empty number line, eg 823 − 356 as 823 − 300 = 523, 523 − 50 = 473, 473 − 6 = 467
4	Adding and subtracting multi-digit numbers using place value partitioning	• partition the second number to add two multi-digit numbers (up to 4 digits), eg 1546 + 625 as 546 + 600 + 20 + 5;- use standard or non-standard partitioning • partition the second number to subtract two multi-digit numbers (up to 4 digits), eg 1546 − 625 as 546 − 600 − 20 − 5;- use standard or non-standard partitioning
Learning Journey Add/subtract: 3-digits using place value		
4	Adding up to 3-digit numbers mentally using place value understanding (jump strategy)	• solve the addition of two 3-digit numbers using a jump strategy, eg 823 + 356 as 823 + 300 = 1123, 1123 + 50 = 1173, 1173 + 6 = 1179 • explain and justify the use of the strategy
5	Subtracting up to 3-digit numbers mentally using place value understanding (jump strategy)	• solve the subtraction of two 3-digit numbers using a jump strategy, eg 823 − 356 as 823 − 300 = 523, 523 − 50 = 473, 473 − 6 = 467 • explain and justify the use of the strategy
6	Adding or subtracting up to 3-digit numbers mentally using place value understanding (jump strategy)	• solve the addition or subtraction of two 3-digit numbers using a jump strategy, eg 823 − 356 as 823 − 300 = 523, 523 - 50 = 473, 473 − 6 = 467
Learning Journey Add/subtract: 2- & 3-digit using split strategy		
1	Adding a 2-digit and 3-digit number using place value models (split strategy)	• model the addition of a 2-digit and 3-digit number using a split strategy with or without crossing tens;- use place value equipment, money or diagrams • solve addition problems using a split strategy, eg 265 + 27 as 260 + 20 and 5 + 7, 280 + 12 = 292 • record and explain the use of the strategy
	Adding up to two 3-digit numbers mentally using place value understanding (split strategy)	• solve addition problems using a split strategy, eg 265 + 327 as 200 + 300, 60 + 20 and 5 + 7, 500 + 80 + 12 = 592 • record and explain the strategy using numerals, models and/or diagrams
2	Subtracting a 2-digit number from a 3-digit number using place value models (split strategy)	• model the subtraction of a 2-digit and 3-digit number using a split strategy;- place value equipment, money or diagrams • solve subtraction problems using a split strategy, eg 265 − 21 as 260 − 20 and 5 − 1, 240 + 4 = 244 • record and explain the use of the strategy
	Subtracting two 3-digit numbers mentally using place value understanding (split strategy)	• record and explain the strategy using numerals, models and/or diagrams • solve addition and subtraction problems using a split strategy, eg 265 + 327 as 200 + 300, 60 + 20 and 5 + 7, 500 + 80 + 12 = 592

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA055 Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation		
Quest: Addition and subtraction facts and strategies		
Learning Journey Add/subtract: 2- & 3-digit using split strategy		
Steps	**Content**	**Detail**
3	Adding and subtracting 2-digit and 3-digit numbers using place value models (split strategy)	• model the addition or subtraction of a 2-digit and 3-digit number using a split strategy;- place value equipment, money or diagrams • solve addition and subtraction problems using a split strategy, eg 265 − 21 as 260 − 20 and 5 − 1, 240 + 4 = 244 • record and explain the strategy using numerals, models and/or diagrams • check calculations using the inverse operation
	Adding and subtracting two 3-digit numbers mentally using place value understanding (split strategy)	• solve addition and subtraction problems using a split strategy, eg 265 + 327 as 200 + 300, 60 + 20 and 5 + 7, 500 + 80 + 12 = 592 • record and explain the strategy using numerals, models and/or diagrams • check calculations using the inverse operation
Learning Journey Add/subtract: rounding & compensation		
1	Introducing addition using rounding and compensating with two 2-digit numbers	• add two 2-digit numbers where 1 number is close to a ten (digit in the ones column is 7, 8 or 9) • round 1 number to the next 10, carry out the addition and adjust the answer to compensate for the original rounding, eg 35 + 29 as 35 + 30 − 1 • record the strategy using numerals, models and/or diagrams and explain the need to compensate
	Adding up to two 3-digit numbers using rounding and compensating	• add up to two 3-digit numbers where 1 number is close to a hundred (ends in 97, 98 or 99) • round 1 number to the next 100, carry out the addition and adjust the answer to compensate for the original rounding, eg 398 + 23 as 400 + 23 − 2
2	Introducing subtraction using rounding and compensating with two 2-digit numbers	• subtract two 2-digit numbers where 1 number is close to a ten • round 1 number to the next 10, carry out the subtraction and adjust the answer to compensate for the original rounding, eg 33 − 19 as 33 − 20 + 1 or 81 − 35 as 80 − 35 + 1 • record the strategy using numerals, models and/or diagrams and explain the need to compensate
	Subtracting up to two 3-digit numbers using rounding and compensating	• record the strategy using numerals, models and/or diagrams and explain the need to compensate • subtract up to two 3-digit numbers where 1 number is close to a hundred (ends in 97, 98 or 99) • round 1 number to the next 100, carry out the subtraction and adjust the answer to compensate for the original rounding, eg 398 − 23 as 400 − 23 + 2 • record the strategy using numerals, models and/or diagrams and explain the need to compensate
3	Introducing addition and subtraction using rounding and compensating with two 2-digit numbers	• add or subtract two 2-digit numbers where 1 number is close to a ten (digit in the ones column is 7, 8 or 9) • round 1 number to the next 10, carry out the addition or subtraction and adjust the answer to compensate for the original rounding, eg 33 − 19 as 33 − 20 + 1 or 81 − 35 as 80 − 35 + 1 • check calculations using the inverse operation
	Adding and subtracting up to two 3-digit numbers using rounding and compensating	• add or subtract up to two 3-digit numbers where 1 number is close to a hundred (ends in 97, 98 or 99) • round 1 number to the next 100, carry out the addition or subtraction and adjust the answer to compensate for the original rounding, eg 398 + 23 as 400 + 23 − 2 • use place value equipment to model pairs that add to 100, eg 63 and 37 • recognise that the ones make an extra ten when added

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and place value

ACMNA055 Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation		
Quest: Addition and subtraction facts and strategies		
Learning Journey Add/subtract: rounding & compensation		
Steps	**Content**	**Detail**
4	Introducing addition using rounding and compensating when the change or start is unknown	• model with number lines and solve addition problems with two 2-digit numbers where the digits in the ones column for the known addend and result are close together, eg 23 + ? = 81 becomes 23 + 60 - 2 • explain and justify the use of the strategy
Learning Journey Add/subtract: to and from 100		
1	Modelling pairs that add to 100	• use place value equipment to model pairs that add to 100, eg 63 and 37 • recognise that the ones make an extra ten when added
2	Adding to make 100	• find pairs of numbers that add to 100 (multiples of 5), eg 45 and 55 • find pairs of numbers that add to 100, eg 42 and 58 • find the missing number to add to 100 when 1 number is given
3	Subtracting from 100	• subtract 1 number from 100 (multiple of 5), eg 100 − 35 = 65 • subtract 1 number from 100, eg 100 − 29 = 71
Learning Journey Add/subtract: multiples of 100, 1000 & 10000		
1	Adding multiples of 100, 1000 and 10 000	• model the addition of hundreds and/or thousands using place value equipment or play money; relate these additions to adding ones, eg 4 + 3 = 7 so 4 thousands + 3 thousands = 7 thousands or 4000 + 3000 = 7000 • use known basic facts, eg 5 + 3 to add multiples of 100, 1000 or 10 000 using place value knowledge and pattern identification, eg 5 + 3 = 8, so 500 + 300 = 800, 5000 + 3000 = 8000 and 50 000 + 30 000 = 80 000
2	Subtracting multiples of 100, 1000 and 10 000	• model the subtraction of hundreds and/or thousands using place value equipment or play money; relate these additions to subtracting ones, eg 8 − 3 = 5 so 8 thousands − 3 thousands = 5 thousands or 8000 − 3000 = 5000 • use known basic facts, eg 9 − 5 to subtract multiples of 100, 1000 or 10 000 using place value knowledge and pattern identification, eg 9 − 5 = 4, so 900 − 500 = 400, 9000 − 5000 = 4000 and 90 000 − 50 000 = 40 000
3	Adding multiple single-digit numbers	• use the associative property of addition to make easier additions when possible, eg doubles or near doubles, pairs that add to a ten
Learning Journey Add/Subtract: using non-standard partitioning		
1	Adding two 3-digit numbers using non-standard partitioning	• partition the second number using non-standard partitioning to add two 3-digit numbers, eg 1546 + 625 as 546 + 500 + 100 + 20 + 5 • record and explain the strategy using numerals, models and/or diagrams
2	Subtracting two 3-digit numbers using non-standard partitioning	• partition the second number using non-standard partitioning to subtract two 3-digit numbers, eg 1546 − 625 as 546 − 500 − 100 − 20 − 5 • record and explain the strategy using numerals, models and/or diagrams
Learning Journey Add/Subtract: Choosing efficient strategies		
1	Choosing efficient addition strategies when adding 2-digit and 3-digit numbers	• solve 2-digit and 3-digit addition problems using efficient and effective strategies depending on the numbers in the problem, eg use rounding and compensating, jump strategies, split strategies, place value strategies or bridging strategies • record and explain the strategy using numerals, models and/or diagrams • check the solution using a different strategy; compare with own and others' strategies, discuss and compare the efficiency of strategies

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA055 Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation		
Quest: Addition and subtraction facts and strategies		
Learning Journey Add/Subtract: Choosing efficient strategies		
Steps	**Content**	**Detail**
2	Choosing efficient subtraction strategies when subtracting 2-digit and 3-digit numbers	• solve 2-digit and 3-digit subtraction problems using efficient and effective strategies depending on the numbers in the problem, eg use rounding and compensating, jump strategies, split strategies, place value strategies or bridging strategies • record and explain the strategy using numerals, models and/or diagrams • check the solution using a different strategy; compare with own and others' strategies, discuss and compare the efficiency of strategies
3	Choosing efficient addition and subtraction strategies when adding or subtracting 2-digit and 3-digit numbers	• solve 2-digit and 3-digit addition and subtraction problems using efficient and effective strategies depending on the numbers in the problem, eg use rounding and compensating, jump strategies, split strategies, place value strategies or bridging strategies • record and explain the strategy using numerals, models and/or diagrams • check the solution using a different strategy; compare with own and others' strategies, discuss and compare the efficiency of strategies
Learning Journey Add/Subtract: Estimating		
1	Estimating additions	• round numbers to the nearest multiple of 100 to estimate additions, eg 546 + 789 as 500 + 800 • round numbers to the nearest multiple of 10 or 100 to estimate additions, eg 546 + 789 as 540 + 800 • explain the reason for the estimation used and whether the estimation is higher or lower than the actual answer
2	Estimating subtractions	• round numbers to the nearest multiple of 100 to estimate subtractions, eg 546 − 189 as 500 − 200 • round numbers to the nearest multiple of 10 or 100 to estimate subtractions, eg 746 − 389 as 740 − 400 • explain the reason for the estimation used and whether the estimation is higher or lower than the actual answer
ACMNA056 Recall multiplication facts of two, three, five and ten and related division facts		
Quest: Skip counting		
Learning Journey Skip counting by 10 to 1000		
1	Counting by skip counting forwards by 10s from any multiple of 10 to 1000	• use concrete materials, models, drawings, number lines/charts to skip count forwards by 10s from any multiple of 10 up to 1000 • skip count forwards by 10s from any multiple of 10 by memory and an understanding of the number sequence • recognise an error in the skip counting sequence
2	Counting by skip counting backwards by 10s from any multiple of 10 up to 1000	• use concrete materials, models, drawings, number lines/charts to skip count backwards by 10s from any multiple of 10 up to 1000 • skip count backwards by 10s from any multiple of 10 by memory and an understanding of the number sequence • recognise an error in the skip counting sequence
3	Counting by skip counting forwards or backwards by 10s from any multiple of 10 up to 1000	• use concrete materials, models, drawings, number lines/charts to skip count forwards or backwards by 10s from any multiple of 10 up to 1000 • skip count forwards or backwards by 10s from any multiple of 10 by memory and an understanding of the number sequence • recognise an error in the skip counting sequence

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA056 Recall multiplication facts of two, three, five and ten and related division facts		
Quest: Skip counting		
Learning Journey Skip counting by 2 to 1000		
Steps	**Content**	**Detail**
1	Counting by skip counting forwards by 2s from any multiple of 2 to 1000	• use concrete materials, models, drawings, number lines/charts to skip count forwards by 2s from any multiple of 2 up to 1000 • skip count forwards by 2s from any multiple of 2 by memory and an understanding of the number sequence • recognise an error in the skip counting sequence
2	Counting by skip counting backwards by 2s from any multiple of 2 up to 1000	• use concrete materials, models, drawings, number lines/charts to skip count backwards by 2s from any multiple of 2 up to 1000 • skip count backwards by 2s from any multiple of 2 by memory and an understanding of the number sequence • recognise an error in the skip counting sequence
Learning Journey Skip counting by 5 to 1000		
1	Counting by skip counting forwards by 5s from any multiple of 5 to 1000	• use concrete materials, models, drawings, number lines/charts to skip count forwards by 5s from any multiple of 5 up to 1000 • skip count forwards by 5s from any multiple of 5 by memory and an understanding of the number sequence • recognise an error in the skip counting sequence
2	Counting by skip counting backwards by 5s from any multiple of 5 up to 1000	• use concrete materials, models, drawings, number lines/charts to skip count backwards by 5s from any multiple of 5 up to 1000 • skip count backwards by 5s from any multiple of 5 by memory and an understanding of the number sequence • recognise an error in the skip counting sequence
3	Counting by skip counting forwards or backwards by 5s from any multiple of 5 up to 1000	• use concrete materials, models, drawings, number lines/charts to skip count forwards or backwards by 5s from any multiple of 5 up to 1000 • skip count forwards or backwards by 5s from any multiple of 5 by memory and an understanding of the number sequence • recognise an error in the skip counting sequence
Learning Journey Skip counting by 3 to 1000		
1	Counting by skip counting forwards by 3s from zero up to 30	• use concrete materials, models, drawings, number lines/charts to skip count by 3s from zero • use rhythmic counting to count in 3s from zero • recognise an error in the skip counting sequence
2	Counting by skip counting backwards by 3s from 30	• use concrete materials, models, drawings, number lines/charts to skip count backwards by 3s from 30 • use rhythmic counting to count backwards in 3s from 30 • recognise an error in the skip counting sequence
3	Counting by skip counting forwards or backwards by 3s from zero up to 30	• use concrete materials, models, drawings, number lines/charts to skip count by 3s • use rhythmic counting to count in 3s • recognise an error in the skip counting sequence
4	Counting by skip counting forwards by 3s from any multiple of 3 up to 30	• use concrete materials, models, drawings, number lines/charts to skip count by 3s from any multiple of 3 • use knowledge of the number sequence to count in 3s from any multiple of 3 • recognise an error in the skip counting sequence

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA056 Recall multiplication facts of two, three, five and ten and related division facts		
Quest: Skip counting		
Learning Journey Skip counting by 3 to 1000		
Steps	**Content**	**Detail**
5	Counting by skip counting backwards by 3s from any multiple of 3 from 30	• use concrete materials, models, drawings, number lines/charts to skip count backwards by 3s from 30 • use knowledge of the number sequence to count backwards in 3s from any multiple of 3 • recognise an error in the skip counting sequence
6	Counting by skip counting forwards or backwards by 3s from any multiple of 3 from zero to 30	• use concrete materials, models, drawings, number lines/charts to skip count by 3s • use knowledge of the number sequence to count forwards or backwards in 3s from any multiple of 3 • recognise an error in the skip counting sequence
Learning Journey Skip counting by 4 to 40		
1	Counting by skip counting forwards by 4s from zero up to 40	• use concrete materials, models, drawings, number lines/charts to skip count by 4s from zero • use rhythmic counting to count in 4s from zero • recognise an error in the skip counting sequence
Quest: Multiplication & Division facts		
Learning Journey Multiplication/Division facts for 2		
1	Recalling multiplication facts for 2	• recall the 2 multiplication facts
2	Using multiplication facts for 2	• solve and create multiplication problems in context (using multiplication facts for 2), including word problems
3	Recalling the division facts for 2	• recall the division facts for 2
4	Using division facts for 2	• solve and create division problems in context (using multiplication facts for 2), including word problems
5	Multiplying and dividing by 2	• recall the multiplication and division facts for 2 • solve and create multiplication and division problems in context (using multiplication facts for 2), including word problems
Learning Journey Multiplication/Division facts for 10		
1	Recalling the multiplication facts for 10	• recall the 10 multiplication facts
2	Using multiplication facts for 10	• solve and create multiplication problems in context (using multiplication facts for 10), including word problems
3	Recalling the division facts for 10	• recall the division facts for 10
4	Using division facts for 10	• solve and create division problems in context (using multiplication facts for 10), including word problems
5	Multiplying and dividing by 10	• recall the multiplication and division facts for 10 • solve and create multiplication and division problems in context (using multiplication facts for 10), including word problems

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA056 Recall multiplication facts of two, three, five and ten and related division facts		
Quest: Multiplication & Division facts		
Learning Journey Multiplication/Division facts for 5		
Steps	**Content**	**Detail**
1	Recalling multiplication facts for 5	• recall the 5 multiplication facts
2	Using multiplication facts for 5	• solve and create multiplication problems in context (using multiplication facts for 5), including word problems
3	Recalling the division facts for 5	• recall the division facts for 5
4	Using division facts for 5	• solve and create division problems in context (using multiplication facts for 5), including word problems
5	Multiplying and dividing by 5	• recall the multiplication and division facts for 5 • solve and create multiplication and division problems in context (using multiplication facts for 5), including word problems
Learning Journey Multiplication/Division facts for 2, 5, 10		
1	Multiplying by 2s, 5s and 10s	• recall the multiplication facts for 2s, 5s and 10s • solve multiplication problems with 2, 5 or 10, including word problems; use the multiplication symbol
2	Dividing by 2s, 5s and 10s	• recall the division facts for 2s, 5s and 10s • solve division problems with 2, 5 or 10, including word problems; use the division symbol
3	Multiplying and dividing by 2s, 5s and 10s	• recall the multiplication facts and related division facts for 2s, 5s and 10s • solve multiplication and division problems with 2, 5 or 10, including word problems; use the multiplication symbol
Learning Journey Multiplication/Division facts for 3		
1	Exploring multiplication by 3	• relate multiplication by 3 to doubles and 1 more group; model and describe, eg '3 groups of 4 is the same as double 4 and one more group of 4' • explore patterns of the multiplication facts for 3 on a number chart • model the 2 related multiplication facts, eg 3 x 4 and 4 x 3
2	Recalling multiplication facts for 3	• recall the multiplication facts for 3
3	Using multiplication facts for 3	• solve and create multiplication problems in context (using multiplication facts for 3), including word problems
4	Dividing by 3	• model and describe the related multiplication and division facts for 3 using models, drawings or manipulatives, eg 5 x 3 = 15 and 15 divided by 3 = 5 • relate division to how many (whole) times the divisor goes into the dividend
5	Recalling the division facts for 3	• recall the division facts for 3
6	Using division facts for 3	• solve and create division problems in context (using multiplication facts for 3), including word problems
7	Multiplying and dividing by 3	• recall the multiplication facts and related division facts for 3 • solve multiplication and division problems with 3, including word problems

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA057 Represent and solve problems involving multiplication using efficient mental and written strategies and appropriate digital technologies		
Quest: Multiplication word problems		
Learning Journey Writing & solving multiplication word problems		
Steps	**Content**	**Detail**
1	Writing and solving simple multiplication word problems (within 100)	• pose appropriate multiplication problems (up to 10 x 10) • solve multiplication word problems and explain using language, action, drawings, models • compare their own and others' methods of solution
2	Solving multiplication problems using fair shares or equal grouping (within 100)	• solve fair share multiplication or division problems (with unknown in any position), eg '20 flowers are to be placed in 4 bunches, how many flowers will be in each bunch?' • solve equal grouping multiplication or division problems (with unknown in any position), eg 'There are 9 tables in a cafeteria. Each table has 5 chairs. What is the total number of chairs in the cafeteria?' • write equations using a symbol, eg a box or a blank, to represent the unknown number • compare their own and others' methods of solution
3	Solving multiplication and division problems involving arrays (within 100)	• solve multiplication and division problems (with the unknown in any position) involving arrays, eg 'A rectangular egg carton has 3 rows and 4 columns of eggs. How many eggs are there?' • write equations using a symbol, eg a box or a blank, to represent the unknown number • compare their own and others' methods of solution
4	Solving multiplication and division problems involving comparisons (within 100)	• solve multiplication and division problems involving comparisons eg 'Anna has 3 times as much money as David. David has $6. How much money does Anna have?' • write equations using a symbol, eg a box or a blank, to represent the unknown number • compare their own and others' methods of solution
Learning Journey Word problems and missing numbers		
1	Finding the missing number to make a multiplication number sentence true (2, 5, 10 facts)	• complete number sentences involving 1 operation of multiplication by finding the missing number using a variety of tools, equipment and strategies, eg 3 x ? = 30 or ? X 2 = 18 or 5 x 3 = ?
2	Finding the missing number to make a division number sentence true (2, 5, 10 facts)	• complete number sentences involving 1 operation of division by finding the missing number using a variety of tools, equipment and strategies eg 40 ÷ 10 = ?, or 35 ÷ ? = 7 or ? ÷ 2 = 9
3	Solving simple two-step word problems with addition and subtraction (max sum of 100)	• read and represent a two-step word problem using a letter for the unknown quantity • solve the problem using a variety of tools, models and strategies
4	Solving two-step word problems with the four operations (2, 5, 10 multiplication facts)	• use the four operations to solve two-step word problems • represent an unknown quantity with a letter • solve the problem using a variety of tools, models and strategies

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Fractions and decimals

ACMNA058 Model and represent unit fractions including 1/2, 1/4, 1/3, 1/5 and their multiples to a complete whole		
Quest: Fractions		
Learning Journey Using fractions: halves, quarters & eighths		
Steps	**Content**	**Detail**
1	Finding halves and quarters or objects, shapes or sets (symbols used)	• find halves and quarters of objects and shapes • find halves and quarters of sets • find the whole from a part • find halves and quarters of uneven partitioned shapes • use language 'one half', 'two halves', 'one quarter', 'two quarters' and so on • use symbols to represent fractions: 1/2, 2/2, 1/4, 2/4, 3/4, 4/4
2	Counting up to 10 in halves and quarters (symbols used)	• count up to 10 from any starting point in halves and quarters • use the number line to count with halves and quarters
3	Finding halves, quarters and eighths of objects or shapes	• recognise equivalence • estimate the size of a fractional part before using, eg paper folding to check or estimate the size of the whole from the part • find the whole from a part • find halves, quarters and eighths of uneven partitioned shapes • use symbols for halves, quarters and eighths • recognise larger denominator = smaller parts
Learning Journey Numerator and denominator		
1	Introducing the terms numerator and denominator	• read and write symbols to represent fractions • use the terms denominator and numerator to describe a fraction
Learning Journey Using fractions: halves, thirds & quarters		
1	Introducing thirds	• find thirds of objects, shapes and lengths • find thirds of sets • estimate the size of a fractional part before using eg paper folding to check or estimate the size of the whole from the part • find the whole from a part • use language 'one third', 'two thirds', 'three thirds' • use symbols to represent: 1/3, 2/3, 3/3
2	Finding halves, thirds or quarters of shapes using partitioning	• recognise that equal shares are not always the same shape
Learning Journey Using fractions: halves, thirds & quarters		
1	Introducing thirds	• find thirds of objects, shapes and lengths • find thirds of sets • estimate the size of a fractional part before using eg paper folding to check or estimate the size of the whole from the part • find the whole from a part • use language 'one third', 'two thirds', 'three thirds' • use symbols to represent: 1/3, 2/3, 3/3
2	Finding halves, thirds or quarters of shapes using partitioning	• recognise that equal shares are not always the same shape

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Fractions and decimals

ACMNA058 Model and represent unit fractions including 1/2, 1/4, 1/3, 1/5 and their multiples to a complete whole		
Quest: Fractions		
Learning Journey Using fractions: thirds & sixths		
Steps	**Content**	**Detail**
1	Introducing sixths	• find sixths of objects and shapes • find sixths of sets • estimate the size of a fractional part before using, eg paper folding to check or estimate the size of the whole from the part • find the whole from a part • use language 'one sixth', 'two sixths', 'three sixths' • use symbols to represent: 1/6, 2/6, 3/6 • understand the relationship between thirds and sixths
2	Finding thirds and sixths of objects, shapes and sets	• recognise equivalence • find thirds and sixths of objects, shapes and lengths • find thirds and sixths of sets (using models) • find the whole from a part • find thirds and sixths of uneven partitioned shapes • use language 'one third', 'two thirds', 'three thirds' • use fractional notation
Learning Journey Using fractions: fifths		
1	Introducing fifths	• estimate the size of a fractional part before using, eg paper folding to check or estimate the size of the whole from the part • find fifths of objects, shapes and lengths • find fifths of sets • find the whole from a part • use language 'one fifth', 'two fifths', 'three fifths' and so on • use symbols to represent fractions 1/5, 2/5 ...

Money and financial mathematics

ACMNA059 Represent money values in multiple ways and count the change required for simple transactions to the nearest five cents		
Quest: Money		
Learning Journey Making purchases and calculating change		
Steps	**Content**	**Detail**
1	Using money to make purchases	• calculate the total cost of purchasing two items given their values and record the value in dollars and cents separately (no decimal point) • determine the exact notes and coins needed to purchase two items given their values
2	Calculating change when making purchases	• determine one or more notes and coins that have enough value to make a purchase of one or more items • calculate the change required when making purchases using cash and record values in dollars and cents separately (no decimal point)

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Number and Algebra

Patterns and algebra

ACMNA060 Describe, continue, and create number patterns resulting from performing addition or subtraction		
Quest: Number patterns		
Learning Journey Identifying and creating number patterns		
Steps	**Content**	**Detail**
1	Identifying and creating additive number patterns (3s, 4s, 6s, 7s, 8s, 9s, from any starting point within 100)	• identify additive number patterns, eg patterns that increase in 3s, 4s, 6s, 7s, 8s and 9s from any starting point • describe the rule for a forwards (additive) number pattern, eg 'It goes up by 3s' • continue and create an additive number pattern
2	Identifying and creating subtractive number patterns (3s, 4s, 6s, 7s, 8s, 9s, from any starting point within 100)	• identify subtractive number patterns, eg patterns that decrease by 3s, 4s, 6s, 7s, 8s and 9s from any starting point • describe the rule for a backwards (subtractive) number pattern, eg 'It goes down by 3s' • continue and create a subtractive number pattern represented in numbers, on a number line or expressed in words, eg 'make a pattern that starts at 20 and shrinks by subtracting 2 each time'
3	Identifying and creating additive and subtractive number patterns (3s, 4s, 6s, 7s, 8s, 9s, from any starting point within 100)	• identify additive or subtractive number patterns on a number line, hundreds chart or calendar, eg patterns that increase in 3s, 4s, 6s, 7s, 8s and 9s from any starting point • describe the rule for a forwards (additive) or backwards (subtractive) number pattern, eg 'It goes up by 3s' • continue and create an additive or subtractive number pattern represented in numbers, on a number line or expressed in words, eg 'make a pattern that starts at 0 and grows by adding 7 each time'

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG061 Measure, order and compare objects using familiar metric units of length, mass and capacity		
Quest: Length, mass and capacity		
Learning Journey Comparing, ordering and measuring length		
Steps	**Content**	**Detail**
1	Comparing lengths in metres and centimetres	• compare lengths and distances using metres and centimetres
2	Ordering lengths in metres and centimetres	• order lengths and distances using metres and centimetres
3	Estimating and measuring to the nearest centimetre	• estimate lengths and check by measuring; explain strategies used to estimate lengths and distances, such as by referring to a known length, eg 'My handspan is 10 cm and my desk is 8 handspans long, so my desk is about 80 cm long' • measure lengths and distances to the nearest centimetre using a centimetre ruler • record lengths and distances using the abbreviation for centimetres (cm)
4	Measuring in metres and centimetres	• estimate and measure lengths and distances using metres and centimetres • explain strategies used to estimate lengths and distances, such as by referring to a known length, eg 'My handspan is 10 cm and my desk is 8 handspans long, so my desk is about 80 cm long' • record lengths and distances using abbreviations for metres and centimetres, eg 1 m 25 cm
5	Introducing formal units for length: millimetres	• recognise the need for a formal unit smaller than the centimetre to measure length • develop a personal reference for the approximate length of 1 mm • recognise and model that there are 10 mm in 1 cm, ie 10 mm = 1 cm • estimate and use the millimetre as a unit to measure lengths to the nearest millimetre using a ruler • record lengths using the abbreviation for millimetres (mm), eg 5 cm 3 mm or 53 mm • compare lengths with the same standard unit
Learning Journey Measure & compare units of volume & capacity		
1	Introducing formal units for volume and capacity: litres	• recognise and explain the need for formal units to measure volume and capacity • develop a personal reference for one litre and fractions of 1 litre (quarters and halves); relate the litre to familiar everyday containers, eg milk cartons • recognise that one-litre containers can be a variety of shapes • record volumes and capacities using the abbreviation for litres (L)
2	Estimating, comparing and measuring in litres	• estimate and measure capacities to the nearest litre • compare and order 2 or more containers by capacity measured in litres, including the capacity of commercially packaged objects whose capacity is stated in litres • record volumes and capacities using the abbreviation for litres (L)
Learning Journey Using the kilogram to measure mass		
1	Introducing formal units for mass: the kilogram	• establish the need for formal units to measure mass and introduce the kilogram • develop a sense of the mass of 1 kilogram and identify objects that have mass 'about 1 kilogram', 'less than 1 kilogram', 'greater than 1 kilogram', eg a litre of milk is about 1 kilogram, a standard pack of flour is 1 kilogram • identify everyday situations where kilograms are an appropriate unit for measuring the mass • introduce the abbreviation 'kg' for recording mass in kilograms
2	Measuring mass in kilograms	• compare and order 2 or more objects by mass measured to the nearest kilogram using carried scales • estimate the number of objects that have a total mass of 1 kilogram and check by measuring • estimate mass using a personal reference for a kilogram • record mass using the abbreviation 'kg' • compare masses using uniform informal units and the symbols >, =, < • compare masses using simple scaling by integers, eg 'five times as heavy'

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Using units of measurement

ACMMG062 Tell time to the minute and investigate the relationship between units of time		
Quest: Telling time		
Learning Journey Telling time to the minute		
Steps	**Content**	**Detail**
1	Telling time to the minute (analogue)	• read time on analogue clocks to the minute using the terms 'o'clock', 'past' and 'to', including 'half-past', 'quarter past' and 'quarter to' • observe and describe the position or draw the hands of an analogue clock when reading time to the minute, including the hour hand, minute hand and second hand • position or draw the hands on an analogue clock to show time to the minute where the time is given using the terms 'o'clock', 'past' and 'to', including 'half-past', 'quarter past' and 'quarter to'
2	Telling time to the minute (digital)	• read time on 12-hour digital clocks to the minute using the terms 'o'clock', 'past' and 'to', including 'half-past', 'quarter past' and 'quarter to' and write in words • record times on analogue clocks to the minute in 12-hour digital format • position or draw the hands on an analogue clock to show time to the minute where the time is given in 12-hour digital format • connect 12-hour digital displays for times (the minute) to their corresponding display on an analogue clock

Shape 4169038

ACMMG063 Make models of three-dimensional objects and describe key features		
Quest: 3D objects		
Learning Journey Exploring prisms and nets		
Steps	**Content**	**Detail**
1	Introducing rectangular prisms	• manipulate and describe the attributes of rectangular prisms • recognise that a cube is a special kind of rectangular prism • recognise rectangular prisms in the environment and drawings
2	Exploring prisms	• manipulate and describe the attributes of prisms • recognise that a cube is a special kind of prism • recognise prisms in the environment and drawings
3	Comparing, sorting and naming prisms and pyramids	• compare and sort prisms and pyramids by their geometric properties, eg number of edges, number of vertices • describe and name prisms and pyramids by the shape of their base
	Comparing three-dimensional objects including pyramids, prisms, cones, spheres and cylinders	• describe similarities and differences between prisms (including cubes), pyramids, cylinders, cones and spheres, eg surfaces, faces, edges and vertices • recognise and describe the use of three-dimensional objects in a variety of contexts, eg buildings, packaging • identify and name three-dimensional objects as prisms (including cubes), pyramids, cylinders, cones and spheres
4	Making basic models of three-dimensional objects	• use a variety of materials to make models of prisms (including cubes), pyramids, cylinders, cones and spheres, given a three-dimensional object, picture or photograph to view • identify and describe the two-dimensional shapes that can be found in a three-dimensional object, eg build a structure using concrete materials and describe it using geometric terms so that a partner will be able to build it

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Shape

ACMMG063 Make models of three-dimensional objects and describe key features		
Quest: 3D objects		
Learning Journey Rectangular prism nets		
Steps	**Content**	**Detail**
1	Introducing nets of rectangular prisms	• deconstruct everyday packages that are prisms (including cubes) to create nets, eg cut up tissue boxes • make connections between nets and the two-dimensional shapes of the faces • recognise that a net requires each face to be connected to at least 1 other face • investigate, make and identify the variety of nets that can be used to create a particular prism, such as the variety of nets that can be used to make a cube
2	Introducing nets of prisms	• deconstruct everyday packages that are prisms (including cubes) to create nets, eg cut up tissue boxes • make connections between nets and the two-dimensional shapes of the faces • recognise that a net requires each face to be connected to at least 1 other face • investigate, make and identify the variety of nets that can be used to create a particular prism, such as the variety of nets that can be used to make a cube • compare two-dimensional shapes to parts of three-dimensional objects in the environment

Geometric reasoning

ACMMG064 Identify angles as measures of turn and compare angle sizes in everyday situations		
Quest: Identifying and comparing angles		
Learning Journey Identifying and comparing angles		
Steps	**Content**	**Detail**
1	Introducing right angles	• identify right angles on two-dimensional shapes and three-dimensional objects • identify right angles in pictures, designs and the environment • identify right angles in line diagrams • use and interpret the symbol ∟ in diagrams to represent a right angle • define perpendicular lines and identify them in pictures, designs and the environment • recognise that a pair of perpendicular lines form 4 right angles
2	Comparing angles informally	• compare angles directly by placing 1 angle over another • compare angles indirectly by using a hinged angle measurer
Learning Journey Introducing angles		
1	Introducing the concept of angles up to 180°	• understand and describe angles as an amount of turning, openings • identify angles in everyday situations, eg door openings, designs, between the arms of a clock • recognise that angles are formed whenever 2 lines meet or when 2 rays meet at a common endpoint

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Location and transformation

ACMMG065 Create and interpret simple grid maps to show position and pathways		
Quest: Grid referenced maps		
Learning Journey Interpreting and creating grid referenced maps		
Steps	**Content**	**Detail**
1	Interpreting grid referenced maps	• establish that grid referencing on maps allows for more accurate description of features/ locations • understand the structure (letter then number, horizontal then vertical) and meaning of grid references (everything in that grid square) • use grid references to describe features/locations on maps • identify features/locations on maps given their gird reference
2	Creating grid referenced maps	• draw grid referenced maps of familiar locations such as the classroom, school or local area • use technology to create grid referenced maps of familiar locations such as the classroom, school or local area
3	Drawing pathways on grid referenced maps	• draw a path from 1 feature to another on a grid referenced map given the grid reference of each feature • use grid references to describe a path from 1 feature to another on a grid referenced map
ACMMG066 Identify symmetry in the environment		
Quest: Lines of symmetry		
Learning Journey Recognising and drawing lines of symmetry		
1	Recognising line symmetry in the environment	• observe and describe symmetry informally in everyday objects, pictures, designs and shapes • identify shapes that are symmetrical and are not symmetrical by folding to test for symmetry • sort objects, pictures, designs and/or shapes according to whether they are symmetrical or not • draw a single line of symmetry on given pictures, designs and shapes
2	Recognising line symmetry of shapes	• define the line of symmetry of a two-dimensional shape as a line across which the shape can be folded into 2 matching parts • identify a line of symmetry in two-dimensional shapes • sort two-dimensional shapes according to whether they are symmetrical or not
3	Drawing lines of symmetry on given designs and shapes	• recognise that some designs and shapes may have more than 1 line of symmetry • identify and draw all lines of symmetry on designs and shapes • determine the total number of lines of symmetry on designs and shapes • determine whether or not a given line through designs and shapes is a line of symmetry

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Statistics and Probability

Chance

ACMSP067 Conduct chance experiments, identify and describe possible outcomes and recognise variation in results		
Quest: Conducting chance experiments		
Learning Journey Conducting chance experiments		
Steps	**Content**	**Detail**
1	Introducing chance experiments (with equal outcomes)	• use the term 'outcome' to describe any possible result of a chance experiment • predict and list all possible outcomes in a chance experiment, eg list the outcomes when 3 pegs are randomly selected from a bag containing an equal number of pegs of 2 colours • predict the number of times each outcome should occur in a chance experiment involving a set number of trials
2	Conducting chance experiments (with equal outcomes)	• predict and list all possible outcomes in a chance experiment, eg list the outcomes when 3 pegs are randomly selected from a bag containing an equal number of pegs of 2 colours • keep a tally and graph the results of a chance experiment • explain any differences between expected results and actual results in a chance experiment; make statements that acknowledge 'randomness' in a situation, eg 'The spinner could stop on any colour'
3	Introducing chance experiments (with unequal outcomes)	• use the term 'outcome' to describe any possible result of a chance experiment • predict and list all possible outcomes in a chance experiment, eg describe the probability of spinning red when you spin a spinner that has 1/2 shaded yellow, 1/4 shaded blue and 1/4 shaded red • predict the number of times each outcome should occur in a chance experiment involving a set number of trials
4	Conducting chance experiments (with unequal outcomes)	• predict and list all possible outcomes in a chance experiment, eg describe the probability of spinning red when you spin a spinner that has 1/2 shaded yellow, 1/4 shaded blue and 1/4 shaded red • keep a tally and graph the results of a chance experiment • explain any differences between expected results and actual results in a chance experiment; make statements that acknowledge 'randomness' in a situation, eg 'The spinner could stop on any colour'
5	Introducing chance situations	• predict and record all possible combinations in a chance situation, eg list all possible outfits when choosing from three different T-shirts and 2 different pairs of shorts • record and explain possible combinations using a list, table or diagram • repeat a chance experiment several times and discuss why the results vary

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP068 Identify questions or issues for categorical variables. Identify data sources and plan methods of data collection and recording		
Quest: Data sources and collection		
Learning Journey Introducing the statistical investigation process		
Steps	**Content**	**Detail**
1	Introducing the statistical investigation process (including line plots)	• determine what data to gather in order to investigate a question of interest, eg colour, mode of transport, gender, type of animal, sport • collect data through questioning and record the data using tally marks • identify categories of data and use them to sort data, eg sort data collected on attendance by day of the week and into boys and girls present • represent numerical or category data in a table, list or picture graph (one-to-one correspondence) • record observations based on data collected and displayed in a list, table, picture graph or line plot
2	Introducing the statistical investigation process (tables, lists, picture graphs or bar graphs)	• determine what data to gather in order to investigate a question of interest, eg colour, mode of transport, gender, type of animal, sport • collect data through questioning and record the data using tally marks • identify categories of data and use them to sort data, eg sort data collected on attendance by day of the week and into boys and girls present • represent category data in a table, list, bar graph or picture graph (one-to-one correspondence) • record observations based on data collected and displayed in a list, table, picture graph, or simple bar graph
Learning Journey Category data		
1	Posing questions related to category data	• pose questions about a matter of interest to obtain information that can be recorded in categories • adjust statistical questions to ensure their suitability • recognise that data can be collected by the user or others; identify possible sources of data collected by others, eg newspapers, government data-collection agencies, sporting agencies, environmental groups • pose questions based on category data recorded by others
2	Collecting and recording category data	• predict and create a list of categories for efficient data collection in relation to a matter of interest, eg 'Which breakfast cereal is the most popular with members of our class?' • collect data by conducting a simple survey and create a list or table (with and without digital technology) to organise the data, eg collect data on the number of each colour of lollies in a packet • compare collection and recording methods
ACMSP069 Collect data, organise into categories and create displays using lists, tables, picture graphs and simple column graphs, with and without the use of digital technologies		
Quest: Collecting and organising data		
Learning Journey Statistical investigations		
1	Constructing and interpreting tables	• determine what data to gather in order to investigate a statistical question collect, record and sort data • represent category data in a table, list, picture graph or column graph (including many-to-one correspondence) • make a simple concluding statement based on data collected
2	Conducting a simple statistical investigation (tables, lists, picture graphs, bar graphs)	• represent given or collected categorical data in tables using appropriate headings and structure • interpret data in tables to solve problems; answer comparative and summative questions

Australian Curriculum Year 3

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP069 Collect data, organise into categories and create displays using lists, tables, picture graphs and simple column graphs, with and without the use of digital technologies		
Quest: Collecting and organising data		
Learning Journey Representing and interpreting data displays		
Steps	**Content**	**Detail**
1	Introducing and reading data in column graphs with one-to-one correspondence	• become familiar with the structure and layout of a basic column graph including title, labels on each axis, equal spacing • answer one-step and two-step questions, eg, 'How many more students like reading than art?'; identify basic similarities and differences between categories; make simple conclusions • recognise and remedy errors in column graphs
2	Representing and reading data in a given column graph with one-to-one correspondence	• complete a vertical or horizontal column graph (one-to-one correspondence) ; choose the correct title for a bar graph • answer one-step and two-step questions, eg, 'How many more students like reading than art?'; identify basic similarities and differences between categories; make simple conclusions • agree or disagree with simple statements made by others related to data in a column graph
3	Representing and reading data displayed in tables or lists	• display category or numerical data using lists and tables • pose questions and answer one-step and two-step questions, eg 'How many more students like reading than art?'; identify basic similarities and differences between categories; make simple conclusions
4	Representing and reading category data in a table	• represent primary or secondary data in a given table using appropriate headings and layout • interpret data in a table; ask and answer summative and comparative questions
ACMSP070 Interpret and compare data displays		
Quest: Data displays		
Learning Journey Comparing data displays		
1	Comparing basic data displays (tables, lists, picture graphs, column graphs)	• represent the same data set using more than one type of display (tables, lists, picture graphs or column graphs) and compare the displays • discuss the advantages and/or disadvantages of different representations of the same data • describe information and make conclusions about data presented in different data displays, eg 'Football is the most popular sport for students in Year 3 at our school'

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA071 Investigate and use the properties of odd and even numbers		
Quest: Properties of odd and even numbers		
Learning Journey Odd and even numbers		
Steps	**Content**	**Detail**
1	Using the properties of odd and even numbers	• investigate and generalise the result of adding, subtracting and multiplying pairs of even numbers, pairs of odd numbers, or one even and one odd number, eg even + odd = odd, odd × odd = odd • explain why the result of a calculation is even or odd with reference to the properties of the numbers used in the calculation • predict whether the answer to a calculation will be even or odd by using the properties of the numbers in the calculation • investigate the place value of digits within odd and even numbers
ACMNA072 Recognise, represent and order numbers to at least tens of thousands		
Quest: Numbers up to 5 digits		
Learning Journey Comparing and ordering numbers up to 5 digits		
1	Comparing 5-digit numbers using words and symbols	• compare two 5-digit numbers using words and symbols <, =, >
2	Ordering numbers up to 5 digits	• arrange numbers of up to 5 digits in ascending and descending order
Learning Journey Place value up to 5 digits		
1	Reading and writing numbers up to 5 digits	• apply an understanding of place value to read numbers up to 5 digits • apply an understanding of place value to write numbers up to 5 digits
2	Identifying the place value of digits in numbers up to 5 digits	• state the place value of digits in numbers of up to 5 digits • pose and answer questions that extend place value understanding of numbers, eg 'What happens if I rearrange the digits in the number 12 345?', 'How can I rearrange the digits to make the largest number?' • represent and describe whole numbers to 10 000 pictorially and symbolically
3	Finding the number 1000 more or 1000 less than a given number	• apply an understanding of place value to find the number 1000 more or 1000 less
Learning Journey Using place value to partition: up to 5 digits		
1	Using place value to partition 5-digit numbers	• use place value to partition numbers of up to 5 digits, eg 67 012 is 60 000 + 7000 + 10 + 2
2	Using non-standard partitioning with 5-digit numbers	• partition numbers of up to 5 digits in non-standard forms, eg 67 000 as 50 000 + 17 000
3	Understanding the relationship between place value positions	• recognise that in a multi-digit number a digit in 1 place represents 10 times as much as it represents in the place to its right • recognise that in a multi-digit number a digit in 1 place represents 1/10 of what it represents in the place to its left
Learning Journey Using place value to partition: up to 5 digits		
1	Rounding 5-digit numbers	• round to the nearest 10, 100, 1000 or 10 000

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA073 Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems		
Quest: Addition and subtraction strategies		
Learning Journey Representing problems using a bar model		
Steps	**Content**	**Detail**
1	Representing addition problems using a bar model (within 1000)	• represent an addition problem where the result is unknown, eg 'Anna had 58 marbles. Sam gave her 27 more. How many marbles does Anna have now?' • represent addition problems where the change or part is unknown, eg 'Anna has 58 marbles, how many more does she need to have 73? or Anna had 53 marbles. 17 were yellow. How many were red?' • represent addition problems where the start is unknown, eg 'Anna had some marbles. Sam gave her 17 more. Now she has 53. How many did she have to start with?' • solve addition problems represented on a bar model using efficient mental strategies
2	Representing subtraction problems using a bar model (within 1000)	• represent subtraction problems where the result is unknown, eg 'Anna had 52 marbles. She gave 17 to Sam. How many marbles does she have left?' • represent and solve subtraction problems where the change is unknown, eg 'Anna had 52 marbles. She gave some to Sam. Now she has 15 left. How many marbles did she give to Sam?' • represent and solve subtraction problems where the start is unknown, eg 'Anna gave 27 marbles to Sam. Now she has 5 marbles left. How many marbles did Anna begin with?' • solve subtraction problems represented on a bar model using efficient mental strategies
3	Representing comparison problems using a bar model (within 1000)	• represent and solve comparison problems where the difference is unknown, eg 'Anna has 13 plums. Sam has 7 plums. How many more plums does Anna have?' • represent and solve comparison problems where the referent is unknown, eg 'Anna has 43 marbles. She has 17 more than Sam. How many marbles does Sam have?' • represent and solve subtraction problems where the comparison quantity is unknown, eg 'Sam has 17 marbles. Anna has 35 more marbles. How many marbles does Anna have?' • solve comparison problems represented on a bar model using efficient mental strategies
Learning Journey Add/subtract: efficient strategies		
1	Choosing efficient mental addition strategies with numbers up to five digits	• apply place value and partitioning to rearrange and regroup numbers to assist with calculations, eg use rounding and compensating, bar model, jump strategies, split strategies, place value strategies or bridging strategies • use a range of recording methods to solve addition problems, eg number sentences, empty number line, regrouping
3	Solving one-step word problems using efficient mental addition strategies with numbers up to five digits	• solve addition word problems using mental strategies
2	Choosing efficient mental subtraction strategies with numbers up to five digits	• apply place value and partitioning to rearrange and regroup numbers to assist with calculations, eg use rounding and compensating, jump strategies, split strategies, place value strategies or bridging strategies • use a range of recording methods to solve subtraction problems, eg number sentences, empty number line, regrouping
4	Solving word problems using efficient mental subtraction strategies with numbers up to five digits	• solve subtraction word problems using mental strategies

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA073 Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems		
Quest: Addition and subtraction strategies		
Learning Journey Posing addition and subtraction problems		
Steps	**Content**	**Detail**
1	Posing simple addition problems	• pose a simple word problem to represent an addition number sentence • select number ranges that are appropriate for the context
2	Posing simple subtraction problems	• pose a simple word problem to represent a subtraction number sentence; represent both 'take away' and 'comparison' problems • select number ranges that are appropriate for the context; must take the smaller value away from the larger value
Learning Journey Addition algorithms (without carrying)		
1	Using a formal written algorithm for addition calculations up to two-digit numbers (no carrying)	• apply algorithms to solve problems without carrying, with the same number of places and with a different number of places • use estimation or reverse operation to check the reasonableness of solutions
2	Using a formal written algorithm for addition calculations up to three-digit numbers (no carrying)	• apply algorithms to solve problems without carrying, with the same number of places and with a different number of places • use estimation or reverse operation to check the reasonableness of solutions
3	Using a formal written algorithm for addition calculations up to four-digit numbers (no carrying)	• apply algorithms to solve problems without carrying, with the same number of places and with a different number of places • use estimation or reverse operation to check the reasonableness of solutions
4	Using a formal written algorithm for addition calculations up to five-digit numbers (no carrying)	• apply algorithms to solve problems without carrying, with the same number of places and with a different number of places; include opportunities for students to write their own algorithms with digits in correct place value positions; include word problems • use estimation or reverse operation to check the reasonableness of solutions
Learning Journey Addition algorithms (with carrying)		
1	Using a formal written algorithm for addition calculations up to two-digit numbers (with carrying)	• apply algorithms to solve problems with carrying in 1 or more places, with the same number of places and with a different number of places • use estimation or reverse operation to check the reasonableness of solutions
2	Using a formal written algorithm for addition calculations with three-digit and one-digit numbers (with carrying)	• apply algorithms to solve problems with carrying; include opportunities for students to write their own algorithms with digits in correct place value positions; include word problems • use estimation or reverse operation to check the reasonableness of solutions
	Using a formal written algorithm for addition calculations with three-digit and two-digit numbers (with carrying)	• apply algorithms to solve problems with carrying in 1 or more places; include opportunities for students to write their own algorithms with digits in correct place value positions; include word problems • use estimation or reverse operation to check the reasonableness of solutions

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and place value

ACMNA073 Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems		
Quest: Addition and subtraction strategies		
Learning Journey Addition algorithms (with carrying)		
Steps	**Content**	**Detail**
3	Using a formal written algorithm for addition calculations of two three-digit numbers (with carrying)	• apply algorithms to solve problems with carrying in 1 or more places; include opportunities for students to write their own algorithms with digits in correct place value positions; include word problems • use estimation or reverse operation to check the reasonableness of solutions
	Using a formal written algorithm for addition calculations up to three-digit numbers (with carrying)	• apply algorithms to solve problems with carrying in 1 or more places, with the same number of places and with a different number of places; include opportunities for students to write their own algorithms with digits in correct place value positions; include word problems • use estimation or reverse operation to check the reasonableness of solutions
4	Using a formal written algorithm for addition calculations up to four-digit numbers (with carrying)	• apply algorithms to solve problems with carrying in 1 or more places, with the same number of places and with a different number of places; include opportunities for students to write their own algorithms with digits in correct place value positions; include word problems • use estimation or reverse operation to check the reasonableness of solutions
5	Using a formal written algorithm for addition calculations up to five-digit numbers (with carrying)	• apply algorithms to solve problems with carrying in 1 or more places, with the same number of places and with a different number of places; include opportunities for students to write their own algorithms with digits in correct place value positions; include word problems • use estimation or reverse operation to check the reasonableness of solutions
Learning Journey Addition algorithms (with/without carrying)		
1	Using a formal written algorithm for addition calculations of 3 or more addends up to two digits (with and without carrying)	• apply algorithms with 3 or more addends with the same number of places and with a different number of places
2	Using a formal written algorithm for addition calculations of 3 or more addends up to 3 digits (with and without carrying)	• apply algorithms with 3 or more addends with the same number of places and with a different number of places; include number range that involves carrying more than 1 ten or hundred; include word problems • use estimation to check the reasonableness of solutions
3	Using a formal written algorithm for addition calculations of 3 or more addends up to four digits (with and without carrying)	• apply algorithms with 3 or more addends with the same number of places and with a different number of places; include number range that involves carrying more than 1 ten, hundred or thousand; include word problems
4	Using a formal written algorithm for addition calculations of 3 or more addends up to 5 digits (with and without carrying)	• apply algorithms with 3 or more addends with the same number of places and with a different number of places; include number range that involves carrying more than 1 in one or more places; include word problems

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and place value

ACMNA073 Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems		
Quest: Addition and subtraction strategies		
Learning Journey Subtraction algorithms (without decomposing)		
Steps	**Content**	**Detail**
1	Using a formal written algorithm to record subtraction calculations involving up to two-digit numbers (without decomposing)	• apply algorithms to solve problems without trading (decomposing), with the same number of places for both numbers, with fewer places in the second number (subtrahend) and with and without 1 or more zeros in the first number (minuend); include opportunities for students to write their own algorithms with digits in correct place value positions and with the larger number first; include word problems • use estimation or reverse operation to check the reasonableness of solutions
2	Using a formal written algorithm to record subtraction calculations involving up to three-digit numbers (without decomposing)	• apply algorithms to solve problems without trading (decomposing), with the same number of places for both numbers, with fewer places in the second number (subtrahend) and with and without 1 or more zeros in the first number (minuend); include opportunities for students to write their own algorithms with digits in correct place value positions and with the larger number first; include word problems • use estimation or reverse operation to check the reasonableness of solutions
3	Using a formal written algorithm to record subtraction calculations involving up to four-digit numbers (without decomposing)	• apply algorithms to solve problems without trading (decomposing), with the same number of places for both numbers, with fewer places in the second number (subtrahend) and with and without 1 or more zeros in the first number (minuend); include opportunities for students to write their own algorithms with digits in correct place value positions and with the larger number first; include word problems • use estimation or reverse operation to check the reasonableness of solutions
4	Using a formal written algorithm to record subtraction calculations involving up to five-digit numbers (without decomposing)	• apply algorithms to solve problems without trading (decomposing), with the same number of places for both numbers, with fewer places in the second number (subtrahend) and with and without 1 or more zeros in the first number (minuend); include opportunities for students to write their own algorithms with digits in correct place value positions and with the larger number first; include word problems • use estimation or reverse operation to check the reasonableness of solutions
Learning Journey Subtraction algorithms (with decomposing)		
1	Using a formal written algorithm to record subtraction calculations involving up to two-digit numbers (with decomposing)	• apply algorithms to solve problems with trading (decomposing) in one or more places, with the same number of places for both numbers, with fewer places in the second number (subtrahend) and with and without one or more zeros in the first number (minuend); include opportunities for students to write their own algorithms with digits in correct place value positions and with the larger number first; include word problems • use estimation or reverse operation to check the reasonableness of solutions
2	Using a formal written algorithm to record subtraction calculations involving up to three-digit numbers (with decomposing)	• apply algorithms to solve problems with trading (decomposing) in 1 or more places, with the same number of places for both numbers, with fewer places in the second number (subtrahend) and with and without 1 or more zeros in the first number (minuend); include opportunities for students to write their own algorithms with digits in correct place value positions and with the larger number first; include word problems • use estimation or reverse operation to check the reasonableness of solutions
3	Using a formal written algorithm to record subtraction calculations involving up to four-digit numbers (with decomposing)	• apply algorithms to solve problems with trading (decomposing) in 1 or more places, with the same number of places for both numbers, with fewer places in the second number (subtrahend) and with and without 1 or more zeros in the first number (minuend); include opportunities for students to write their own algorithms with digits in correct place value positions and with the larger number first; include word problems • use estimation or reverse operation to check the reasonableness of solutions
4	Using a formal written algorithm to record subtraction calculations involving up to five-digit numbers (with decomposing)	• apply algorithms to solve problems with trading (decomposing) in 1 or more places, with the same number of places for both numbers, with fewer places in the second number (subtrahend) and with and without 1 or more zeros in the first number (minuend); include opportunities for students to write their own algorithms with digits in correct place value positions and with the larger number first; include word problems • use estimation or reverse operation to check the reasonableness of solutions

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and place value

ACMNA073 Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems		
Quest: Addition and subtraction strategies		
Learning Journey Add/subtract: word problems		
Steps	**Content**	**Detail**
1	Solving addition and subtraction two-step problems in context (max sum 1000)	• read and interpret a word problem • decide which operations and strategies to use and explain why • solve an addition and subtraction two-step problem
ACMNA074 Investigate number sequences involving multiples of 3, 4, 6, 7, 8, and 9		
Quest: Investigating sequences with multiples		
Learning Journey Investigating sequences with multiples		
1	Investigating number sequences involving multiples of 3, 4, 6, 7, 8 and 9	• generate number patterns using multiples of 3, 4, 6, 7, 8 and 9 • investigate visual number patterns on a number chart • find missing terms in a number sequence
ACMNA075 Recall multiplication facts up to 10 × 10 and related division facts		
Quest: Multiplication and division facts		
Learning Journey Multiplication/division facts for 4		
1	Recalling multiplication facts for 4	• recall the multiplication facts for 4
	Using multiplication facts for 4	• solve and create multiplication problems in context (using multiplication facts for 4), including word problems
2	Dividing by 4	• model and describe the related multiplication and division facts for 4 using models, drawings or manipulatives, eg 4 x 3 = 12 and 12 divided by 3 = 4 • relate division to how many (whole) times the divisor goes into the dividend
	Recalling division facts for 4	• recall the division facts for 4
3	Using division facts for 4	• solve and create division problems in context (using multiplication facts for 4), including word problems
4	Multiplying and dividing by 4	• recall the multiplication facts and related division facts for 4 • solve multiplication and division problems with 4, including word problems
Learning Journey Multiplication/division facts up to 5		
1	Multiplying by 2, 5, 3 and 4 (1 - 10)	• recall the multiplication facts for 2s, 5s, 3s and 4s • solve multiplication problems with 2, 5, 3 and 4, including word problems
2	Dividing by 2, 5, 3 and 4 (1 - 10)	• recall the division facts for 2s, 5s, 3s and 4s • solve division problems with 2, 5, 3 and 4, including word problems
3	Multiplying and dividing by 2, 5, 3 and 4 (1 - 10)	• recall the multiplication and division facts for 2s, 5s, 3s and 4s • solve multiplication and division problems with 2, 5, 3 and 4, including word problems
4	Recalling multiplication facts to 5 x 5	• recall multiplication facts to 5 x 5

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA075 Recall multiplication facts up to 10 × 10 and related division facts		
Quest: Multiplication and division facts		
Learning Journey Multiplication/division facts and properties		
Steps	**Content**	**Detail**
1	Relating multiplication and division facts through fact families	• model and describe the fact families for 2, 3, 4, 5 and 10 multiplication facts, eg 3 x 4 = 12, 4 x 3 = 12, 12 divided by 3 = 4 and 12 divided by 4 equals 3 • explain why a rectangular array can be read as a division in 2 ways by forming vertical or horizontal groups, eg 12 ÷ 3 = 4 or 12 ÷ 4 = 3
2	Recalling multiplication facts up to 10 × 10 with automaticity	• recall facts in order • recall facts in random order • create a table or simple spreadsheet to record multiplication facts
3	Using the commutative property of multiplication up to 10 x 10	• use the commutative property of multiplication, eg 7 x 9 = 9 x 7
Learning Journey Exploring multiplication/division for 6 up to 60		
1	Exploring multiplication by 6 up to 60	• use concrete materials, models, drawings, number lines/charts to skip count by 6 from zero; explore patterns of the multiplication facts for 6 on a number chart • relate multiplication by 6 to double multiplication by 3
2	Recalling and using multiplication facts for 6 (up to 60)	• recall the multiplication facts for 6 • solve multiplication problems with 6 including word problems
3	Dividing by 6 up to 60	• model and describe the related multiplication and division facts for 6 using models, drawings or manipulatives, eg 6 x 3 = 18 and 18 divided by 3 = 6 • relate division to how many (whole) times the divisor goes into the dividend
4	Recalling and using division facts for 6 up to 60	• recall the division facts for 6 • solve division problems with 6 including word problems
5	Multiplying and dividing by 6 up to 60	• recall the multiplication facts and related division facts for 6 • solve multiplication and division problems with 6, including word problems
Learning Journey Exploring multiplication/division for 7 up to 70		
1	Exploring multiplication by 7 up to 70	• use concrete materials, models, drawings, number lines/charts to skip count by 7 from zero; explore patterns of the multiplication facts for 7 on a number chart
2	Recalling and using multiplication facts for 7 (up to 70)	• recall the multiplication facts for 7 • solve multiplication problems with 7 including word problems
3	Dividing by 7 up to 70	• model and describe the related multiplication and division facts for 7 using models, drawings or manipulatives, eg 7 x 3 = 21 and 21 divided by 3 = 7 • relate division to how many (whole) times the divisor goes into the dividend
4	Recalling and using division facts for 7 up to 70	• recall the division facts for 7 • solve division problems with 7 including word problems
5	Multiplying and dividing by 7 up to 70	• recall the multiplication facts and related division facts for 7 • solve multiplication and division problems with 7, including word problems

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA075 Recall multiplication facts up to 10 × 10 and related division facts		
Quest: Multiplication and division facts		
Learning Journey Exploring multiplication/division for 8 up to 80		
Steps	**Content**	**Detail**
1	Exploring multiplication by 8 up to 80	• use concrete materials, models, drawings, number lines/charts to skip count by 8 from zero; explore patterns of the multiplication facts for 8 on a number chart • relate multiplication by 8 to double multiplication by 4
2	Recalling and using multiplication facts for 8 (up to 80)	• recall the multiplication facts for 8 • solve multiplication problems with 8 including word problems
3	Dividing by 8 up to 80	• model and describe the related multiplication and division facts for 8 using models, drawings or manipulatives, eg 8 x 3 = 24 and 24 divided by 3 = 8 • relate division to how many (whole) times the divisor goes into the dividend
4	Recalling and using division facts for 8 up to 80	• recall the division facts for 8 • solve division problems with 8 including word problems
5	Multiplying and dividing by 8 up to 80	• recall the multiplication facts and related division facts for 8 • solve multiplication and division problems with 8, including word problems
Learning Journey Exploring multiplication/division for 9 up to 90		
1	Exploring multiplication by 9 up to 90	• use concrete materials, models, drawings, number lines/charts to skip count by 9 from zero; explore patterns of the multiplication facts for 9 on a number chart • relate multiplication by 9 to multiplication by 10 (multiply by 10 and then subtract the extra group)
2	Recalling and using multiplication facts for 9 (up to 90)	• recall the multiplication facts for 9 • solve multiplication problems with 9 including word problems
3	Dividing by 9 up to 90	• model and describe the related multiplication and division facts for 9 using models, drawings or manipulatives, eg 9 x 3 = 27 and 27 divided by 3 = 9 • relate division to how many (whole) times the divisor goes into the dividend
4	Recalling and using division facts for 9 up to 90	• recall the division facts for • solve division problems with 9 including word problems
5	Multiplying and dividing by 9 up to 90	• recall the multiplication facts and related division facts for 9 • solve multiplication and division problems with 9, including word problems
ACMNA076 Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder		
Quest: Mult and div strategies, no remainder		
Learning Journey Multiplying 2-digit numbers by multiples of 100		
1	Representing and using known facts to solve multiplication and division problems with multiples of 10 and 100	• represent with models/diagrams and use known facts and place value understanding to solve multiplication problems with multiples of 10 or 100, eg 3 x 6 = 18 so 3 x 600 = 1800 • use known facts and place value understanding to solve division problems with multiples of 10 or 100, eg 18 ÷ 6 = 3 so 1800 ÷ 600 = 3 • explain and justify the use of the strategy
2	Representing and using known facts to multiply two 2-digit multiples of 100	• represent with models/diagrams and use known facts and place value understanding to multiply 2 multiples of 100, eg 300 x 400 = 3 x 4 = 12 so 300 x 400 = 1200 • know that multiplying by 100 shifts the digits 2 places to the left
3	Representing and using known facts to multiply 2-digit numbers by 100	• represent with models/diagrams and use known facts and place value understanding to multiply 2-digit numbers by 100, eg 13 x 100 = 10 x 100 + 3 x 10 • know that multiplying by 100 shifts the digits 2 places to the left

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA076 Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder		
Quest: Mult and div strategies, no remainder		
Learning Journey Dividing 3-digit numbers by 10		
Steps	**Content**	**Detail**
1	Representing and using known facts to divide 3-digit numbers by 10	• represent with models/diagrams and use known facts and place value understanding to divide 2-digit numbers by 10, eg 460 ÷10 = 46 • know that dividing by 10 shifts the digits 1 place to the right
Learning Journey Multiplication strategies: 1-digit numbers		
1	Representing and multiplying two 1-digit numbers using rounding and compensating	• represent with models/diagrams and use known facts to solve multiplication problems by adding on or taking off, eg 5 × 10 is 50, so 5 × 9 is 5 less, which is 45 • explain and justify the use of the strategy
2	Representing and multiplying two 1-digit numbers using doubling and related facts	• represent with models/diagrams and use the relationship between multiplication facts, eg the multiplication facts for 6 are double the multiplication facts for 3 • explain and justify the use of the strategy
3	Representing and multiplying two 1-digit numbers using repeated doubling	• represent with models/diagrams and use doubling and repeated doubling as a strategy to multiply by 2, 4 and 8, eg 7 × 8 is double 7, double again and then double again • explain and justify the use of the strategy
4	Representing and multiplying two 1-digit numbers using factorising	• represent with models/diagrams and split factors, eg 5 × 8 is the same as 5 × 2 × 4, which becomes 10 × 4 • explain and justify the use of the strategy
Learning Journey Using the conventions of multiplication		
1	Using the conventions of multiplication number sentences	• use the term 'product' to describe the result of multiplying 2 or more numbers • use the equals sign to record equivalent number relationships involving multiplication, and to mean 'is the same as', rather than to mean to perform an operation
Learning Journey Multiples and factors up to 100		
1	Introducing multiples up to 100	• find 'multiples' for a given whole number
2	Introducing factors for numbers up to 100	• determine 'factors' for a given whole number • connect number relationships involving multiplication to factors of a number
Learning Journey Inverse facts: multiplication and division		
1	Using inverse facts	• relate multiplication facts to their inverse division facts • relate division facts to their inverse multiplication facts
Learning Journey Practising multiplication strategies		
1	Multiplying 3 or more single-digit numbers using the commutative and associative properties	• apply the commutative property of multiplication • explore and apply the associative property of multiplication, eg 2 × 3 × 5 = 2 × 5 × 3 = 10 × 3 = 30

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA076 Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder		
Quest: Mult and div strategies, no remainder		
Learning Journey Multiplying 2-digit numbers by a 1-digit number		
Steps	**Content**	**Detail**
1	Representing and multiplying a 2-digit number by a 1-digit number using place value understanding and the distributive law	• represent and use place value to solve a multiplication fact, eg multiplying the tens and then the units, eg 7 × 19: 7 tens + 7 nines is 70 + 63, which is 133 • explain and justify the use of the strategy
2	Multiplying a 2-digit number by a 1-digit number using an area model	• use area model to solve multiplication problems • explain and justify the use of the strategy
3	Representing and multiplying a 2-digit number by a 1-digit number using doubling and related facts	• represent and use doubling to multiply a 2-digit and 1-digit number, eg 41 × 6 is 41 × 3, which is 123, and then double to obtain 246 • explain and justify the use of the strategy
Learning Journey Multiplying 2-digit numbers using doubling		
1	Representing and multiplying a 2-digit number by a 2, 4 or 8 using doubling and repeated doubling	• represent and use repeated doubling as a strategy to multiply, eg 23 × 2 is double 23, 23 × 4 is double 23 and double again, 23 × 8 is double 23, double again and double again • explain and justify the use of the strategy
Learning Journey Multiplying 2-digit numbers using factorising		
1	Representing and multiplying a 2-digit number by a 1-digit number using factorising (the associative property)	• represent and use factorising (factorise the larger number), eg 18 × 4 = 9 × 2 × 4 = 9 × 8 = 72 • explain and justify the use of the strategy
Learning Journey Selecting effective multiplication strategies		
1	Selecting efficient strategies to solve multiplication problems	• select and use a variety of mental and informal written strategies to solve multiplication problems • apply the inverse relationship of multiplication and division to justify answers • check the answer to a word problem using digital technologies • record mental strategies accurately
Learning Journey Comparisons using the language of multiplication		
1	Describing comparisons using the language of multiplication	• describe comparisons using the language of multiplication, eg 35 = 5 x 7 as 35 is 5 times as many as 7 and 7 times as many as 5
Learning Journey Dividing a 2-digit number by a 1-digit number		
1	Dividing a 2-digit number by a 1-digit number using the inverse relationship of multiplication and division (no remainders)	• divide a 2-digit number by a 1-digit number using the inverse relationship of multiplication and division, eg 63 ÷ 9 = 7 because 7 × 9 = 63
2	Dividing a 2-digit number by a 1-digit number using halving and repeated halving (no remainders)	• use halve to divide by 2 • use halve, halve to divide by 4 • use halve, halve, halve to divide by 8
3	Dividing a 2-digit number by a 1-digit number using related facts (no remainders)	• use related facts to divide a 2-digit number by a 1-digit number, eg to divide by 5, first divide by 10 and then multiply by 2

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Fractions and decimals

ACMNA077 Investigate equivalent fractions used in contexts		
Quest: Equivalent fractions		
Learning Journey Investigating equivalent fractions		
Steps	**Content**	**Detail**
1	Investigating simple equivalent fractions less than 1 using concrete materials and/or models (denominators 2, 3, 4, 5, 6, 8, 10)	• use models such as number lines, fraction strips, fraction walls to identify equivalent fractions • use concrete materials or models to show equivalent fractions, eg folding a strip of paper
2	Investigating equivalent fractions up to and including 1 whole using area models (denominators 2, 4 and 8; 3 and 6; 5 and 10 and 100)	• model, compare and represent the equivalence of fractions with related denominators by redividing the whole, using identical area models fraction walls and bar models
ACMNA078 Count by quarters halves and thirds, including with mixed numerals. Locate and represent these fractions on a number line		
Quest: Counting by fractions and mixed numerals		
Learning Journey Counting in halves and quarters		
1	Counting up to 10 in halves and quarters (symbols used)	• count up to 10 from any starting point in halves and quarters • use the number line to count with halves and quarters
Learning Journey Counting in thirds		
1	Counting in thirds on a number line up to 1	• represent fractions on a number line (in simple cases, eg identify 2/3 on a number line that already shows divisions in thirds)
2	Counting in thirds on a number line up to 3	• count in proper and improper fractions on a number line • identify whole number equivalence 3/3 = 1, 6/3 = 2
Learning Journey Mixed numerals on the number line		
1	Counting and representing mixed numerals on a number line up to 3 (thirds)	• count in mixed numerals on a number line up to 3 • locate and represent mixed numerals on a number line, including on a partially-completed number line
ACMNA079 Recognise that the place value system can be extended to tenths and hundredths. Make connections between fractions and decimal notation		
Quest: Place value to hundredths		
Learning Journey Using decimal tenths		
1	Introducing decimal notation	• identify decimal fractions in everyday use • understand that the decimal point is a mark that identifies the ones place, and indicates the change from whole numbers to parts of a whole • read decimal fractions correctly, ie 'six point nine' • understand that any numbers after the decimal point represent part of a whole
2	Introducing decimal tenths	• recognise that the place value system can be extended to tenths • represent tenths using concrete materials and written representations • recognise that tenths arise from dividing an object into 10 equal parts • recognise that tenths arise from dividing a one-digit number or quantity by 10 • identify decimals on a number line • represent decimals using models and place value equipment such as base ten and arrow cards, place value grid, hundred square
3	Comparing and ordering decimal tenths	• compare and order tenths using >, < and =
4	Counting in decimal tenths	• count forwards and backwards by tenths from any decimal number expressed to 1 decimal place, using concrete materials and number lines, eg use base ten materials to represent 3.7 and count forward: 3.8, 3.9, 4.0, 4.1, ...

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Fractions and decimals

ACMNA079 Recognise that the place value system can be extended to tenths and hundredths. Make connections between fractions and decimal notation		
Quest: Place value to hundredths		
Learning Journey Using decimal hundredths		
Steps	**Content**	**Detail**
1	Introducing decimal hundredths	• recognise that the place value system can be extended to tenths and hundredths • recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10 • state the place value of digits in decimal numbers of up to 2 decimal places • read decimal fractions correctly, ie 'six point one nine' rather than 'six point nineteen'
2	Counting in decimal hundredths	• count forwards and backwards by hundredths from any decimal number expressed to 2 decimal place, using concrete materials and number lines
3	Modelling and representing decimal fractions up to 2 decimal places	• model decimal fractions using concrete materials • represent decimal fractions, eg as fractions (tenths and hundredths), on number lines, using hundreds grids, in place value models and charts
4	Comparing and ordering decimal hundredths	• compare numbers with the same number of decimal places up to 2 decimal places
	Comparing decimal fractions up to 2 decimal places	• compare numbers with a different number of decimal places up to 2 decimal places using >, < and =
5	Connecting decimal fractions to common fractions involving hundredths	• understand the relationship between decimal fractions and common fractions involving hundredths
Learning Journey Partitioning decimal hundredths		
1	Partitioning decimal hundredths less than 1	• use place value to partition decimals of up to 2 decimal places, eg 5.37 = 5 + 3/10 + 7/100 • use place value charts and expanders to link decimal fractions to place value, eg base 10 blocks, hundreds grids
2	Partitioning decimal hundredths more than 1	• partition decimals of up to 2 decimal places in non-standard forms, eg 5.37 = 5 + 37/100 • use place value charts and expanders to link decimal fractions to place value, eg base 10 blocks, hundreds grids
Learning Journey Connecting fractions and decimal notation		
1	Connecting decimal fractions to common fractions involving tenths	• understand the relationship between decimal fractions and common fractions involving tenths • recognise and apply decimal notation to express whole numbers and tenths as decimals, eg 0.1 is the same as 1/10 • investigate equivalences using various methods, eg use a number line or a calculator to show that 1/2 is the same as 0.5 and 5/10
2	Connecting decimal fractions to common fractions involving tenths and hundredths	• understand the relationship between decimal fractions and common fractions involving tenths and hundredths • recognise and apply decimal notation to express whole numbers, tenths and hundredths as decimals, eg 0.1 is the same as 1/10 • investigate equivalences using various methods, eg use a number line or a calculator to show that 1/2 is the same as 0.5 and 5/10
3	Connecting decimal fractions to common fractions involving halves, fifths, tenths and hundredths	• understand the relationship between decimal fractions and common fractions involving halves, fifths, tenths and hundredths
4	Connecting decimal fractions to common fractions	• understand the relationship between decimal fractions and common fractions

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Money and financial mathematics

ACMNA080 Solve problems involving purchases and the calculation of change to the nearest five cents with and without digital technologies		
Quest: Solving money problems		
Learning Journey Addition and subtraction money problems		
Steps	**Content**	**Detail**
1	Using decimals to represent money	• recognise that 1 cent is one-hundredth of a dollar and connect decimal notation to money values in dollars and cents • calculate the total value of a group of notes and coins and record this value using decimal notation and the symbol $ • combine amounts of notes and coins to make a given amount of money in decimal notation • use the symbols $ and c correctly when recording amounts of money
2	Using money: Addition and subtraction problems	• use addition and subtraction to solve a variety of problems involving purchases of two or more items, including calculating change, and record the value using a decimal point and the symbol $ • use estimation to check the reasonableness of solutions to problems involving purchases and calculation of change

Patterns and algebra

ACMMG064 Identify angles as measures of turn and compare angle sizes in everyday situations		
Quest: Exploring number patterns		
Learning Journey Exploring number patterns		
Steps	**Content**	**Detail**
1	Exploring number patterns resulting from performing multiplication	• find a higher term in a number pattern resulting from performing multiplication, given the first few terms, eg determine the next term in the pattern 4, 8, 16, 32, 64, ... • describe how the next term in a number pattern is calculated, eg 'Each term in the pattern is double the previous term' • find missing terms in a number sequence
ACMNA082 Solve word problems by using number sentences involving multiplication or division where there is no remainder		
Quest: Multiplication & division word problems		
Learning Journey Expressing equations as word problems		
1	Expressing given one-step word problems as a multiplication or division number sentences and solving	• represent and solve multiplication and division word problems (up to 10 x 10 multiplication ad division facts) using number sentences with a symbol for the unknown, eg 'Anne spent $28 dollars on tickets to a show for her friends. If 7 friends are coming to the show, what was the cost of each ticket?' • discuss whether it is more appropriate to represent the problem using x or ÷ in order to calculate the solution
2	Expressing given one-step equations as word problems	• express given addition or subtraction equations as word problems (up to 2 digit with 2-digit addition or subtraction) • express given multiplication or division equations as word problems (using multiplication facts up to 10 x 10)

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Number and Algebra

Patterns and algebra

ACMNA082 Solve word problems by using number sentences involving multiplication or division where there is no remainder		
Quest: Multiplication & division word problems		
Learning Journey Mult/div: Solving word problems		
Steps	**Content**	**Detail**
1	Solving two-step multiplication and/or division word problems, including correspondence problems	• solve two-step word problems in context involving multiplication and division; choose the appropriate operation
2	Solving multi-step multiplication and/or division word problems	• solve multi-step word problems involving multiplication and division • represent unknown with a letter
3	Selecting efficient strategies to solve division problems	• select and use a variety of mental and informal written strategies to solve division problems • apply the inverse relationship of multiplication and division to justify answers • check the answer to a word problem using digital technologies • record mental strategies accurately
ACMNA083 Find unknown quantities in number sentences involving addition and subtraction and identify equivalent number sentences involving addition and subtraction		
Quest: Addition & subtraction number sentences		
Learning Journey Using number sentences to find unknown quantities		
1	Using inverse operations to complete addition and/or subtraction number sentences (2-digit numbers)	• complete number sentences involving addition and subtraction by calculating missing numbers, eg find the missing numbers: □ + 55 = 83, □ − 15 = 19 • use inverse operations to complete number sentences • justify solutions when completing number sentences
2	Finding missing numbers where there are addition and/or subtraction operations on both sides of the equals sign	• find the missing number in a number sentence involving operations of addition or subtraction on both sides of the equals sign, eg 8+□=6+7

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Using units of measurement

ACMMG084 Use scaled instruments to measure and compare lengths, masses, capacities and temperatures		
Quest: Length, mass, capacity and temperature		
Learning Journey Metric units of length		
Steps	**Content**	**Detail**
1	Using scaled instruments to measure length	• select and use an appropriate device to measure lengths and check accuracy of estimations • explain why 2 students may obtain different measures for the same length
2	Selecting appropriate units of measurement: metres, centimetres, millimetres	• explore the appropriateness of units when measuring length • select and justify the most appropriate metric unit to measure given lengths and distances
3	Converting between metres and centimetres (whole numbers only)	• describe 1 m as 100 cm • convert between metres and centimetres using whole numbers, eg 3 m is the same as 300 cm • record measurement equivalents in a table • explain the relationship between the size of a unit and the number of units needed
4	Converting between centimetres and millimetres (whole numbers only)	• describe 1 m as 100 cm • convert between metres and centimetres using whole numbers, eg 3 m is the same as 300 cm • record measurement equivalents in a table • explain the relationship between the size of a unit and the number of units needed
Learning Journey Length and 3D objects		
1	Applying length to attributes of three-dimensional objects	• recognise the features of a three-dimensional object associated with length that can be measured • describe the length, height and width of a three-dimensional object
Learning Journey Introducing perimeter		
1	Introducing perimeter	• use the term 'perimeter' to describe the total distance around a two-dimensional shape • estimate and measure the perimeters of two-dimensional shapes • describe when a perimeter measurement might be used in everyday situations
Learning Journey Temperature		
1	Using the language of temperature	• identify benchmarks for freezing, cold, cool, warm, hot and boiling temperatures (water) • identify benchmarks for cold, cool, warm and hot temperatures (air)
2	Introducing thermometers	• estimate temperature using personal reference • use a standard thermometer to determine whether temperature is rising or falling • relate thermometers to the number line • introduce the unit of degrees to record temperatures • recognise and read temperatures in everyday situations, eg weather report, cooking
3	Measuring temperature	• recognise the need for formal units to measure temperature • use a thermometer to measure and compare temperatures to the nearest degree Celsius • record temperatures to the nearest degree Celsius using the symbol for degrees (°) • use a digital or analogue thermometer to take and record daily temperature readings

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Using units of measurement

ACMMG084 Use scaled instruments to measure and compare lengths, masses, capacities and temperatures		
Quest: Length, mass, capacity and temperature		
Learning Journey Measuring capacity in millilitres		
Steps	**Content**	**Detail**
1	Introducing standard measurements in millilitres	• know that a standard cup is 250 mL and a standard teaspoon is 5 mL • recognise standard measurements in everyday contexts such as cooking
2	Introducing formal units for volume and capacity: millilitres	• recognise the need for a formal unit smaller than the litre to measure volume and capacity • recognise that there are 1000 millilitres in 1 litre, ie 1000 millilitres = 1 litre • relate the millilitre to familiar everyday containers and familiar informal units, eg 250 mL fruit juice containers, 1 teaspoon is approximately 5 mL
3	Reading scales with 100 millilitre markings	• read a scale where every 100 mL is marked and labelled • read a scale where every 100 mL is marked and half and I litre are labelled • read a scale where every 100 mL is marked and every other 100 mL is labelled
4	Measuring with millilitres to the nearest 100 mL	• use the millilitre as a unit to measure volume and capacity, using a device calibrated in millilitres (read to the nearest 100 mL with every 100 mL or every other 100 mL marked) • record volumes and capacities using the abbreviation for millilitres (mL) • estimate the capacity of a container in millilitres and check by measuring (measure to the nearest 100 mL with every 100 mL or every other 100 mL marked) • compare and order the capacities of 2 or more containers measured in millilitres
Learning Journey Measuring mass in grams and kilograms		
1	Investigating mass in packaging	• interpret information about mass on commercial packaging • estimate the mass of a substance in a partially-filled container/packet from the information on the label
2	Introducing formal units for mass: the gram	• establish the need for a smaller unit of mass and introduce the gram, including that 1000 grams = 1 kilogram • develop a sense of the mass of standard everyday objects in grams, eg an egg is about 50 grams • identify everyday situations where grams are an appropriate unit for measuring the mass • introduce the abbreviation 'g' for recording mass in grams and record masses • calculate the number of grams in a whole number of kilograms • interpret simple fractions (¼, ½, ¾) of a kilogram and relate these to the number of grams
3	Measuring in grams	• estimate mass using personal references for grams and 'guess and check' • measure mass in grams by using and interpreting varied scales and images of scales • record mass in grams using the appropriate abbreviation (g)
4	Measuring in grams and kilograms	• estimate mass using personal references for grams and kilograms • choose appropriate standard units to estimate and measure (g/kg) • measure mass in grams and kilograms by using and interpreting varied scales • record mass in grams, kilograms and mixed units using the appropriate abbreviations (g), (kg), eg 5 kg and 500 g
ACMMG290 Compare objects using familiar metric units of area and volume		
Quest: Area and volume		
Learning Journey Comparing area using metric units		
1	Comparing and ordering rectangular areas using counting of standard metric units	• compare two areas by measuring using standard metric units • order three or more areas by measuring using standard metric units • choose the most appropriate unit cm^2 or m^2 and justify selection

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Using units of measurement

ACMMG290 Compare objects using familiar metric units of area and volume		
Quest: Area and volume		
Learning Journey Using cubic cm to measure volume		
Steps	**Content**	**Detail**
1	Using unit cubes to measure volume	• measure volumes by counting unit cubes, using cubic centimetres, cubic inches, cubic feet and improvised units
2	Estimating and measuring volume using cubic centimetre blocks	• use the cubic centimetre as a unit to measure volumes by packing small containers with cubic-centimetre blocks and describing in terms of layers, eg '2 layers of 10 cubic-centimetre blocks' • construct three-dimensional objects using cubic-centimetre blocks and count the blocks to determine the volumes of the objects; devise and explain strategies for counting blocks • compare the volumes of 2 or more objects made from cubic-centimetre blocks by counting blocks • record volumes using the abbreviation for cubic centimetres (cm^3)
3	Using cubic centimetres to measure volume	• measure the volumes of rectangular containers by packing them with cubic-centimetre blocks • explain the advantages and disadvantages of using cubic-centimetre blocks as a unit to measure volume • describe arrangements of cubic-centimetre blocks in containers in terms of layers • connect the layers of blocks with multiplying the dimensions
ACMMG085 Convert between units of time		
Quest: Converting units of time		
Learning Journey Converting units of time		
1	Converting between units of time (multiplicative conversions only)	• calculate the number of seconds in a whole number of minutes • calculate the number of minutes in a whole number of hours • calculate the number of days in a whole number of weeks • calculate the number of months in a whole number of years • solve problems involving conversion between units of time
ACMMG086 Use 'am' and 'pm' notation and solve simple time problems		
Quest: AM/PM and elapsed time		
Learning Journey AM/PM and elapsed time problems		
1	Using am and pm notation	• know that there are 24 hours in a day • recognise that midday/noon divides the day into two equal parts of 12 hours each • establish the need to distinguish between times in the first 12 hours of the day and the second 12 hours of the day, and introduce am and pm notation • know and record midday/noon as 12 pm and 12:00 pm, and midnight as 12 am and 12:00 am • use am and pm notation to record times in relation to midday/noon and midnight • read times written using am and pm notation using 'past', 'to', morning, afternoon, evening and night appropriately', eg 3:40 pm is 'twenty to four in the afternoon'
2	Solving problems relating to elapsed time involving the four operations (to five minutes)	• use the 4 operations to solve word problems involving intervals of time including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Shape

ACMMG087 Compare the areas of regular and irregular shapes by informal means		
Quest: Area of regular and irregular shapes		
Learning Journey Measuring & comparing regular and irregular shapes		
Steps	**Content**	**Detail**
1	Measuring areas of rectilinear figures by decomposing into rectangles and counting units	• recognise area as additive • decompose rectilinear figures into rectangles to find their area by tiling or using a grid overlay
2	Estimating and comparing areas of non-rectilinear shapes using a square grid	• use a square grid to approximate and compare the areas of non-rectilinear shapes • compare how different placements of the grid make approximation easier or more difficult • find and explain the area of irregular shapes by counting squares or part squares
3	Approximating and comparing areas of non-rectilinear shapes using a square centimetre grid	• use a square-centimetre grid to approximate and compare the areas of non-rectilinear shapes • compare how different placements of the grid make approximation easier or more difficult • find and explain the area of irregular shapes by counting squares or part squares
ACMMG088 Compare and describe two dimensional shapes that result from combining and splitting common shapes, with and without the use of digital technologies		
Quest: Composing and decomposing 2D shapes		
Learning Journey Composing and decomposing 2D shapes		
1	Composing and decomposing two-dimensional shapes	• create two-dimensional shapes by combining and splitting common shapes • follow instructions to create a common shape using a specified set of 2 or more common shapes • describe and/or name the shape formed by combining and splitting common shapes • compare the area of combined and split shapes and their components • investigate the range of combinations that can be used to combine or split common shapes

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Location and transformation

ACMMG090 Use simple scales, legends and directions to interpret information contained in basic maps		
Quest: Scales, legends and directions		
Learning Journey Using legends and cardinal compass directions		
Steps	**Content**	**Detail**
1	Using legends on maps	• establish the need for legends on maps with and without grid referencing • use the legend of a map to determine the feature located at a given grid reference • use the legend of a map to determine the grid reference for a given feature
2	Introducing cardinal compass directions	• understand, locate and label the 4 cardinal compass directions on a compass rose: north (N), south (S), east (E) and west (W) • connect the 4 cardinal compass directions to features of the local area from their particular location • determine the direction of other cardinal compass directions when given one of the cardinal compass directions
3	Describing locations on maps using cardinal compass directions	• recognise that north (N) is typically represented by an arrow on a map • use the 4 cardinal compass directions to describe the location of one feature in relation to another on a map that has an arrow representing north
4	Following and giving cardinal compass directions	• follow a sequence of 2 or more directions to find a location within a safe zone of the school • give a sequence of 2 or more directions for a another person to find a location within a safe zone of the school
5	Drawing routes on maps using cardinal compass directions	• draw a route on a map given a sequence of directions involving cardinal directions and landmarks • use cardinal directions and landmarks to describe a route between 2 locations on a map
Learning Journey Solving measurement problems		
1	Using multiplication and division to solve measurement and scaling problems (within 100)	• solve simple rates problems using multiplication and division (within 100), eg 'Teesha made 3 cards in 1 hour. How many cards can she make in 3 hours?' • write equations using a symbol, eg a box or a blank, to represent the unknown number • compare their own and others' methods of solution
ACMMG091 Create symmetrical patterns, pictures and shapes with and without digital technologies		
Quest: Symmetrical patterns, pictures & shapes		
Learning Journey Introducing transformations		
1	Introducing transformations: Slides (translations)	• describe the process of performing a 'slide' and the similarities and differences between the original shape and the shape after it has undergone a 'slide' • identify and describe a one-step slide of a shape using the term 'slide' • perform a one-step slide of a shape using physical materials and record the result without the use of digital technology • perform a one-step slide of a shape and record the result using digital technology • predict and draw the result of a one-step slide on a given shape
2	Introducing transformations: Flips (reflections)	• describe the process of performing a 'flip' and the similarities and differences between the original shape and the shape after it has undergone a 'flip' • identify and describe a one-step flip of a shape using the term 'flip' • perform a one-step flip of a shape using physical materials and record the result without the use of digital technology • perform a one-step flip of a shape and record the result using digital technology • predict and draw the result of a one-step flip on a given shape

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Location and transformation

ACMMG091 Create symmetrical patterns, pictures and shapes with and without digital technologies		
Quest: Symmetrical patterns, pictures & shapes		
Learning Journey Introducing transformations		
Steps	**Content**	**Detail**
3	Introducing transformations: Turns (rotations)	• describe the process of performing a 'turn' and the similarities and differences between the original shape and the shape after it has undergone a 'turn' about a centre of rotation • recognise and describe turns as 'clockwise' or 'anti-clockwise' • identify and describe one-step quarter turns, half turns and three-quarter turns of a shape using the terms 'quarter turn', 'half turn', 'three-quarter turn' • perform one-step quarter turns, half turns and three-quarter turns of shapes using physical materials and record the results without the use of digital technology • perform one-step quarter turns, half turns and three-quarter turns of a shape and perform a one-step flip of a shape, recording the results using digital technology • predict and draw the result of one-step quarter turns, half turns and three-quarter turns on a given shape • explore and describe the number of half turns and quarter turns required for a full-turn
Learning Journey Creating and drawing symmetrical designs		
1	Creating and drawing symmetrical designs and shapes	• create symmetrical designs using physical materials • create symmetrical shapes using physical materials • draw symmetrical designs and shapes without the use of digital technology • create symmetrical designs and shapes using digital technology
2	Completing symmetrical designs	• complete symmetrical designs and shapes given their line of symmetry and one half of the design or shape
Learning Journey Recognising tessellations		
1	Recognising tessellations	• recognise and describe transformations in tessellating designs consisting of a single shape • create and record tessellating designs using transformations on a single shape • determine whether a shape will or will not tessellate

Geometric reasoning

ACMMG089 Compare angles and classify them as equal to, greater than, or less than, a right angle		
Quest: Classifying angles		
Learning Journey Classifying angles		
Steps	**Content**	**Detail**
1	Classifying angles in relation to a right angle	• classify angles as 'less than a right angle', 'about the same as a right angle', 'greater than a right angle'
2	Classifying angles as acute, right or obtuse	• identify and name angles as acute, right or obtuse • categorise angles as acute, right or obtuse • draw and create angles of a given size: acute, right, obtuse (no protractors)
3	Classifying angles as acute, right, obtuse, straight, reflex or a revolution	• understand and describe angles greater than or equal to 180° • identify and name angles as acute, right, obtuse, straight, reflex and revolution • categorise angles as acute, right, obtuse, straight, reflex and revolution • draw and create angles of a given size: acute, right, obtuse, straight, reflex and revolution (no protractors)

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Statistics and Probability

Chance

ACMSP092 Describe possible everyday events and order their chances of occurring		
Quest: Chance events		
Learning Journey Describing the chance of events occurring		
Steps	**Content**	**Detail**
1	Describing the chances of everyday events occurring	• use the terms 'equally likely', 'likely' and 'unlikely' to describe the chance of everyday events occurring • compare the chance of familiar events occurring and describe the events as being 'more likely' or 'less likely' to occur than each other • order events from least likely to most likely to occur
2	Describing the chances of events occurring in simple chance experiments	• compare the likelihood of obtaining particular outcomes in a simple chance experiment
ACMSP093 Identify everyday events where one cannot happen if the other happens		
Quest: Non-simultaneous everyday events		
Learning Journey Exploring non-simultaneous everyday events		
1	Exploring everyday events that cannot occur simultaneously	• identify and discuss everyday events that cannot occur at the same time
ACMSP094 Identify events where the chance of one will not be affected by the occurrence of the other		
Quest: Independent and dependent events		
Learning Journey Independent and dependent events		
1	Identifying events where the chances of occurring are independent of other events	• identify and discuss events where the chance of 1 event occurring will not be affected by the occurrence of the other • explain why subsequent events are independent • compare independent events with dependent events

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP095 Select and trial methods for data collection, including survey questions and recording sheets		
Quest: Methods of data collection		
Learning Journey Surveys and sorting data		
Steps	**Content**	**Detail**
1	Creating and refining a survey	• create a survey and related recording sheet, considering the appropriate organisation of categories for data collection; predict possible responses • identify questions and issues relevant to given categorical data, match statistical questions with given data sets; recognise statistical questions that are clearly unsuitable • choose effective ways to collect and record data for an investigation, eg creating a survey with a scale of 1 to 5 to indicate preferences • refine survey questions as necessary after a small trial • discuss and decide the most suitable question to investigate a particular matter of interest, eg by narrowing the focus of a question
2	Conducting and evaluating a survey	• conduct a survey to collect categorical data • discuss and determine possible improvements to the questions or recording sheet • compare the effectiveness of different methods of collecting and recording data • discuss the advantages and/or disadvantages of open-ended questions in a survey, compared to questions with predetermined categories
3	Collecting and sorting data	• plan methods of data collection (eg, surveying or questioning, when to ask, who to ask) and efficient ways of recording data (eg, tables and tally charts); identify issues with data collection and refines the process as appropriate • recognise that data can come from other sources, eg governmental agencies, sports, environmental agencies • sort data into the correct categories; enter data into the correct cells in a table; create a table in a spreadsheet (digital recording); recognise when data has been sorted incorrectly
ACMSP096 Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values		
Quest: Constructing suitable data displays		
Learning Journey Column graphs using many-to-one correspondence		
1	Introducing column graphs with many-to-one correspondence	• determine the scale on a column graph • read and interpret data in a column graph with many-to-one correspondence • recognise and remedy errors or unsuitable scales in a column graph
2	Representing data in column graphs using many-to-one correspondence	• represent given or collected categorical data in column graphs • discuss and determine a suitable scale of many-to-one correspondence to draw graphs for large data sets and state the key used • use grid paper to assist in drawing graphs that represent data using a scale of many-to-one correspondence • use data in a spreadsheet to create column graphs with appropriately labelled axes • mark equal spaces on axes, name and label axes, and choose appropriate titles for graphs • interpret data in column graph; ask and answer questions related to the data in the display; draw conclusions

Australian Curriculum Year 4

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP096 Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values		
Quest: Constructing suitable data displays		
Learning Journey Picture graphs with many-to-one correspondence		
Steps	**Content**	**Detail**
1	Introducing picture graphs with many-to-one correspondence	• interpret the key on a picture graph with many-to-one correspondence • read and interpret data in a picture graph with many-to-one correspondence • recognise and remedy errors or unsuitable scales in a picture graph
2	Representing data in picture graphs using many-to-one correspondence	• represent given or collected categorical data in picture graphs • discuss and determine a suitable scale of many-to-one correspondence to draw graphs for large data sets and state the key used • use grid paper to assist in drawing graphs that represent data using a scale of many-to-one correspondence • mark equal spaces on axes, name and label axes, and choose appropriate titles for graphs • interpret data in a picture graph; ask and answer questions related to the data in the display; draw conclusions
ACMSP097 Evaluate the effectiveness of different displays in illustrating data features including variability		
Quest: Evaluating and comparing data displays		
Learning Journey Evaluating and comparing data displays		
1	Evaluating and comparing data displays	• interpret and evaluate the effectiveness of various data displays found in media and in factual texts, where displays represent data using a scale of many-to-one correspondence • identify and discuss misleading representations of data • discuss and compare features of data displays, including considering the number and appropriateness of the categories used, eg a display with only three categories (blue, red, other) for car colour is not likely to be useful • discuss the advantages and disadvantages of different representations of the same categorical data, eg column graphs compared to picture graphs that represent data using scales of many-to-one correspondence

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and Place Value

ACMNA098 Identify and describe factors and multiples of whole numbers and use them to solve problems		
Quest: Multiples, factors and divisibility tests		
Learning Journey Multiples and factors		
Steps	**Content**	**Detail**
1	Finding factors for whole numbers up to 100	• determine all 'factors' of a given whole number up to 100 • determine the 'highest common factor' (HCF) of 2 whole numbers
2	Finding multiples up to 100	• determine 'multiples' of a given whole number • determine the 'lowest common multiple' (LCM) of 2 whole numbers
3	Solving problems using factors and multiples	• solve problems using knowledge of factors and multiples, eg 'There are 48 people at a party. In how many ways can you set up the tables and chairs, so that each table seats the same number of people and there are no empty chairs?'
Learning Journey Divisibility tests		
1	Introducing divisibility tests for dividing by 2	• apply divisibility test to find multiples of 2
	Introducing divisibility tests for dividing by 5	• apply divisibility test to find multiples of 5
	Introducing divisibility tests for dividing by 10	• apply divisibility test to find multiples of 10
2	Introducing divisibility tests for dividing by 4	• apply divisibility test to find multiples of 4
	Introducing divisibility tests for dividing by 8	• apply divisibility test to find multiples of 8
3	Introducing divisibility tests for dividing by 3	• apply divisibility test to find multiples of 3
	Introducing divisibility tests for dividing by 6	• apply divisibility test to find multiples of 6
	Introducing divisibility tests for dividing by 9	• apply divisibility test to find multiples of 9
ACMNA099 Use estimation and rounding to check the reasonableness of answers to calculations		
Quest: Estimating and rounding		
Learning Journey Checking with estimation and rounding		
1	Checking accuracy of addition and subtraction calculations	• check solutions to problems by using the inverse operation • use estimation to check the reasonableness of answers to addition and subtraction calculations
Learning Journey Rounding to estimate products and quotients		
1	Rounding to estimate products	• estimate products by rounding
2	Rounding to estimate quotients	• estimate quotients using rounding

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and Place Value

ACMNA100 Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies		
Quest: Multiplication		
Learning Journey Multiplication using multiples of 10		
Steps	**Content**	**Detail**
1	Using known facts to multiply 1-digit numbers with multiples of 1000	• use known facts and place value understanding to solve multiplication problems with multiples of 1000, eg 3 x 6 = 18 so 3 x 6000 = 18 000
2	Using known facts to multiply 1-digit numbers with multiples of 10 000	• use known facts and place value understanding to solve multiplication problems with multiples of 1000, eg 3 x 6 = 18 so 3 x 60 000 = 180 000
Learning Journey Multiplication: rounding, compensating and partitioning		
1	Multiplying 1-digit and 2-digit numbers using rounding and compensating	• use known facts to solve multiplication problems by adding on or taking off, eg 5 × 100 is 500, so 5 × 99 is 5 less, which is 495
2	Using partitioning to double or halve any number (up to 4-digits)	• use models and diagrams to support partitioning to double or halve any number (up to 4-digits), eg 58 halved as half of 50 + half of 8, or double 58 as double 50 + double 8
3	Using compensation to double or halve any number (up to 4-digits)	• use models and diagrams to support the use of compensation to double or halve any number (up to 4-digits), eg double 398 as double 400 and subtract 4, or half of 398 as half of 400 and subtract 1
4	Using partitioning or compensation to double or halve any number (up to 4-digits)	• use partitioning or compensation to double or halve any number (up to 4-digits)
Learning Journey Multiplication: doubling, halving and thirding		
1	Multiplying using doubling	• use the relationship between multiplication facts, eg the multiplication facts for 6 are double the multiplication facts for 3
	Multiplying by 2, 4 or 8 using repeated doubling	• use doubling as a strategy to multiply by 2, eg 70 × 2 is double 70 • use double-double as a strategy to multiply by 4, eg 70 × 4 is double-double 70 which is 280 • use doubling as a strategy to multiply by 8, eg 70 × 8 is double-double-double 70 which is 560
2	Using doubling and halving to solve multiplication problems with 2-digit and 1-digit numbers	• mentally adjust a multiplication problem by doubling one factor and halving the other, eg 24 x 6 as 12 x 12
3	Using doubling and halving to solve multiplication problems with a 1-digit number and a 1 or 2-digit number	• mentally adjust a multiplication problem by doubling one factor and halving the other, eg 24 x 50 as 12 x 100
4	Using doubling and halving or thirding and trebling to solve multiplication problems	• mentally adjust a multiplication problem using doubling and halving or thirding and trebling where appropriate, eg 18 x 3 as 6 x 9 or 24 x 6 as 12 x 12

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and Place Value

ACMNA100 Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies		
Quest: Multiplication		
Learning Journey Multiplying using the split method		
Steps	**Content**	**Detail**
1	Multiplying 3-digit numbers by 1-digit numbers using split method	• multiply the hundreds, then the tens and then the ones
2	Multiplying 4-digit numbers by 1- digit numbers using split method	• multiply the thousands, then the hundreds, then the tens and then the ones
Learning Journey Multiplying by factorising		
1	Multiplying by factorising (using the distributive property)	• split factors, eg 50 × 8 is the same as 50 × 2 × 4, which becomes 100 × 4
2	Factorising to multiply a 2-digit number by a 2-digit number	• factorise to multiply a 2-digit number by a 2-digit number, eg 12 × 25 = 3 × 4 × 25 = 3 × 100 = 300
Learning Journey Multiplying using an area model		
1	Multiplying 3-digit numbers by 1-digit numbers using an area model	• use an area model for 3-digit by 1-digit multiplication
2	Multiplying 4-digit numbers by 1-digit numbers using an area model	• use an area model for 4-digit by 1-digit multiplication
3	Multiplying 2-digit numbers by 2-digit numbers using an area model	• use an area model for 2-digit by 2-digit multiplication
Learning Journey Multiplying using formal algorithms		
1	Multiplying 2-digit numbers by 1-digit numbers using the expanded algorithm	• multiply the ones, then the tens, with and without regrouping
	Multiplying 3-digit numbers by 1-digit numbers using the expanded algorithm	• multiply the ones, then the tens, then the hundreds, with and without regrouping
	Multiplying 4-digit numbers by 1-digit numbers using the expanded algorithm	• multiply the ones, then the tens, then the hundreds and then the thousands, with and without regrouping
2	Multiplying 2-digit numbers by 1-digit numbers using the contracted algorithm	• multiply the ones, then the tens, with and without regrouping
	Multiplying 3-digit numbers by 1-digit numbers using the contracted algorithm	• multiply the ones, then the tens, then the hundreds, with and without regrouping
	Multiplying 4-digit numbers by 1-digit numbers using the contracted algorithm	• multiply the ones, then the tens, then the hundreds and then the thousands, with and without regrouping
3	Multiplying 2-digit numbers by 2-digit numbers using the extended form of the formal algorithm	• multiply 2-digit by 2-digit numbers using extended form, with and without regrouping
	Multiplying 3-digit numbers by 2-digit numbers using the extended form of the formal algorithm	• multiply 3-digit by 2-digit numbers using extended form, with and without regrouping

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and Place Value

ACMNA100 Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies		
Quest: Multiplication		
Learning Journey Multiplication word problems		
Steps	**Content**	**Detail**
1	Solving multiplication word problems	• apply appropriate mental strategies to solve multiplication word problems • apply appropriate written strategies to solve multiplication word problems
ACMNA101 Solve problems involving division by a one-digit number, including those that result in a remainder		
Quest: Division		
Learning Journey Division using partitioning		
1	Dividing a 3-digit number by a 1-digit number using partitioning	• partition a 3-digit number to divide
Learning Journey Extended division: no remainders or zeros		
1	Dividing a 2-digit number by a 1-digit divisor using the extended algorithm, no remainders or zeros in answers	• apply the written algorithm to divide a 2-digit number by a 1-digit number, without remainders and without zeros in the answer
2	Dividing a 3-digit number by a 1-digit divisor using the extended algorithm, no remainders or zeros in answers	• apply the written algorithm to divide a 3-digit number by a 1-digit number, without remainders and without zeros in the answer
3	Dividing a 4-digit number by a 1-digit divisor using the extended algorithm, no remainders or zeros in answers	• apply the written algorithm to divide a 4-digit number by a 1-digit number, without remainders and without zeros in the answer
4	Solving problems involving division of a 2-digit number by a one-digit number, with no remainders	• recognise and use different notations to indicate division
Learning Journey Extended division: remainders		
1	Dividing a 2-digit number by a 1-digit divisor using the extended algorithm, with remainders but without zeros in answers	• apply the written algorithm to divide a 2-digit number by a 1-digit number, with remainders but without zeros in the answer
2	Dividing a 3-digit number by a 1-digit divisor using the extended algorithm, with remainders but without zeros in answers	• apply the written algorithm to divide a 3-digit number by a 1-digit number, with remainders but without zeros in the answer
3	Dividing a 4-digit number by a 1-digit divisor using the extended algorithm, with remainders but without zeros in answers	• apply the written algorithm to divide a 4-digit number by a 1-digit number, with remainders but without zeros in the answer
4	Solving problems involving division of a 2-digit number by a 1-digit number, with remainders	• record remainders as fractions and decimals

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and Place Value

ACMNA101 Solve problems involving division by a one-digit number, including those that result in a remainder		
Quest: Division		
Learning Journey Extended division - with and without remainders		
Steps	**Content**	**Detail**
1	Dividing a 2-digit number by a 1-digit divisor using the extended algorithm, with and without remainders and zeros in answers	• apply the written algorithm to divide a 2-digit number by a 1-digit number, with and without remainders and zeros in the answer
2	Dividing a 3-digit number by a 1-digit divisor using the extended algorithm, with and without remainders and zeros in answers	• apply the written algorithm to divide a 3-digit number by a 1-digit number, with and without remainders and zeros in the answer
3	Dividing a 4-digit number by a 1-digit divisor using the extended algorithm, with and without remainders and zeros in answers	• apply the written algorithm to divide a 4-digit number by a 1-digit number, with and without remainders and zeros in the answer
4	Solving problems involving the division of a number with 3 or more digits by 1 digit, with no remainder	• divide the hundreds, then the tens, and then the ones • use the formal algorithm
Learning Journey Contracted division - no remainders or zeros		
1	Dividing a 2-digit number by a 1-digit divisor using the contracted algorithm, no remainders or zeros in answers	• apply the written algorithm to divide a 2-digit number by a 1-digit number, without remainders and without zeros in the answer
2	Dividing a 3-digit number by a 1-digit divisor using the contracted algorithm, no remainders or zeros in answers	• apply the written algorithm to divide a 3-digit number by a 1-digit number, without remainders and without zeros in the answer
3	Dividing a 4-digit number by a 1-digit divisor using the contracted algorithm, no remainders or zeros in answers	• apply the written algorithm to divide a 4-digit number by a 1-digit number, without remainders and without zeros in the answer
Learning Journey Contracted division - no remainders		
1	Dividing a 2-digit number by a 1-digit divisor using the contracted algorithm, with remainders but without zeros in answers	• apply the written algorithm to divide a 2-digit number by a 1-digit number, with remainders but without zeros in the answer
2	Dividing a 3-digit number by a 1-digit divisor using the contracted algorithm, with remainders but without zeros in answers	• apply the written algorithm to divide a 3-digit number by a 1-digit number, with remainders but without zeros in the answer
3	Dividing a 4-digit number by a 1-digit divisor using the contracted algorithm, with remainders but without zeros in answers	• apply the written algorithm to divide a 4-digit number by a 1-digit number, with remainders but without zeros in the answer
4	Solving problems involving the division of a number with 3 or more digits by 1 digit, with remainders	• divide the hundreds, then the tens, and then the ones • use the formal algorithm
Learning Journey Contracted division - with and without remainders		
1	Dividing a 2-digit number by a 1-digit divisor using the contracted algorithm, with and without remainders and zeros in answers	• apply the written algorithm to divide a 2-digit number by a 1-digit number, with and without remainders and zeros in the answer
2	Dividing a 3-digit number by a 1-digit divisor using the contracted algorithm, with and without remainders and zeros in answers	• apply the written algorithm to divide a 3-digit number by a 1-digit number, with and without remainders and zeros in the answer
3	Dividing a 4-digit number by a 1-digit divisor using the contracted algorithm, with and without remainders and zeros in answers	• apply the written algorithm to divide a 4-digit number by a 1-digit number, with and without remainders and zeros in the answer

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and Place Value

ACMNA101 Solve problems involving division by a one-digit number, including those that result in a remainder		
Quest: Division		
Learning Journey Division word problems		
Steps	**Content**	**Detail**
1	Solving division word problems	• divide a number with 3 or more digits by a single-digit divisor
ACMNA291 Use efficient mental and written strategies and apply appropriate digital technologies to solve problems		
Quest: Addition and subtraction		
Learning Journey Adding numbers of any size		
1	Using a formal written algorithm for addition calculations involving numbers of any size (no carrying)	• apply algorithms to solve problems without carrying, with the same number of places and with a different number of places; include opportunities for students to write their own algorithms with digits in correct place value positions; include word problems
2	Using a formal written algorithm for addition calculations involving numbers of any size (with carrying)	• apply algorithms to solve problems with carrying in 1 or more places, with the same number of places and with a different number of places; include opportunities for students to write their own algorithms with digits in correct place value positions; include word problems
3	Using a formal written algorithm for addition calculations of 3 or more addends up to any size (with and without carrying)	• apply algorithms with 3 or more addends with the same number of places and with a different number of places; include opportunities for students to write their own algorithms with digits in correct place value positions; include word problems
Learning Journey Subtracting numbers of any size		
1	Using a formal written algorithm to record subtraction calculations involving numbers of any size (without decomposing)	• apply algorithms to solve problems without trading (decomposing), with the same number of places for both numbers, with fewer places in the second number (subtrahend) and with and without 1 or more zeros in the first number (minuend); include opportunities for students to write their own algorithms with digits in correct place value positions and with the larger number first; include word problems
2	Using a formal written algorithm to record subtraction calculations involving numbers of any size (with decomposing)	• apply algorithms to solve problems with trading (decomposing) in 1 or more places, with the same number of places for both numbers, with fewer places in the second number (subtrahend) and with and without 1 or more zeros in the first number (minuend); include opportunities for students to write their own algorithms with digits in correct place value positions and with the larger number first; include word problems
3	Using equal adjustments to subtract up to 3-digit numbers	• model and solve subtraction problems using equal adjustments
Learning Journey Adding and subtracting numbers of any size		
1	Representing addition or subtraction problems using a bar model	• use a bar model as a tool to represent an addition or subtraction problem
2	Applying efficient strategies for addition and subtraction calculations involving numbers of any size	• add 3 or more numbers with different numbers of digits

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Fractions and decimals

ACMNA102 Compare and order common unit fractions and locate and represent them on a number line		
Quest: Comparing and ordering common unit fractions		
Learning Journey Compare and order common unit fractions		
Steps	**Content**	**Detail**
1	Comparing and ordering unit fractions with different denominators using models and diagrams	• compare and order common unit fractions using models and diagrams for support • compare and order common fractions with different denominators (halves, thirds, quarters, fifths, sixths, sevenths, eighths)
2	Comparing unit fractions with different denominators (denominators of 2, 3, 4, 5, 6, 8, 10, 12)	• model, compare and order common unit fractions • locate and represent unit fractions on a number line • compare the relative value of unit fractions by placing them on a number line (4) between 0 and 1 • compare using <,>, = (4)
ACMNA103 Investigate strategies to solve problems involving addition and subtraction of fractions with the same denominator		
Quest: Addition and subtraction: fractions		
Learning Journey Adding and subtracting proper fractions		
1	Adding proper fractions with the same denominator (denominators 2, 3, 4, 5, 6, 7, 8,)	• add proper fractions with the same denominator
2	Subtracting proper fractions with the same denominator (denominators 2, 3, 4, 5, 6, 7, 8,)	• subtract proper fractions with the same denominator
3	Adding and subtracting proper fractions with the same denominator (denominators 2, 3, 4, 5, 6, 7, 8,)	• add and subtract proper fractions with the same denominator
4	Adding a whole number and a proper fraction	• add a whole number and a proper fraction
5	Subtracting a proper fraction from a whole number	• use diagrams, and mental and written strategies, to subtract a unit fraction from any whole number including 1
Learning Journey Add & subtract fractions - common denominators		
1	Adding mixed numerals with the same denominator	• add mixed numerals with the same denominator
2	Subtracting mixed numerals with the same denominator	• subtract mixed numerals with the same denominator
3	Solving word problems involving both proper fractions and mixed numerals with the same denominator	• solve word problems involving adding and subtracting fractions with the same denominator
ACMNA104 Recognise that the place value system can be extended beyond hundredths		
Quest: Place value to thousandths		
Learning Journey Place value to thousandths		
1	Introducing decimal thousandths	• express thousandths as decimals • interpret decimal notation for thousandths, eg 0.123 = 123/1000 • state the place value of digits in decimal numbers of up to 3 decimal places
2	Partitioning decimal thousandths	• use place value to partition decimals of up to 3 d.p. • partition decimals of up to 3 d.p. in non-standard forms • partition fractions up to thousandths into decimals and fractions

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Number and Algebra

Fractions and decimals

ACMNA105 Compare, order and represent decimals		
Quest: Compare and order decimals		
Learning Journey Compare and order decimals		
Steps	**Content**	**Detail**
1	Interpreting zeros at the end of a decimal	• understand that a zero at the end of a decimal does not change its value
2	Knowing common fraction and decimal equivalences	• know fraction and decimal equivalences for thirds, quarters, fifths and eighths
3	Comparing and ordering decimal fractions of up to 3 decimal places	• place decimal numbers of up to 3 decimal places on a number line between 0 and 1 • compare and order decimals with 3 decimal places using >, < and = • compare and order decimals with a different number of decimal places, up to 3 decimal places

Money and financial mathematics

Classroom-based

Patterns and algebra

ACMNA107 Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction		
Quest: Number patterns - addition and subtraction		
Learning Journey Number patterns - addition and subtraction		
Steps	**Content**	**Detail**
1	Describing, continuing and creating patterns resulting from addition and subtraction including fractions	• identify, continue and create simple number patterns involving addition and subtraction including fractions • describe patterns using the terms 'increase' and 'decrease', eg 'The terms decrease by 1/4' • find missing terms in a number sequence
2	Describing, continuing and creating patterns resulting from addition and subtraction including decimals	• identify, continue and create simple number patterns involving addition and subtraction including decimals • describe patterns using the terms 'increase' and 'decrease', eg for the pattern 4.8, 4.1, 3.4, 2.7, ..., 'The terms decrease by 0.7'

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Number and Algebra

Patterns and algebra

ACMNA107 Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction		
Quest: Number patterns - addition and subtraction		
Learning Journey Number patterns - addition and subtraction		
Steps	**Content**	**Detail**
1	Describing, continuing and creating patterns resulting from addition and subtraction including fractions	• identify, continue and create simple number patterns involving addition and subtraction including fractions • describe patterns using the terms 'increase' and 'decrease', eg 'The terms decrease by 1/4' • find missing terms in a number sequence
2	Describing, continuing and creating patterns resulting from addition and subtraction including decimals	• identify, continue and create simple number patterns involving addition and subtraction including decimals • describe patterns using the terms 'increase' and 'decrease', eg for the pattern 4.8, 4.1, 3.4, 2.7, ..., 'The terms decrease by 0.7'
ACMNA121 Find unknown quantities in number sentences involving multiplication and division and identify equivalent number sentences involving multiplication and division		
Quest: Number sentences - mult and div		
Learning Journey Number sentences - mult and div		
1	Using equivalent number sentences that involve more than 1 operation to find unknown quantities	• complete number sentences that involve more than 1 operation by calculating missing numbers, eg 5 × □ = 4 × 10, 5 × □ = 30 − 10
2	Describing and using inverse operations to solve number sentences with whole numbers and any of the 4 operations	• identify and use inverse operations to assist with the solution of number sentences, eg 125 ÷ 5 = □ becomes □ × 5 = 125
3	Finding the missing number in multiplication and division number sentences involving simple fractions or decimals	• complete number sentences involving multiplication and division, including those involving simple fractions or decimals, eg 7 × □ = 7.7

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG108 Choose appropriate units of measurement for length, area, volume, capacity and mass		
Quest: Length, area, volume, capacity and mass		
Learning Journey Comparing and ordering metric lengths		
Steps	**Content**	**Detail**
1	Introducing formal units for length: kilometres	• recognise the need for a formal unit longer than the metre for measuring distance, eg distance between known places or visible landmarks • recognise that there are 1000 m in 1 km, ie 1000 m = 1 km • describe 1 m as one thousandth of a kilometre • develop a personal reference for the approximate length of 1 km and half a kilometre • record distances using the abbreviation for kilometres (km)
2	Comparing lengths in metres and kilometres	• compare lengths and distances using metres and kilometres
	Ordering lengths in metres and kilometres	• order lengths and distances using metres and kilometres
3	Comparing lengths in millimetres, centimetres, metres and kilometres	• compare lengths and distances using millimetres, centimetres, metres and kilometres
	Ordering lengths in millimetres, centimetres, metres and kilometres	• order lengths and distances using millimetres, centimetres, metres and kilometres
4	Recording lengths using mixed units	• record lengths and distances using combinations of millimetres, centimetres, metres and kilometres
Learning Journey Selecting appropriate units for measuring		
1	Introducing formal units for area: square kilometres and hectares	• measure the dimensions of a large rectangular piece of land and calculate its area in hectares, eg school playground or local park • relate one square kilometre and one hectare to known standard areas such as sports fields, courts and tracks of land • determine side lengths of different rectangles with area of one hectare, eg 200 metres by 50 metres • identify everyday situations where square kilometres or hectares are an appropriate unit for measuring the area
	Selecting and justifying appropriate metric units to measure volume and capacity (mL and L)	• select and use appropriate units to measure the capacities of a variety of containers • select and use appropriate units to estimate the volumes of a variety of objects
2	Introducing formal units for volume: cubic metres	• recognise the need for a formal unit larger than the cubic centimetre • construct and use the cubic metre as a unit to measure larger volumes • explain why volume is measured in cubic metres in certain situations, eg wood bark, soil or concrete ; select and justify referents for cubic cm • recognise that a cubic metre can have dimensions other than a cube of side 1 metre • record volumes using the abbreviation for cubic metres (m^3) • estimate the size of a cubic metre, half a cubic metre and 2 cubic metres

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG108 Choose appropriate units of measurement for length, area, volume, capacity and mass		
Quest: Length, area, volume, capacity and mass		
Learning Journey Selecting appropriate units for measuring		
Steps	**Content**	**Detail**
3	Introducing formal units for mass: the tonne	• establish the need for formal units for very large masses and introduce tonnes, including that 1000 kg = 1 tonne • identify everyday situations where tonnes are an appropriate unit for measuring the mass • apply place value understanding to modelling, describing and recording metric units of measurement • introduce the abbreviation 't' for recording mass in tonnes and record masses using tonnes and kilograms, eg 1 t 750 kg • calculate the number of kilograms in a whole number of tonnes • interpret simple fractions (¼, ½, ¾) of a tonne and relate these to the number of kilograms
	Selecting and using the appropriate metric unit and device to measure mass	• select and use the appropriate metric unit and device to measure mass
	Recognising gross mass and net mass	• select and use the appropriate customary unit and device to measure mass
	Solving multi-step problems involving mass	• solve a variety of problems involving masses of the same unit
ACMMG109 Calculate perimeter and area of rectangles using familiar metric units		
Quest: Perimeter and area		
Learning Journey Calculating perimeter of rectangles		
1	Calculating the perimeters of rectangles	• explore different methods of finding the perimeter of rectangles
2	Calculating the side length of a rectangle given the perimeter	• find the length of 1 unknown side of a rectangle given the perimeter • find possible length combinations of 2 unknown sides of a rectangle given the perimeter
Learning Journey Calculating the area of rectangles		
1	Developing a multiplicative formula for area of a rectangle using metric units	• calculate the area of a rectangle by multiplying the length and width of the rectangle • calculate a side length of the rectangle given its area and one other side length
ACMMG110 Compare 12- and 24-hour time systems and convert between them		
Quest: 24-hour time		
Learning Journey Using 24-hour time		
1	Using 24-hour notation	• convert between 24-hour time notation and 12-hour time notation • convert between analogue and 24-hour digital clocks • record 24-hour time using necessary conventions

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Shape

ACMMG111 Connect three-dimensional objects with their nets and other two-dimensional representations		
Quest: Nets		
Learning Journey Nets		
Steps	**Content**	**Detail**
1	Connecting three-dimensional objects with two-dimensional representations	• visualise and sketch three-dimensional objects from different views, including top, front and side views • reflect on their own drawing of a three-dimensional object and consider how it can be improved • show simple perspective in drawings by showing depth
2	Connecting prisms and pyramids with their nets	• examine a diagram to determine whether it is or is not the net of a prism or pyramid • explain why a given net will not form a prism or pyramid • visualise and sketch nets for a given prism or pyramid • recognise whether a diagram is a net of a particular prism or pyramid • visualise and name prisms and pyramids, given diagrams of their nets • select the correct diagram of a net for a given prism or pyramid from a group of similar diagrams where the others are not valid nets of the object
3	Connecting three-dimensional objects with their nets	• examine a diagram to determine whether it is or is not the net of a closed three-dimensional object • explain why a given net will not form a closed three-dimensional object • visualise and sketch nets for given three-dimensional objects • recognise whether a diagram is a net of a particular three-dimensional object • visualise and name prisms and pyramids, given diagrams of their nets • select the correct diagram of a net for a given prism or pyramid from a group of similar diagrams where the others are not valid nets of the object

Location and transformation 4169057

ACMMG113 Use a grid reference system to describe locations. Describe routes using landmarks and directional language		
Quest: Grid reference and directional language		
Learning Journey Grid-referenced maps		
Steps	**Content**	**Detail**
1	Interpreting grid-referenced maps	• establish that grid referencing on maps allows for more accurate description of features/locations • understand the structure (letter then number, horizontal then vertical) and meaning of grid references (everything in that grid square) • use grid references to describe features/locations on maps • identify features/locations on maps given their gird reference
2	Creating grid-referenced maps	• draw grid-referenced maps of familiar locations such as the classroom, school or local area • use technology to create grid-referenced maps of familiar locations such as the classroom, school or local area
3	Drawing pathways on grid-referenced maps	• draw a path from 1 feature to another on a grid-referenced map given the grid reference of each feature • use grid references to describe a path from 1 feature to another on a grid-referenced maps

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Location and transformation

ACMMG113 Use a grid reference system to describe locations. Describe routes using landmarks and directional language		
Quest: Grid reference and directional language		
Learning Journey Using landmarks and directional language		
Steps	**Content**	**Detail**
1	Introducing intercardinal compass directions	• understand, locate and label the 4 intercardinal compass directions on a compass rose: north-east (NE), south-east (SE), south-west (SW) and north-west (NW) • connect the 4 intercardinal compass directions to features of the local area from their particular location • determine the direction of other cardinal and intercardinal compass directions when given one of the cardinal or intercardinal compass directions
2	Describing locations on maps using cardinal and intercardinal compass directions	• use the cardinal and intercardinal compass directions to describe the location of one feature in relation to another on a map that has an arrow representing north
3	Following and giving directions involving cardinal and intercardinal compass directions	• follow a sequence of 2 or more directions to find a location within a safe zone of the school • give a sequence of 2 or more directions for a another person to find a location within a safe zone of the school
4	Drawing routes on maps using cardinal and intercardinal compass directions	• draw a route on a map given a sequence of directions involving cardinal and intercardinal directions, and landmarks • use cardinal and intercardinal directions, and landmarks, to describe a route between 2 locations on a map
ACMMG114 Describe translations, reflections and rotations of two-dimensional shapes. Identify line and rotational symmetries		
Quest: Transformations and symmetry		
Learning Journey One-step transformations		
1	Defining transformations: One-step translations, reflections and rotations	• define translations, reflections and rotations of shapes and describe the similarities and differences between the original shape and the transformed shape • identify the one-step transformation used to move a shape from 1 position to another
Learning Journey Symmetry		
1	Drawing lines of symmetry on given designs and shapes	• recognise that some designs and shapes may have more than 1 line of symmetry • identify and draw all lines of symmetry on designs and shapes • determine the total number of lines of symmetry on designs and shapes • determine whether or not a given line through designs and shapes is a line of symmetry
2	Recognising rotational symmetry in shapes and designs	• establish and define that rotational symmetry occurs when a shape looks identical to the original after being turned less than a full turn • determine whether or not given shapes and designs have rotational symmetry • sort shapes according to whether they are rotationally symmetrical or not
3	Ordering of rotational symmetry	• define the order of rotational symmetry as the number of times the shape looks identical to the original as it rotates around the centre of symmetry • determine the order of rotational symmetry for given shapes and designs • compare order of rotational symmetry for odd and even sided regular polygons
ACMMG115 Apply the enlargement transformation to familiar two dimensional shapes and explore the properties of the resulting image compared with the original		
Quest: Enlarging 2D shapes		
Learning Journey Enlarging 2D shapes		
1	Enlarging 2D shapes	• enlarge a simple 2D shape using a centre of enlargement and a simple scale factor, eg 2, 3, 4, 5, 10 • recognise the simple scale factor used in an enlargement of a 2D shape

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Geometric reasoning

ACMMG112 Estimate, measure and compare angles using degrees. Construct angles using a protractor		
Quest: Angles		
Learning Journey Identifying and measuring angles		
Steps	**Content**	**Detail**
1	Identifying hidden angles	• identify angles in everyday situations where one arm of the angle is not visible, eg the angle of the door to the frame where one arm is the imaginary line across the bottom of the doorway • identify angles in everyday situations where both arms are not visible, eg a ball rebounding on a billiard table
2	Introducing formal units for measuring angles	• establish the need for a formal unit to measure angles and introduce the degree and its symbol (°)
3	Measuring and estimating angles of up to 180° in degrees	• measure angles of up to 180° using a protractor • estimate angles of up to 180° and check by measuring • measure angles of up to 360° using a protractor • estimate angles of up to 360° and check by measuring
Learning Journey Classifying and constructing angles		
1	Classifying angles by their size in degrees	• connect the term 'right angle' with 90°, 'straight angle' with 180° and 'angle of revolution' with 360° • establish and recall the angle size in degrees for each of the classifications: acute, obtuse and reflex • classify angles with a specified size in degrees as acute, right, obtuse, straight, reflex or a revolution • draw angles that are acute, right, obtuse, straight, reflex or a revolution using a ruler only
2	Constructing angles	• sketch angles of a specified size up to 360° • use a protractor to construct angles of up to 360° accurately

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Statistics and Probability

Chance

ACMSP116 List outcomes of chance experiments involving equally likely outcomes and represent probabilities of those outcomes using fractions		
Quest: Outcomes of chance experiments		
Learning Journey Outcomes of chance experiments		
Steps	**Content**	**Detail**
1	Investigating equally likely outcomes of chance experiments	• recognise that outcomes are described as 'equally likely' when any one outcome has the same chance of occurring as any other outcome • list all outcomes in chance experiments where each outcome is equally likely to occur • use the term 'probability' to describe the numerical value that represents the likelihood of an outcome of a chance experiment • represent probabilities of outcomes of chance experiments using fractions • determine the likelihood of winning simple games by considering the number of possible outcomes
2	Describing the chances of simple events occurring using familiar language and numeric benchmarks	• create, order, describe and explain the likelihood of simple events using the language of probability and numeric benchmarks of 0, 1/2 and 1
ACMSP117 Recognise that probabilities range from 0 to 1		
Quest: Probability		
Learning Journey Probabilities from 0 to 1		
1	Ordering chance outcomes in a probabilities range from 0 to 1	• establish that the sum of the probabilities of the outcomes of any chance experiment is equal to 1 • understand that the probability ranges cannot be less than 0 and greater than 1 • order commonly used chance words on an interval from zero ('impossible') to one ('certain') • describe events that are impossible and events that are certain • describe the likelihood of a variety of events as being more or less than a half (or 0.5) and order the events on an interval
2	Constructing angles	• sketch angles of a specified size up to 360° • use a protractor to construct angles of up to 360° accurately

Data representation and interpretation

ACMSP118 Pose questions and collect categorical or numerical data by observation or survey		
Quest: Categorical and numerical data		
Learning Journey Categorical and numerical data		
Steps	**Content**	**Detail**
1	Conducting surveys to obtain category and numerical data	• pose and refine questions to construct a survey to obtain categorical and numerical data about a matter of interest • collect categorical and numerical data through observation or by conducting surveys • sort category and numerical data and display in a table
2	Conducting a statistical investigation using discrete or continuous data	• ask and investigate statistical questions that may require sampling; demonstrate an understanding that sets of data may be samples of a larger population • distinguish between discrete data and continuous data • collect data by conducting a survey or an experiment to do with themselves, their environment, issues in their school or community, or content from another subject, and record observations or measurements • organise discrete or continuous data and display the data in charts, tables, and graphs that have appropriate titles, labels and scales that suit the range and distribution of the data

Australian Curriculum Year 5

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP119 Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies		
Quest: Constructing data displays		
Learning Journey Constructing data displays		
Steps	**Content**	**Detail**
1	Constructing a line graph using a scale of many-to-one correspondence	• construct a line graph using a scale of many-to-one correspondence, with and without the use of digital technologies • name and label the horizontal and vertical axes when constructing graphs • choose an appropriate title to describe the data represented in a data display • determine an appropriate scale of many-to-one correspondence to represent the data in a data display • mark equal spaces on the axes when constructing graphs, and use the scale to label the markers • interpret data in line graph representing primary data; ask and answer questions related to the data in the display; draw conclusions
2	Constructing a dot plot	• represent numerical data in a dot plot • interpret data in a dot plot; ask and answer questions related to the data in the display; draw conclusions
3	Choosing appropriate data displays	• consider the data type to determine and draw the most appropriate display(s), such as column graphs, dot plots and line graphs • discuss and justify the choice of data display used • recognise that line graphs are used to represent data that demonstrates continuous change • recognise which types of data display are most appropriate to represent categorical data
ACMSP120 Describe and interpret different data sets in context		
Quest: Describing and interpreting data sets		
Learning Journey Describing and interpreting data sets		
1	Interpreting primary and secondary data in a column graph with many-to-one correspondence	• describe and interpret data presented in column graphs; ask and answer questions related to data in a column graph • determine the total number of data values represented in column graphs • identify and describe relationships that can be observed in a column graph; compare column graphs with other data displays
2	Interpreting primary and secondary data in a line graph	• interpret line graphs using the scales on the axes • describe and interpret data presented in line graphs • identify and describe relationships that can be observed in data displays
3	Reading and interpreting data in a dot plot	• describe and interpret data in a dot plot; ask and answer questions related to the data in the display; draw conclusions • determine the total number of data values represented in dot plots • identify and describe relationships that can be observed in data displays • compare dot plots to other types of displays
4	Interpreting data and solving problems using data in tables	• describe and interpret data presented in tables, eg maximum and minimum values; total number of responses; differences between values • identify and describe relationships; draw conclusions and ask questions

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA122 Identify and describe properties of prime, composite, square and triangular numbers		
Quest: Properties of numbers		
Learning Journey Square and triangular numbers		
Steps	**Content**	**Detail**
1	Describing square numbers	• model square numbers and record each number group in numerical and diagrammatic form • explain how square numbers are created • explore square numbers using arrays, grid paper or digital technologies • recognise and explain the relationship between the name 'square' number and the way the pattern of numbers is created
2	Describing triangular numbers	• model triangular numbers and record each number group in numerical and diagrammatic form • explore triangular numbers using arrays, grid paper or digital technologies • recognise and explain the relationship between the name 'triangular' number and the way the pattern of numbers is created • model triangular numbers using matchsticks • explain how triangular numbers are created
Learning Journey Prime and composite numbers		
1	Introducing prime and composite numbers	• establish and define prime numbers • establish and define composite numbers • know and recall all prime numbers up to 19
2	Identifying prime and composite numbers	• determine whether a number is prime, composite or neither • explain whether a whole number is prime, composite or neither by finding the number of factors, eg '13 has two factors (1 and 13) and therefore is prime', '21 has more than two factors (1, 3, 7, 21) and therefore is composite', '1 is neither prime nor composite as it has only one factor, itself'
ACMNA123 Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers		
Quest: Operations with whole numbers		
Learning Journey Addition and subtraction word problems		
1	Solving addition word problems involving numbers of any size	• select and apply efficient mental strategies to solve word problems • select and apply efficient written strategies to solve word problems • use a calculator to solve word problems • interpret words that indicate the required operation • justify the choice of strategy for a given calculation
2	Solving subtraction word problems involving numbers of any size	• select and apply efficient mental strategies to solve word problems • select and apply efficient written strategies to solve word problems • use a calculator to solve word problems • interpret words that indicate the required operation • justify the choice of strategy for a given calculation
3	Solving word problems requiring both addition and subtraction involving numbers of any size	• select and apply efficient mental strategies to solve word problems • select and apply efficient written strategies to solve word problems • justify the use digital technologies to solve word problems • interpret words that indicate the required operation/s • justify the choice of strategy for a given calculation

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and place value

ACMNA123 Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers		
Quest: Operations with whole numbers		
Learning Journey Multiplying and dividing by multiples of 10		
Steps	**Content**	**Detail**
1	Multiplying any numbers by 10, 100, 1000 and their multiples	• use mental strategies to multiply by 10, 100, 1000 and their multiples
	Using mental strategies to multiply 1-digit and 2-digit numbers by multiples of 10 000	• use mental strategies to multiply 1-digit and 2-digit numbers by multiples of 10 000
2	Dividing any numbers by 10, 100, 1000 and their multiples	• use mental strategies to divide by 10, 100, 1000 and their multiples
3	Using known facts to solve multiplication and division problems with multiples of 10 and 100	• use known facts and place value understanding to solve multiplication problems with multiples of 10 or 100, eg 3 x 6 = 18 so 3 x 600 = 1800 • use known facts and place value understanding to solve division problems with multiples of 10 or 100, eg 18 ÷ 6 = 3 so 1800 ÷ 600 = 3 • explain and justify the use of the strategy
Learning Journey Selecting efficient mult/div strategies		
1	Selecting efficient strategies to multiply whole numbers of up to 4 digits by 1- and 2-digit numbers	• apply mental strategies • apply efficient use of formal algorithms • use digital technologies • estimate solutions to problems and check to justify solutions
2	Selecting efficient strategies to divide whole numbers of up to 4 digits by a 1-digit divisor	• apply mental strategies • apply efficient use of formal algorithms • use digital technologies • estimate solutions to problems and check to justify solutions
Learning Journey Division problems		
1	Dividing using known facts	• solve division problems using known division facts and multiplicative relationships, eg 81 divided by 3 must have a quotient that is 3 times the size of 81 divided by 9 so 81 divided by 3 = 27 • explain and justify the use of the strategy
	Dividing using factorising (the distributive property)	• solve division problems by splitting factors, eg 125 ÷ 5 as (100 ÷ 5) + (25 ÷ 5) • explain and justify the use of the strategy
2	Dividing up to a 4-digit number by a 2-digit divisor using the contracted algorithm, no remainders or zeroes in the answer	• apply the written algorithm to divide up to a 4-digit number by a 2-digit number
3	Dividing up to a 4-digit number by a 2-digit divisor using the division algorithm (extended/ long)	• apply the written extended (long) algorithm to divide up to a 4-digit number by a 2-digit number, with and without remainders, with and without zeros in the answer
	Dividing up to a 4-digit number by a 2-digit divisor using the contracted algorithm, with remainders but without zeros in answers	• apply the written algorithm to divide up to a 4-digit number by a 2-digit number, with remainders and without zeros in the answer
4	Dividing up to a 4-digit number by a 2-digit divisor using the contracted algorithm, with and without remainders and zeros in answers	• apply the written algorithm to divide up to a 4-digit number by a 2-digit number, with and without remainders and zeros in the answer

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA123 Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers		
Quest: Operations with whole numbers		
Learning Journey Multiplication and division word problems		
Steps	**Content**	**Detail**
1	Solving word problems involving multiplication and division	• use appropriate language to compare quantities, eg 'twice as much', 'half as much' • use a table or similar organiser to record methods used to solve problems
2	Introducing speed using metric units	• recognise symbols used to record speed in kilometres per hour • solve simple problems involving speed
ACMNA124 Investigate everyday situations that use integers. Locate and represent these numbers on a number line		
Quest: Integers		
Learning Journey Investigating and interpreting integers		
1	Investigating integers in context	• interpret integers in everyday contexts, eg temperature • count forwards and backwards with positive and negative whole numbers, including through 0 (in context)
2	Investigating integers	• recognise the location of negative whole numbers in relation to zero and place them on a number line • use the term 'integers' to describe positive and negative whole numbers and zero • investigate negative whole numbers and the number patterns created when counting backwards on a calculator • recognise that negative whole numbers can result from subtraction
3	Interpreting integers in context	• use a model to interpret intervals across zero (in context)

Fractions and decimals

ACMNA125 Compare fractions with related denominators and locate and represent them on a number line		
Quest: Fractions with related denominators		
Learning Journey Working with fractions		
Steps	**Content**	**Detail**
1	Comparing and ordering proper fractions with different numerators and denominators (denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100)	• compare and order proper fractions using a benchmark fraction for support, eg half or quarter • record comparisons using >, < or = • recognise that comparisons are only valid when the 2 fractions refer to the same whole
2	Recognising and finding equivalent simple fractions with related denominators using multiplicative thinking (denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100)	• develop mental strategies for generating equivalent fractions, such as multiplying or dividing the numerator and the denominator by the same number • explain or demonstrate why 2 fractions are or are not equivalent • apply knowledge of equivalent fractions to convert between units of measurement
3	Using common factors to simplify proper fractions to their simplest form	• determine a common factor of the numerator and denominator of a fractions and use to find an equivalent fraction. Repeat until the fraction is reduced to its simplest form • write a fraction in its simplest form using the highest common factor • know that a fraction is reduced to its simplest form when the only common factor of the numerator and denominator is 1

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Fractions and decimals

ACMNA126 Solve problems involving addition and subtraction of fractions with the same or related denominators		
Quest: Adding and subtracting fractions		
Learning Journey Add & subtract fractions-related denominators		
Steps	**Content**	**Detail**
1	Adding proper fractions with related denominators and answers less than 1 whole	• add proper fractions where the denominators are related • model and represent strategies, including using diagrams and written representations • use knowledge of equivalence to simplify answers when adding fractions
2	Adding and subtracting simple proper fractions in which 1 denominator is a multiple of another (denominators 2, 3, 4, 5, 6, 7, 8, 10, 12, 100)	• add and subtract proper fractions where 1 denominator is the same as, or a multiple of, the other • use knowledge of equivalence to simplify answers when adding and subtracting fractions
	Adding simple fractions with related denominators	• add fractions where the denominators are related • use knowledge of equivalence to simplify answers when adding fractions • where the answer is greater than 1 convert the fraction to a mixed numeral
3	Subtracting proper fractions with related denominators and answers less than 1 whole	• subtract proper fractions where the denominators are related • model and represent strategies, including using diagrams and written representations • use knowledge of equivalence to simplify answers when subtracting fractions
4	Subtracting simple fractions with related denominators	• subtract fractions where the denominators are related • use knowledge of equivalence to simplify answers when subtracting fractions • where the answer is greater than 1 convert the fraction to a mixed numeral
5	Adding and subtracting proper fractions with related denominators and answers less than 1 whole	• add and subtract proper fractions where the denominators are related • model and represent strategies, including using diagrams and written representations • use knowledge of equivalence to simplify answers when adding and subtracting fractions
Learning Journey Add and subtract fractions and mixed numerals		
1	Adding fractions, including mixed numerals, with related denominators	• add fractions, including mixed numerals, where the denominators are related • convert an answer that is an improper fraction to a mixed numeral • use knowledge of equivalence to simplify answers when adding fractions • recognise that improper fractions may sometimes make calculations involving mixed numerals easier
2	Subtracting fractions, including mixed numerals, with related denominators	• subtract fractions, including mixed numerals, where the denominators are related • convert an answer that is an improper fraction to a mixed numeral • use knowledge of equivalence to simplify answers when subtracting fractions • recognise that improper fractions may sometimes make calculations involving mixed numerals easier
3	Adding and subtracting fractions including mixed numerals, with related denominators	• add and subtract fractions where the denominators are related • use knowledge of equivalence to simplify answers when adding and subtracting fractions • where the answer is greater than 1 convert the fraction to a mixed numeral
4	Solving word problems involving fractions and mixed numerals with the related denominators	• solve word problems involving the addition and subtraction of fractions where 1 denominator is the same as, or a multiple of, the other

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Number and Algebra

Fractions and decimals

ACMNA127 Find a simple fraction of a quantity where the result is a whole number, with and without digital technologies		
Quest: Finding a fraction of a quantity		
Learning Journey Finding a fraction of a quantity		
Steps	**Content**	**Detail**
1	Finding a simple fraction of a quantity with and without the use of digital technologies	• calculate a simple fraction of a collection/quantity, with and without the use of digital technologies • explain how unit fractions can be used in the calculation of simple fractions of collections/quantities, eg 'To calculate 3/8 of a quantity, I found 1/8 of the collection first and then multiplied by 3'
2	Solving word problems involving non-unit fractions	• find the whole given the non-unit fraction of a set • solve word problems in different contexts, eg measurement • solve word problems involving fractions with different denominators eg 2/5 of the children have blue eyes, 2/6 have green eyes, if there are 30 children altogether how many children have brown eyes?
ACMNA128 Add and subtract decimals, with and without digital technologies, and use estimation and rounding to check the reasonableness of answers		
Quest: Adding and subtracting decimals		
Learning Journey Adding decimals		
1	Adding decimals to 2 decimal places using mental strategies	• select and apply efficient mental strategies to solve addition problems, including compensation, bridging to 1, using place value • estimate sums • record strategies using numbers, models and diagrams • relate decimals to fractions to aid mental strategies • solve word problems using mental strategies, including problems involving measurement and money
2	Adding decimals to 3 decimal places using mental strategies	• select and apply efficient mental strategies to solve addition problems, including compensation, bridging to 1, using place value • record strategies using numbers, models and diagrams • relate decimals to fractions to aid mental strategies • solve word problems using mental strategies, including problems involving measurement and money
3	Adding decimals using digital technologies	• add decimals using digital technologies • use estimation and rounding to check the reasonableness of answers when adding decimals • interpret a calculator display in the context of the problem, eg 2.6 means $2.60 • solve word problems involving the addition of decimals, including those involving money and measurement
4	Adding decimals using written method	• use a standard algorithm to add decimals with the same number of decimal places • use a standard algorithm to add decimals with a different number of decimal places • use estimation and rounding to check the reasonableness of answers when adding decimals

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Fractions and decimals

ACMNA128 Add and subtract decimals, with and without digital technologies, and use estimation and rounding to check the reasonableness of answers		
Quest: Adding and subtracting decimals		
Learning Journey Subtracting decimals		
Steps	**Content**	**Detail**
1	Subtracting decimals using mental strategies	• select and apply efficient mental strategies to solve subtraction problems, including compensation, bridging to 1, using place value • record strategies using numbers, models and diagrams • relate decimals to fractions to aid mental strategies • solve word problems using mental strategies, including problems involving measurement and money
2	Subtracting decimals using digital technologies	• subtract decimals using digital technologies • use estimation and rounding to check the reasonableness of answers when subtracting decimals • interpret a calculator display in the context of the problem, eg 2.6 means $2.60 • solve word problems involving the subtraction of decimals, including those involving money and measurement
3	Subtracting decimals using written method	• use a standard algorithm to subtract decimals with the same number of decimal places • use a standard algorithm to subtract decimals with a different number of decimal places • use estimation and rounding to check the reasonableness of answers when subtracting decimals
4	Rounding decimal hundredths	• round hundredths to the nearest whole number • round hundredths to the nearest tenth
ACMNA129 Multiply decimals by whole numbers and perform divisions by non-zero whole numbers where the results are terminating decimals, with and without digital technologies		
Quest: Multiplying and dividing decimals		
Learning Journey Multiplying decimals		
1	Multiplying decimals	• use mental strategies to multiply simple decimals by single-digit numbers, eg 3.5 × 2 • multiply decimals of up to 3 decimal places by whole numbers of up to 2 digits, with and without the use of digital technologies, eg 'I measured 3 desks. Each desk was 1.25 m in length, so the total length is 3 × 1.25 = 3.75 m' • solve word problems involving the multiplication of decimals, including those involving money • use estimation and rounding to check the reasonableness of answers when multiplying decimals
2	Multiplying decimals using written method	• multiply decimals up to thousandths using a standard algorithm
Learning Journey Dividing decimals		
1	Dividing whole numbers and decimals of up to 2 decimal places using mental strategies	• divide decimals by a one-digit whole number where the result is a terminating decimal, eg 5.25 ÷ 5 = 1.05 • solve word problems involving the division of decimals, including those involving money • use estimation and rounding to check the reasonableness of answers when dividing decimals
2	Dividing decimals using written method	• divide decimals up to thousandths using a standard algorithm

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Fractions and decimals

ACMNA130 Multiply and divide decimals by powers of 10		
Quest: Multiplying and dividing decimals by powers of 10		
Learning Journey Mult/div decimals by powers of 10		
Steps	**Content**	**Detail**
1	Multiplying decimals by powers of 10	• use PV equipment to multiply decimals by 10 • recognise that the digits move one place the left • use zero as a place holder
2	Dividing decimals by powers of 10	• use PV equipment to divide decimals by 10 • recognise that the digits move one place the right • use zero as a place holder
ACMNA131 Make connections between equivalent fractions, decimals and percentages		
Quest: Fractions, decimals, and percentages		
Learning Journey Representing fractions, decimals and percentages		
1	Introducing percentages	• recognise that the symbol % means 'percent' • understand that 'percent' relates to 'number of parts per one hundred' • write fractions with a denominator of 100 as percentages and vice versa • model percentages with concrete materials/ drawings, eg using 10x10grid • identify real-life contexts where percentages are used • find a percent of a quantity as a rate per 100, eg 30% of a quantity means 30/100 times the quantity
2	Representing percentages and decimals	• write decimals (< 1) to 2 decimal places as percentages • model percentages and decimals using diagrams, eg number line or 100 grid • write decimals as percentages and vice versa
3	Representing simple fractions as percentages	• represent simple fractions as percentages and vice versa • model percentages with concrete materials/ drawings, eg using 10x10grid
	Representing common fractions as percentages	• represent common fractions as percentages and vice versa • model percentages with concrete materials/ drawings, eg using 10x10grid
Learning Journey Fraction, decimal and percentage equivalence		
1	Investigating the relationships between fractions, decimals and percentages	• investigate using concrete materials, drawings and calculators, the relationships between decimals, percentages and fractions with denominators of 2, 4, 5, 10, 20, 25, 50 and 100 • record relationships between decimals, percentages and fractions (with denominators 2, 4, 5, 10, 20, 25, 50, 100) • demonstrate understanding using symbolic representation
2	Representing common equivalent fractions, decimals and percentages	• recall the relationships between decimals, percentages and fractions with denominators of 2, 4, 5, 10, 20, 25, 50 and 100 • recognise fractions, decimals and percentages as different representations of the same value • interpret and explain the use of fractions, decimals and percentages in everyday contexts • relate equivalence to proportion
3	Representing equivalent fractions, decimals and percentages	• write percentages as fractions in their simplest form • write fractions with denominators that are factors of 100 as percentages by multiplying the numerator and denominator by a common value • write fractions with denominators that are not factors of 100 as percentages by writing as a decimal first, eg using short division, then x100 to write as a percentage • write percentages as decimals and vice versa • represent equivalent fractions, decimals and percentages • select and justify the most appropriate representation of a quantity — fraction, decimal, percentage
4	Solving problems relating to percentage and decimal equivalence	• solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4, 1/5, 2/5, 4/5 and those fractions with a denominator or multiple of 10 or 25

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Number and Algebra

Money and financial mathematics

ACMNA132 Investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies		
Quest: Calculating percentages		
Learning Journey Calculating percentages		
Steps	**Content**	**Detail**
1	Converting common fractions to percentages using mental strategies	• use mental strategies to convert fractions to percentages
2	Converting common fractions to percentages using a calculator	• use calculator strategies to convert fractions to percentages
3	Calculating simple percentages	• estimate 0%, 1%, 10%, 25%, 50% and 100% of an amount including examples in context (exclude discounts), explain estimation • model 10%, 25% and 50% of an amount • calculate 10%, 25% and 50% of an amount including examples in context (exclude discounts)
4	Calculating simple percentage discounts	• investigate and calculate percentage discounts of 10%, 25% and 50% on sale items • estimate quantities using benchmarks of 10%, 25% and 50% • calculate sale price by subtracting the proportion from the original amount • calculate common percentages of quantities • choose the most appropriate equivalent form of a percentage to aid calculation
5	Calculating simple percentages of quantities	• equate 10% to 1/10, 25% to 1/4 and 50% to 1/2 • use mental strategies to estimate discounts of 10%, 25% and 50%, • calculate the sale price of an item after a discount of 10%, 25% and 50%, recording the strategy and result

Patterns and algebra

ACMNA133 Continue and create sequences involving whole numbers, fractions and decimals. Describe the rule used to create the sequence		
Quest: Number sequences		
Learning Journey Continuing and creating number sequences		
Steps	**Content**	**Detail**
1	Continuing and creating sequences involving whole numbers, fractions and decimals	• describe the rule used to create the sequence • continue and create number patterns, with and without the use of digital technologies, using whole numbers, fractions and decimals, eg 1/4, 1/8, 1/16, ... or 1.25, 2.5, 5 ... • describe how number patterns have been created and how they can be continued • create simple shape patterns using concrete materials • find missing terms in a number sequence

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Number and Algebra

Patterns and algebra

ACMNA134 Explore the use of brackets and order of operations to write number sentences		
Quest: Order of operations		
Learning Journey Order of operations - no grouping symbols		
Steps	**Content**	**Detail**
1	Introducing order of operations involving addition and subtraction	• solve number sentences involving addition and subtraction
2	Introducing order of operations involving multiplication and division	• solve number sentences involving multiplication and division
3	Introducing order of operations involving all 4 operations	• solve number sentences involving all 4 operations
Learning Journey Order of operations using grouping symbols		
1	Introducing order of operations involving grouping symbols	• explore the use of brackets and the order of operations in number sentences • use the term 'operations' to describe collectively the processes of addition, subtraction, multiplication and division • recognise that the grouping symbols () and [] are used in number sentences to indicate operations that must be performed first • perform calculations involving grouping symbols without the use of digital technologies
2	Applying order of operations for mixed operations and grouping symbols	• apply the order of operations to perform calculations involving mixed operations and grouping symbols • investigate whether different digital technologies apply the order of operations • recognise when grouping symbols are not necessary
3	Introducing order of operations involving multiple grouping symbols	• explore the use of multiple brackets and the order of operations in number sentences • recognise that the grouping symbols () and [] are used in number sentences to indicate operations that must be performed first • perform calculations involving grouping symbols without the use of digital technologies
4	Applying order of operations to real-life contexts	• investigate and establish the order of operations using real-life contexts • write number sentences to represent real-life situations

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Using units of measurement

ACMMG135 Connect decimal representations to the metric system		
Quest: Connecting decimals to the metric system		
Learning Journey Decimal notation and the metric system		
Steps	**Content**	**Detail**
1	Recording kilometres and metres using decimal notation	• record lengths and distances using decimal notation to 3 decimal places
2	Connecting decimal representations to the metric system	• recognise the equivalence of whole-number and decimal representations of measurements of length • interpret decimal notation for lengths and distances involving millimetres, centimetres, metres and kilometres
Learning Journey Decimal representation in capacity		
1	Connecting decimal representations to the metric systems (to 3 decimal places)	• recognise the equivalence of whole-number and decimal representations of measurements of capacities • interpret decimal notation for volumes and capacities • record volume and capacity using decimal notation to 3 decimal places
Learning Journey Decimal representation in mass		
1	Understanding decimal representation of metric measurements of mass	• connect measurements of mass with their decimal representations • recognise the equivalence of whole number and decimal representations, eg 3 kg 250 g = 3.25 kg • record mass using decimal notation of up to 3 decimal places • refer to SI units of mass
ACMMG136 Convert between common metric units of length, mass and capacity		
Quest: Converting units of length, capacity/mass		
Learning Journey Converting metric units of length		
1	Converting between standard metric units of length to 1 decimal place	• understand the meaning of metric prefixes, eg kilo-, centi- and milli- • convert between centimetres and metres and vice versa • convert between centimetres and millimetres and vice versa
2	Converting between common metric units of length up to 2 decimal places	• understand the meaning of metric prefixes, eg kilo-, centi- and milli- • convert between metres and kilometres • convert between millimetres, centimetres and metres to compare lengths and distances • relate the multiplicative relationship between centimetres and metres, metres and kilometres • explain and use the relationship between the size of a unit and the number of units needed to assist in determining whether multiplication or division is required when converting between units
3	Converting between common metric units of length up to 3 decimal places	• understand the meaning of metric prefixes, eg kilo-, centi- and milli- • convert between metres and kilometres • convert between millimetres, centimetres and metres to compare lengths and distances • relate the multiplicative relationship between centimetres and metres, metres and kilometres • explain and use the relationship between the size of a unit and the number of units needed to assist in determining whether multiplication or division is required when converting between units

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG136 Convert between common metric units of length, mass and capacity		
Quest: Converting units of length, capacity/mass		
Learning Journey Converting metric units of capacity		
Steps	**Content**	**Detail**
1	Converting between common metric units of capacity including fractions and decimals (to 2 decimal places)	• convert between millilitres and litres using fractions eg 1 and 1/10 litres as 1100 ml or 3.8 l as 3800 ml • explain and use the relationship between the size of a unit and the number of units needed to assist in determining whether multiplication or division is required when converting between units
2	Converting between common metric units of capacity (to 3 decimal places)	• convert between millilitres and litres • explain and use the relationship between the size of a unit and the number of units needed to assist in determining whether multiplication or division is required when converting between units
Learning Journey Converting metric units of mass		
1	Converting between standard metric units of mass to 1 decimal place	• understand the meaning of metric prefixes, eg kilo-, centi-, milli- • convert between grams and kilograms and vice versa • convert between kilograms and tonnes and vice versa • convert among grams, kilograms and tonnes
	Converting between standard metric units of mass up to 2 decimal places	• understand the meaning of metric prefixes, eg kilo-, centi-, milli- • convert between grams and kilograms and vice versa • convert between kilograms and tonnes and vice versa • convert among grams, kilograms and tonnes • solve problems using different units of mass
	Converting between standard metric units of mass up to 3 decimal places	• understand the meaning of metric prefixes, eg kilo-, centi-, milli- • convert between grams and kilograms and vice versa • convert between kilograms and tonnes and vice versa • convert among grams, kilograms and tonnes • solve problems using different units of mass
ACMMG137 Solve problems involving the comparison of lengths and areas using appropriate units		
Quest: Length and area		
Learning Journey Length problems		
1	Solving one-step problems involving length	• solve a variety of one-step problems involving length and perimeter, including different units of length • sketch or construct a rectangle, triangle or parallelogram given the perimeter and/or area
2	Solving two-step problems involving length	• solve a variety of two-step problems involving length and perimeter, including different units of length
Learning Journey Calculating the area of triangles		
1	Calculating area of a right-angled triangle without a formula	• establish that the area of a right-angled triangle is half the area of a rectangle with the same base and perpendicular height • calculate the area of right-angled triangles using the relationship that the area is half the area of a rectangle with the same base and perpendicular height • calculate the area of right-angled triangles where all three side lengths are given, using the relationship that the area is half the area of a rectangle with the same base and perpendicular height
2	Calculating area of any triangle	• establish that the area of any triangle is Area of triangle = ½ × base × perpendicular height, including triangles in which the perpendicular height meets the base within the length of the base and also triangles in which the perpendicular height (altitude) meets the base outside the length of the base • calculate the area of triangles where more dimensions than are necessary are given, using the relationship that the area is half the area of a rectangle with the same base and perpendicular height

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG137 Solve problems involving the comparison of lengths and areas using appropriate units		
Quest: Length and area		
Learning Journey Calculating the area of triangles		
Steps	**Content**	**Detail**
3	Applying the formula for the area of a rectangle	• develop the formula for the area of a rectangle, A = l × w (also A = lw) • apply the formula for area of a rectangle to find the area of rectangles given 2 side lengths measured in the same or different units • apply the formula for area of a rectangle to find the area of composite rectilinear figures, such as an L-shape, U-shape • apply the formula to real life contexts
ACMMG138 Connect volume and capacity and their units of measurement		
Quest: Volume and capacity		
Learning Journey Volume and capacity		
1	Connecting volume and capacity	• select the appropriate unit to measure volume and capacity • demonstrate that a cube of side 10 centimetre will displace 1 litre of water • demonstrate, by using a medicine cup, that a cube of side 1 centimetre will displace 1 millilitres of water • equate 1 cubic centimetre to 1 millilitre and 1000 cubic centimetres to 1 litre • find the volumes of irregular solids in cubic centimetres using a displacement strategy
ACMMG139 Interpret and use timetables		
Quest: Using timetables		
Learning Journey Using timetables		
1	Using timetables (12-hour and 24-hour time)	• use real-world timetables (12-hour and 24-hour time) to determine arrival time given the desired departure time, including when the departure time is not listed exactly in the timetable • use real-world timetables (12-hour and 24-hour time) to determine departure time given the desired arrival time, including when the arrival time is not listed exactly in the timetable • use real-world timetables (12-hour and 24-hour time) to determine the duration of a journey • solve real-world problems involving timetables

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Shape

ACMMG140 Construct simple prisms and pyramids		
Quest: Constructing prisms and pyramids		
Learning Journey Constructing prisms and pyramids		
Steps	**Content**	**Detail**
1	Constructing simple right prisms	• create prisms using a variety of materials, eg plasticine, paper or cardboard nets, connecting cubes • create skeletal models of prisms, eg using toothpicks and modelling clay or straws and tape • connect the edges of prisms with the construction of their skeletal models • construct three-dimensional models of prisms and sketch the front, side and top views • describe to another student how to construct or draw a prism • construct three-dimensional models of prisms, given drawings of different views
2	Constructing simple pyramids	• create pyramids using a variety of materials • create skeletal models of pyramids • connect the edges of pyramids with the construction of their skeletal models • construct three-dimensional models of pyramids and sketch the front, side and top views • describe to another student how to construct or draw a pyramid • construct three-dimensional models of pyramids, given drawings of different views

Geometric reasoning

ACMMG141 Investigate, with and without digital technologies, angles on a straight line, angles at a point and vertically opposite angles. Use results to find unknown angles		
Quest: Angle properties		
Learning Journey Adjacent and vertically opposite angles		
Steps	**Content**	**Detail**
1	Introducing adjacent angles	• define adjacent angles as angles that share a common arm and a common vertex and recognise the larger angle created • recognise adjacent angles as additive and calculate the size of an unknown angle given the whole and its other parts and find the size of the whole given the size of the parts
2	Exploring adjacent angles that form a right angle	• explore the relationship between angles that form a right angle • calculate an unknown angle within a right angle given the other parts
3	Exploring adjacent angles that form a straight angle	• explore the relationship between angles that form a straight angle • calculate an unknown angle within a straight angle given the other parts
4	Exploring adjacent angles that form an angle of revolution	• explore the relationship between angles that form an angle of revolution • calculate an unknown angle within an angle of revolution given the other parts
5	Exploring vertically opposite angles	• explore the relationship between angles formed when 2 straight lines intersect and identify these as 'vertically opposite angles' • use the equality of vertically opposite angles to find the size of unknown angles in diagrams • use the equality of vertically opposite angles to find the size of unknown angles represented by variables in diagrams

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Location and transformation

ACMMG142 Investigate combinations of translations, reflections and rotations, with and without the use of digital technologies		
Quest: Rigid transformations		
Learning Journey Rigid transformations		
Steps	**Content**	**Detail**
1	Creating patterns that result from rotating shapes	• extend and create repeating patterns that result from rotations, through investigation using a variety of tools, eg pattern blocks, dynamic geometry software, geoboards, dot paper • describe the pattern • predict the next term/s in the pattern
2	Creating patterns that result from translations	• extend and create repeating patterns that result from translations through investigation using a variety of tools, eg pattern blocks, dynamic geometry software, dot paper • describe the pattern • predict the next term/s in the pattern
3	Identifying combinations of transformations	• complete a table of values for a number pattern made using shapes and describe the pattern in words • describe the number pattern in a variety of ways and record descriptions using words, eg 'It looks like the multiplication facts for 4' • determine the rule to describe the pattern by relating the bottom number to the top number in a table, eg 'You multiply the number of squares by 4 to get the number of matches' • use the rule to calculate the corresponding value for a larger number, eg 'How many matches are needed to create 100 squares?'
ACMMG143 Introduce the Cartesian coordinate system using all four quadrants		
Quest: The Cartesian plane		
Learning Journey Locating points on the Cartesian plane		
Steps	**Content**	**Detail**
1	Locating points on the Cartesian plane	• plot and label points, given coordinates, in all 4 quadrants of the number plane • identify and label each quadrant on a number plane • plot a sequence of coordinates to create a picture • identify and record the coordinates of given points in all 4 quadrants of the number plane • recognise that the order of coordinates is important when locating points on the number plane, eg (2, 3) is a location different from (3, 2)

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Mathletics

Statistics and Probability

Chance

Steps	Content	Detail
ACMSP144 Describe probabilities using fractions, decimals and percentages		
Quest: Probability as a fraction, decimal or percent		
Learning Journey Probability as a fraction, decimal or percent		
1	Describing probability of a single event using fractions, decimals and percentages	• list the outcomes for chance experiments where the outcomes are not equally likely to occur and assign experimental probabilities to the outcomes using fractions • use knowledge of equivalent fractions, decimals and percentages to assign probabilities to the likelihood of outcomes within concrete examples • explain real-life events in the context of probabilities • use the terminology 'theoretical probability' and/ or 'relative frequency' as the value given by the formula: number of times named outcome(s) did happen / total number of trials
ACMSP145 Conduct chance experiments with both small and large numbers of trials using appropriate digital technologies		
Quest: Chance experiments		
Learning Journey Chance experiments		
1	Using digital technologies to conduct chance experiments	• assign expected probabilities to outcomes in chance experiments with random generators, including digital simulators, and compare the expected probabilities with the observed probabilities after both small and large numbers of trials • determine and discuss the differences between the expected probabilities and the observed probabilities after both small and large numbers of trials • explain what happens to the observed probabilities as the number of trials increases
2	Making generalisations from chance samples	• use sample results to make predictions about a larger sample • discuss whether a prediction about a larger sample from the results of a sub-sample would be the same if a different sub-sample was used
ACMSP146 Compare observed frequencies across experiments with expected frequencies		
Quest: Frequency/fairness in chance experiments		
Learning Journey Frequency/fairness in chance experiments		
1	Comparing observed frequencies with expected frequencies in chance experiments	• use the term 'frequency' to describe the number of times a particular outcome occurs in a chance experiment • distinguish between the 'frequency' of an outcome and the 'probability' of an outcome in a chance experiment • record and compare the expected frequencies of outcomes of chance experiments with observed frequencies, including where the outcomes are not equally likely • explain why observed frequencies of outcomes in chance experiments may differ from expected frequencies • recognise that some random generators have outcomes that are not equally likely and discuss the effect on expected outcomes
2	Exploring fair and unfair chance experiments	• discuss the 'fairness' of simple games involving chance • design a spinner or label a dice so that a particular outcome is more likely than another and discuss the fairness of the outcomes • list all possible outcomes using tables, lists and tree diagrams (with or without digital technology) where outcomes are not equally likely to occur • record results of chance experiments using appropriate methods, eg tally chart, line plot, bar graph

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Mathletics

Statistics and Probability

Data representation and interpretation

ACMSP147 Interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables		
Quest: Interpreting/representing/comparing data		
Learning Journey Two-way tables		
Steps	**Content**	**Detail**
1	Introducing and interpreting bivariate data and two-way tables	• interpret data presented in two-way tables that represent two categorical variables • ask and answer comparative and relational questions related to data in a two-way table
2	Representing bivariate data in a two-way table	• create a two-way table to organise data involving 2 categorical variables • ask and answer comparative and relational questions related to data in a two-way table
Learning Journey Side-by-side column graphs		
1	Introducing and interpreting side-by-side column graphs	• interpret side-by-side column graphs for 2 categorical variables, eg favourite television show of students in Year 1 compared to that of students in Year 6 • ask and answer comparative and relational questions related to data in a side-by-side column graph
2	Representing bivariate data in a side-by-side column graph	• construct a side by side column graph for two categorical variables eg favourite television show of students in Year 1 compared to that of students in Year 6 • ask and answer comparative and relational questions related to data in a side by side column graph
Learning Journey Comparing & selecting bivariate data displays		
1	Comparing different displays of the same data set	• interpret and compare different displays of the same data set to determine the most appropriate display for the data set • compare the effectiveness of different student-created data displays • discuss the advantages and disadvantages of different representations of the same data • explain which display is the most appropriate for interpretation of a particular data set • compare representations of the same data set in a side-by-side column graph and in a two-way table
2	Selecting appropriate data displays	• select an appropriate type of graph to represent a set of data • graph data using technology, and justify the choice of graph from types of graphs already studied
ACMSP148 Interpret secondary data presented in digital media and elsewhere		
Quest: Interpreting & evaluating secondary data		
Learning Journey Interpreting & evaluating secondary data		
1	Interpreting discrete and continuous secondary data	• differentiate between first-hand and second-hand data • read, interpret, and draw conclusions from secondary data presented in charts, tables, and graphs (including broken-line graphs)
2	Interpreting secondary data	• interpret data representations found in digital media and in factual texts • interpret tables and graphs from the media and online sources • identify and describe conclusions that can be drawn from a particular representation of data

Australian Curriculum Year 6

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP148 Interpret secondary data presented in digital media and elsewhere		
Quest: Interpreting & evaluating secondary data		
Learning Journey Interpreting & evaluating secondary data		
Steps	**Content**	**Detail**
3	Evaluating data collection for bias and misleading information	• identify sources of possible bias in representations of data in the media by discussing various influences on data collection and representation, eg who created or paid for the data collection, whether the representation is part of an advertisement • determine, through investigation, how well a set of data represents a population, on the basis of the method that was used to collect the data (Sample problem: Would the results of a survey of primary students about their favourite television shows represent the favourite shows of students in the entire school? Why or why not?). • discuss the messages that those who created a particular data representation might have wanted to convey
4	Evaluating data displays for bias and misleading information	• critically evaluate data representations found in digital media and related claims • identify misleading representations of data in the media, eg broken axes, graphics that are not drawn to scale • explain how different scales used on graphs can influence conclusions drawn from the data • demonstrate, through investigation, an understanding of how data from charts, tables, and graphs can be used to make inferences and convincing arguments (eg, describe examples found in newspapers and magazines)

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Number and place value

ACMNA149 Investigate index notation and represent whole numbers as products of powers of prime numbers		
Quest: Indices		
Learning Journey Introducing indices		
Steps	**Content**	**Detail**
1	Describing numbers written in 'index form' using terms such as 'base', 'power', 'index', 'exponent', 'to the power of', 'squared', 'cubed'	• describe numbers written in 'index form' using terms such as 'base', 'power', 'index', 'exponent', 'to the power of', 'squared', 'cubed' • use index notation to express powers of numbers (positive indices only)
2	Evaluating numbers expressed as powers of integers	• evaluate numbers expressed as powers of integers
3	Evaluating expressions involving indices without using a calculator	• evaluate expressions involving indices without using a calculator • apply the order of operations to evaluate expressions involving indices
4	Evaluating expressions involving indices using a calculator	• evaluate expressions involving indices using a calculator • apply the order of operations to evaluate expressions involving indices
5	Using index laws to simplify equations with numerical bases	• use index laws to simplify equations with numerical bases
Learning Journey Divisibility, indices and factors		
1	Determining and applying tests of divisibility for 2, 3, 4, 5, 6 and 10	• determine and apply tests of divisibility for 2, 3, 4, 5, 6 and 10
2	Using index notation to express prime factors	• use factor trees to express a number as a product of its prime factors, using index notation where appropriate • use the ladder method to express a number as a product of its prime factors, using index notation where appropriate
3	Finding the highest common factor of large numbers by first expressing the numbers as products of prime factors	• find the highest common factor of large numbers by first expressing the numbers as products of prime factors
ACMNA150 Investigate and use square roots of perfect square numbers		
Quest: Square and cube roots		
Learning Journey Working with square roots		
1	Finding square roots of perfect square whole numbers only	• find the square roots of perfect square whole numbers up to 100
2	Finding square roots of non-perfect squares using a calculator	• find the square roots of non-perfect squares using a calculator
3	Determining between which 2 whole numbers lies the square root of a non-perfect square number up to 100	• determine mentally, between which 2 whole numbers lies the square root of a non-perfect square number up to 100
	Estimating the square root of non-square numbers	• estimate the square root of a non-square number up to 100 • estimate the square root of a non-square number up to 100 using a number line to estimate

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA150 Investigate and use square roots of perfect square numbers		
Quest: Square and cube roots		
Learning Journey Working with cube roots		
Steps	**Content**	**Detail**
1	Finding cube roots of perfect cube whole numbers	• find the cube roots of perfect cube whole numbers up to 125
2	Finding cube roots of non-perfect cubes using a calculator	• find cube roots of non-perfect cubes using a calculator
3	Determining mentally, between which 2 whole numbers lies the cube root of a non-perfect cube number up to 125	• determine mentally, between which 2 whole numbers lies the cube root of a non-perfect cube number up to 125
	Estimating the cube root of a non-perfect cube number up to 125	• estimate the cube root of a non-perfect cube number up to 125
Learning Journey Solving problems with square and cube roots		
1	Finding square roots of large perfect square whole numbers from prime factors	• find square roots of large perfect square whole numbers from prime factors
2	Applying the order of operations to evaluate expressions involving square roots and cube roots, with and without a calculator	• apply the order of operations to evaluate expressions involving square roots and cube roots, with and without a calculator
ACMNA151 Apply the associative, commutative and distributive laws to aid mental and written computation		
Quest: Laws of multiplication and division		
Learning Journey Laws of multiplication and division		
1	Using factors of a number to aid mental computation involving multiplication and division	• use factors of a number to aid mental computation involving multiplication and division
2	Showing the connection between division and multiplication, including where there is a remainder	• show the connection between division and multiplication, including where there is a remainder
3	Applying the distributive law to aid in mental computation to expand expressions containing 2 terms within the grouping symbols	• apply the distributive law to aid in mental computation to expand expressions containing 2 terms within the grouping symbols
	Applying the commutativity law of multiplication to aid mental computation	• apply the commutativity law to aid mental computation
	Applying the associativity law of multiplication to aid in mental computation	• apply the associativity law of multiplication to aid in mental computation
4	Applying the distributive law to aid in mental computation to expand expressions containing 3 or more terms within the grouping symbols	• apply the distributive law to aid in mental computation to expand expressions containing 3 or more terms within the grouping symbols
5	Solving problems within a given context by applying the distributive law	• solve problems within a given context by applying the distributive law

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA280 Compare, order, add and subtract integers		
Quest: Working with integers		
Learning Journey Compare, order, add and subtract integers		
Steps	**Content**	**Detail**
1	Describing the direction and magnitude of integers	• describe the direction and magnitude of integers when applied to the number line
2	Comparing the relative value of integers, including recording the comparison by using the symbols < and >	• compare the relative value of integers, including recording the comparison by using the symbols and < and > including negative integers
	Ordering integers	• order integers of any size in ascending and descending order including negative numbers
3	Understanding addition and subtraction of integers pictorially	• understand addition and subtraction of integers pictorially
	Understanding addition and subtraction of integers symbolically	• understand addition and subtraction of integers symbolically
4	Representing addition and subtraction on a horizontal or vertical number line diagram	• represent addition and subtraction on a horizontal or vertical number line diagram
5	Adding and subtracting negative integers	• add and subtract negative integers
Learning Journey Solving temperature problems		
1	Measuring temperature scales	• interpret scales on thermometers to accurately read temperatures
2	Calculating change in temperature	• calculate the difference in temperature between all ranges including between 0 and a negative or positive, both positive, both negative, 1 positive and 1 negative
3	Solving problems within a given context involving a change in temperature	• solve problems within a given context involving a change in temperature • solve problems within a given context involving a change in temperature using temperature specific terminology, eg warmer
4	Describing the difference between a given minimum and maximum temperature using terms such as 'temperature range'	• describe the difference between a given minimum and maximum temperature using terms such as 'temperature range'

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Number and Algebra

Real numbers

ACMNA152 Compare fractions using equivalence. Locate and represent positive and negative fractions and mixed numbers on a number line		
Quest: Expressing and comparing fractions		
Learning Journey Fractions: improper and proper fractions		
Steps	**Content**	**Detail**
1	Generating equivalent fractions with denominators (denominators 1–100, 1000)	• generate equivalent fractions
2	Expressing a fraction in its simplest form	• determine the highest common factor of a pair of integers • express a fraction in its simplest form
3	Expressing improper fractions as mixed numerals	• express improper fractions as mixed numerals that do not require simplification of the proper fraction • express improper fractions as mixed numerals that require simplification of the proper fraction
4	Expressing mixed numerals as improper fractions	• express mixed numerals as improper fractions
Learning Journey Fractions: comparing and ordering		
1	Comparing and ordering proper fractions	• compare and order proper fractions where the denominators are not always multiples of the same number • record comparisons using =, ≠, <, > ≤, ≥ symbols
2	Comparing and ordering improper fractions	• compare and order improper fractions where the denominators are not always multiples of the same number • record comparisons using =, ≠, <, > ≤, ≥ symbols
3	Comparing and ordering proper fractions, improper fractions and mixed numerals	• compare and order proper fractions, improper fractions and mixed numerals where the denominators are not always multiples of the same number • record comparisons using =, ≠, <, > ≤, ≥ symbols
4	Placing positive and negative fractions, decimals and mixed numbers on a number line in order to compare	• place positive and negative fractions, decimals and mixed numbers on a number line in order to compare

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Real numbers

ACMNA153 Solve problems involving addition and subtraction of fractions, including those with unrelated denominators		
Quest: Adding and subtracting fractions		
Learning Journey Fractions: adding fractions		
Steps	**Content**	**Detail**
1	Adding proper fractions with common denominators	• add proper fractions with common denominators
	Adding improper fractions with common denominators	• add improper fractions with common denominators • add improper fractions with common denominators expressing answers as a mixed numeral
2	Adding proper fractions with unlike denominators	• add proper fractions with unlike denominators
3	Adding improper fractions with unlike denominators	• add improper fractions with unlike denominators • add improper fractions with unlike denominators expressing answers as a mixed numeral
Learning Journey Fractions: subtracting fractions		
1	Subtracting proper fractions with common denominators	• subtract proper fractions with common denominators
2	Subtracting improper fractions with common denominators	• subtract improper fractions with common denominators • subtract improper fractions with common denominators, expressing answers as a mixed numeral
3	Subtracting mixed numbers with common denominators	• subtract mixed numbers with common denominators
4	Subtracting proper fractions with unlike denominators	• subtract proper fractions with unlike denominators
5	Subtracting improper fractions with unlike denominators	• subtract improper fractions with unlike denominators • subtract improper fractions with unlike denominators expressing answers as a mixed numeral
	Subtracting mixed numbers with unlike denominators	• subtract mixed numbers with unlike denominators
Learning Journey Fractions: adding and subtracting fractions		
1	Performing addition or subtraction with fractions where fractions can be in different forms	• perform addition or subtraction with fractions where fractions can be in different forms
2	Subtracting a fraction from an integer	• subtract a fraction from a whole number using written methods
3	Demonstrating an understanding of adding and subtracting positive fractions and mixed numerals, with like and unlike denominators, concretely, pictorially and symbolically	• demonstrate an understanding of adding and subtracting positive fractions and mixed numerals, with like and unlike denominators, concretely, pictorially and symbolically
4	Recognising and explaining incorrect operations with fractions	• recognise and explain incorrect operations with fractions

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Number and Algebra

Real numbers

ACMNA154 Multiply and divide fractions and decimals using efficient written strategies and digital technologies		
Quest: Multiplying & dividing fractions & decimals		
Learning Journey Multiplying decimals & finding quantities		
Steps	**Content**	**Detail**
1	Multiplying decimals using a calculator	• multiply decimals using a calculator
2	Multiplying decimals using written/mental methods	• multiply decimals using mental/written methods
3	Calculating decimals of quantities using a calculator	• calculate decimals of quantities using a calculator
4	Calculating decimals of quantities using mental/ written methods	• calculate decimals of quantities using mental, written and calculator methods
Learning Journey Multiplying fractions & finding quanitites		
1	Multiplying proper fractions by a whole number greater than 1	• multiply proper fractions by a whole number greater than 1
	Multiplying improper fractions by a whole number greater than 1	• multiply improper fractions by a whole number greater than 1
	Multiplying improper fractions by a whole number greater than 1, expressing answer as a mixed numeral	• multiply improper fractions, expressing answer as a mixed numeral
2	Multiplying 2 proper fractions	• multiply 2 proper fractions using written methods
3	Multiplying 2 improper fractions	• multiply improper fractions using written methods
	Multiplying 2 improper fractions, expressing the answer as a mixed numeral	• multiply 2 improper fractions expressing the answer as a mixed numeral
4	Multiplying 2 mixed numerals	• multiply mixed numerals using written methods
	Multiplying mixed numerals by a whole number greater than 1	• multiply mixed numerals by a whole number greater than 1
5	Multiplying proper fractions, improper fractions and mixed numerals using written methods	• multiply proper fractions, improper fractions and mixed numerals using written methods
	Calculating fractions of quantities using mental or written strategies	• calculate fractions of quantities using mental or written strategies
Learning Journey Dividing integers, fractions and decimals		
1	Dividing positive integers by unit fractions	• divide positive integers by unit fractions
2	Dividing fractions and decimals using a calculator	• divide fractions and decimals using a calculator
3	Dividing decimals by powers of 10	• divide decimals by powers of 10

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Number and Algebra

Real numbers

ACMNA154 Multiply and divide fractions and decimals using efficient written strategies and digital technologies		
Quest: Multiplying & dividing fractions & decimals		
Learning Journey Dividing fractions by fractions and integers		
Steps	**Content**	**Detail**
1	Dividing a unit fraction by a positive integer	• divide unit fractions by whole numbers, eg 1/3 ÷ 2 = 1/6
2	Dividing a positive integer by a proper fraction	• divide a positive integer by a proper fraction
	Dividing a proper fraction by a positive integer	• divide a non-unit proper fraction by a whole number (where the divisor is a factor of the numerator). Use diagrams for support • divide a non-unit proper fraction by any whole number
3	Dividing a proper fraction by a proper fraction	• divide a proper fraction by a proper fraction
4	Dividing a positive integer by an improper fraction	• divide a positive integer by an improper fraction and mixed numeral
	Dividing an improper fraction by a positive integer	• divide an improper fraction by a positive integer
5	Dividing improper fractions by proper fractions and vice versa	• divide improper fractions by proper fractions and vice versa
	Dividing an improper fraction by an improper fraction	• divide an improper fraction by an improper fraction
ACMNA155 Express one quantity as a fraction of another, with and without the use of digital technologies		
Quest: Expressing one quantity as a fraction of another		
Learning Journey Expressing one quantity as a fraction of another		
1	Expressing 1 quantity as a fraction (proper/improper/mixed) of another	• express 1 quantity as a fraction of another
2	Expressing 1 quantity as a fraction of another (using digital technology)	• express 1 quantity as a fraction of another with the use of digital technology
ACMNA156 Round decimals to a specified number of decimal places		
Quest: Rounding decimals		
Learning Journey Rounding decimals		
1	Rounding decimals to a specified number of decimal places (simple rounding)	• round decimals to a given number of decimal places when rounding decimals up/down to the next decimal place value
2	Rounding decimals to a specified number of decimal places (complex rounding)	• round decimals to a given number of decimal places when rounding decimals requires places to be filled with zeroes

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Real numbers

ACMNA157 Connect fractions, decimals and percentages and carry out simple conversions		
Quest: Fractions, decimals and percentages		
Learning Journey Converting decimals		
Steps	**Content**	**Detail**
1	Demonstrating that the decimal expansion of a rational number either repeats or terminates	• demonstrate that the decimal expansion of a rational number either repeats or terminates
2	Converting decimals to percentages	• convert decimals with up to 2 decimal places to percentages containing whole-numbers only • convert decimals with more than 2 decimal places to percentages, writing answers as a percentage with decimal parts • convert decimals with 3-4 decimal places to percentages, writing answers in fraction form • convert decimals with 5 or more decimal places to percentages, writing answers in decimal form rounded to an appropriate degree of accuracy
Learning Journey Converting percentages		
1	Converting percentages less than or equal to 100% into fractions	• convert percentages less than or equal to 100% into fractions
	Converting terminating percentages less than 100% into a decimal	• convert terminating percentages less than 100% into a decimal
2	Converting percentages greater than 100% to mixed numerals	• convert percentages greater than 100% to mixed numerals
	Converting percentages greater than 100% to improper fractions	• convert percentages greater than 100% to improper fractions
	Converting terminating percentages greater than or equal to 100% into a decimal	• convert terminating percentages greater than or equal to 100% into a decimal
3	Converting recurring percentages less than 100% into a decimal	• convert recurring percentages less than 100% into a decimal
	Converting recurring percentages greater than or equal to 100% into a decimal	• convert recurring percentages greater than or equal to 100% into a decimal
Learning Journey Converting fractions to decimals		
1	Converting fractions to decimals using a calculator	• convert fractions to decimals using a calculator
2	Converting fractions to terminating decimals using division	• convert unit fractions to terminating decimals using division • convert improper fractions to terminating decimals using division • convert mixed numerals to terminating decimals using division
3	Converting fractions to recurring decimals using division	• convert fractions to recurring decimals using division • convert improper fractions to recurring decimals using division • convert mixed numerals to recurring decimals using division

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Real numbers

ACMNA157 Connect fractions, decimals and percentages and carry out simple conversions		
Quest: Fractions, decimals and percentages		
Learning Journey Converting fractions to percentages		
Steps	**Content**	**Detail**
1	Converting fractions to percentages using a calculator	• convert fractions to percentages using a calculator
2	Converting fractions to terminating percentages by manipulating the denominator to 100	• convert fractions to terminating percentages by manipulating the denominator to be 100 • convert improper fractions to terminating percentages by manipulating the denominator to be 100 • convert mixed numerals to terminating percentages by manipulating the denominator to be 100
3	Converting fractions to terminating percentages using division	• convert fractions to terminating percentages using division • convert improper fractions to terminating percentages using division • convert mixed numerals to terminating percentages using division
4	Converting fractions to recurring percentages using division	• convert fractions to recurring percentages using division • convert improper fractions to recurring percentages using division • convert mixed numerals to recurring percentages using division
Learning Journey Ordering fractions, decimals and percentages		
1	Ordering fractions, decimals and percentages	• order fractions, decimals and percentages
ACMNA158 Find percentages of quantities and express one quantity as a percentage of another, with and without digital technologies.		
Quest: Percentages of quantities		
Learning Journey Percentages of quantities		
1	Determining percentages of quantities (written and mental methods)	• determine percentages of quantities using written and mental strategies
2	Determining percentages of quantities (calculator method)	• determine percentages of quantities using a calculator
3	Expressing a smaller quantity/value as a percentage amount of another larger quantity/value	• express a smaller quantity/value as a percentage amount of another larger quantity/value in the same units • express a smaller quantity/value as a percentage amount of another larger quantity/value in different units
4	Expressing a larger quantity/value as a percentage amount of another smaller quantity/value	• express a larger quantity/value as a percentage amount of another smaller quantity/value in the same units • express a larger quantity/value as a percentage amount of another smaller quantity/value in different units
ACMNA173 Recognise and solve problems involving simple ratios		
Quest: Ratios		
Learning Journey Using simple ratios		
1	Comparing quantities measured in the same units using ratios	• compare quantities measured in the same units using ratios
	Dividing an interval into a given ratio on a number line	• divide an interval into a given ratio on a number line

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Number and Algebra

Real numbers

ACMNA173 Recognise and solve problems involving simple ratios		
Quest: Ratios		
Learning Journey Using simple ratios		
Steps	**Content**	**Detail**
2	Expressing 1 part of a ratio as a fraction of the whole	• express 1 part of a ratio as a fraction of the whole
3	Identifying terms of a ratio as 'parts' of the ratio	• identify terms of a ratio as 'parts' of the ratio
Learning Journey Simplifying ratios		
1	Simplifying ratios using highest common factors	• simplify ratios using highest common factors
2	Simplifying ratios with fractions involved	• simplify ratios containing one or more fraction parts using the HCF to re-write as a pair of fractions with a common denominator first
3	Simplifying ratios with decimals involved	• simplify ratios containing one or more decimal parts multiplying both parts by a common power of 10 that removes the decimal. Write the resultant ratio in simplest form
4	Identifying equivalent ratios	• identify equivalent ratios
Learning Journey Solve simple problems involving ratios		
1	Applying the unitary method to ratio problems	• apply the unitary method to ratio problems
2	Dividing a quantity into a given ratio	• describe 'sharing' in a given ratio • express the division of a quantity into 2 parts as a ratio using original amounts

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Number and Algebra

Money and financial mathematics

ACMNA174 Investigate and calculate 'best buys', with and without digital technologies		
Quest: Best buys and discounts		
Learning Journey Best buys and discounts		
Steps	**Content**	**Detail**
1	Calculating 'best buys' by comparing price per unit, or quantity per monetary unit, with the use of digital technologies	• calculate 'best buys' by comparing price per unit, or quantity per monetary unit, with the use of digital technologies, eg 500 g for $4.50 compared with 300 g for $2.75
2	Calculating discounts given the original price	• calculate a discount amount given the original price and the percentage discount • calculate the final price of an item given the discount percentage and original price
3	Calculating 'best buys' by comparing price per unit, or quantity per monetary unit, without the use of digital technology	• calculate 'best buys' by comparing price per unit, or quantity per monetary unit without the use of digital technology, eg 500 g for $4.50 compared with 300 g for $2.76
4	Calculating discounts starting with the final price	• calculate a discount amount given the final price and the percentage discount • calculate the original price given the final price and the percentage discount

Patterns and algebra

ACMNA175 Introduce the concept of variables as a way of representing numbers using letters		
Quest: Variable and equivalent algebraic expressions		
Learning Journey Variable and equivalent algebraic expressions		
Steps	**Content**	**Detail**
1	Using equivalent algebraic expressions involving multiplication	• recognise and use equivalent algebraic expressions using algebraic symbols and words involving multiplication
2	Using equivalent algebraic expressions involving multiplication to indices	• recognise and use equivalent algebraic expressions using algebraic symbols and words involving multiplication
	Using equivalent algebraic expressions involving division	• recognise and use equivalent algebraic expressions using algebraic symbols and words using division
3	Using algebraic symbols to represent mathematical operations written in words and vice versa	• use algebraic symbols to represent mathematical operations written in words and vice versa, eg the product of x and y is xy, x + y is the sum of x and y
ACMNA176 Create algebraic expressions and evaluate them by substituting a given value for each variable		
Quest: Algebraic patterns and expressions		
Learning Journey Number patterns		
1	Using objects to build a geometric pattern, record the results in a table of values, describe the pattern in words and algebraic symbols, and represent the relationship on a number grid	• use objects to build a geometric pattern, record the results in a table of values, describe the pattern in words and algebraic symbols, and represent the relationship on a number grid
2	Checking pattern descriptions by substituting further values	• check pattern descriptions by substituting further values
3	Replacing written statements describing patterns with equations written in algebraic symbols	• replace written statements describing patterns with equations written in algebraic symbols

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Patterns and algebra

ACMNA176 Create algebraic expressions and evaluate them by substituting a given value for each variable		
Quest: Algebraic patterns and expressions		
Learning Journey Evaluating formulae		
Steps	**Content**	**Detail**
1	Substituting known values in for pronumerals	• substitute known values in for pronumerals to find the value of an expression, eg if x = 2 and y = 3, find the value of 2x + 3y
2	Using simple formulas to solve problems involving substituting in known variables to solve a problem	• use simple formulas to solve problems involving substituting in known variables to solve a problem
3	Using authentic formulas to solve problems involving substituting in known variables to solve a problem	• use authentic formulas to solve problems involving substituting in known variables to solve a problem
4	Determining whether a particular pattern can be described using algebraic symbols	• describe patterns using algebraic symbols
Learning Journey Creating algebraic expressions		
1	Creating algebraic expressions	• create algebraic expressions and evaluate them by substituting a given value for each variable
2	Substituting into algebraic expressions and evaluating the result	• substitute into algebraic expressions and evaluate the result • substitute numerical values into formulas and expressions, including scientific formulas
ACMNA177 Extend and apply the laws and properties of arithmetic to algebraic terms and expressions		
Quest: Simplifying algebraic expressions		
Learning Journey Simplifying algebraic expressions		
1	Simplifying algebraic expressions that involve addition and subtraction	• extend and apply the laws and properties of arithmetic to algebraic terms and expressions • recognise like terms and add and subtract them to simplify algebraic expressions
2	Simplifying algebraic expressions that involve multiplication	• simplify algebraic expressions that involve multiplication • recognise the equivalence of algebraic expressions involving multiplication, eg 3bc = 3cb
3	Simplifying algebraic expressions that involve division	• simplify algebraic expressions that involve division • recognise whether particular algebraic expressions involving division are equivalent or not
4	Connecting algebra with the commutative and associative properties of arithmetic to determine that a + b = b + a and (a + b) + c = a + (b + c)	• connect algebra with the commutative and associative properties of arithmetic to determine that a + b = b + a and (a + b) + c = a + (b + c)
	Recognising the role of grouping symbols and the different meanings of expressions, such as 2a + 1 and 2(a + 1)	• recognise the role of grouping symbols and the different meanings of expressions, such as 2a + 1 and 2(a + 1)

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Number and Algebra

Linear and non-linear relationships

ACMNA178 Given coordinates, plot points on the Cartesian plane, and find coordinates for a given point		
Quest: Using the coordinate system		
Learning Journey Using the coordinate system		
Steps	**Content**	**Detail**
1	Locating points on the Cartesian plane	• plot and label points, given coordinates, in all 4 quadrants of the number plane • identify and label each quadrant on a number plane • identify and record the coordinates of given points in all 4 quadrants of the number plane
2	Plotting coordinates on the Cartesian plane (not whole numbers)	• plot and label points on the Cartesian plane, given coordinates, including those with coordinates that are not whole numbers • identify and record the coordinates of given points on the Cartesian plane, including those with coordinates that are not whole numbers
ACMNA179 Solve simple linear equations		
Quest: Solving equations		
Learning Journey Equations introduction		
1	Demonstrating an understanding of equivalence and the preservation of equality or 'balance'	• model preservation of equality pictorially • model preservation of equality symbolically
2	Finding pairs of numbers that satisfy an equation with 2 unknowns	• find pairs of numbers that satisfy an equation with 2 unknowns
3	Solving simple linear equations using concrete materials	• solve simple linear equations using concrete materials, such as the balance model or cups and counters, stressing the notion of performing the same operation on both sides of an equation
Learning Journey Solving 1-step equations: addition/subtraction		
1	Solving linear equations using inverse operations involving 1 step of addition or subtraction (integers) with integer solutions	• solve linear equations using inverse operations involving 1 step of addition or subtraction (integers) with integer solutions
2	Solving linear equations using inverse operations involving 1 step of addition or subtraction (integers or decimals) with integer and non-integer solutions	• solve linear equations using inverse operations involving 1 step of addition or subtraction (integers or decimals) with integer and non-integer solutions
3	Solving linear equations using inverse operations involving 1 step of addition or subtraction (integers or fractions) with integer and non-integer solutions	• solve linear equations using inverse operations involving 1 step of addition or subtraction (integers or fractions) with integer and non-integer solutions

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Linear and non-linear relationships

ACMNA179 Solve simple linear equations		
Quest: Solving equations		
Learning Journey Solving 1-step equations: multiplication		
Steps	**Content**	**Detail**
1	Solving linear equations using inverse operations involving 1 step of multiplication with integer solutions	• solve linear equations using inverse operations involving 1 step of multiplication with integer solutions
2	Solving linear equations using inverse operations involving 1 step of multiplication (integers or decimals) with integer and non-integer solutions	• solve linear equations using inverse operations involving 1 step of multiplication (integers or decimals) with integer and non-integer solutions
3	Solving linear equations using inverse operations involving 1 step of multiplication (integers or decimals) with integer and non-integer solutions	• solve linear equations using inverse operations involving 1 step of multiplication (integers or decimals) with integer and non-integer solutions
Learning Journey Solving 1-step equations: division		
1	Solving linear equations using inverse operations involving 1 step of division (integers) with integer solutions	• solve linear equations using inverse operations involving 1 step of division (integers) with integer solutions
2	Solving linear equations using inverse operations involving 1 step of division with integer and non-integer solutions (pronumeral in numerator position)	• solve linear equations using inverse operations involving 1 step of division with integer and non-integer solutions (pronumeral in numerator position)
3	Solving linear equations (integer, fraction or decimal coefficients) using inverse operations involving 1 step of division with integer and non-integer solutions (pronumeral in numerator position)	• solve linear equations (integer, fraction or decimal coefficients) using inverse operations involving 1 step of division with integer and non-integer solutions (pronumeral in numerator position)
Learning Journey Solving 1-step equations: mixed operations		
1	Solving linear equations using inverse operations involving 1 step with mixed operations with integer solutions	• solve linear equations using inverse operations involving 1 step with mixed operations with integer solutions
2	Solving linear equations using inverse operations involving 1 step with mixed operations with integer and non-integer solutions	• solve linear equations using inverse operations involving 1 step with mixed operations with integer and non-integer solutions
3	Solving linear equations using inverse operations involving 1 step with mixed operations with integer and non-integer solutions	• solve linear equations using inverse operations involving 1 step with mixed operations with integer and non-integer solutions
Learning Journey Solving 2-step equations: variable in numerator		
1	Solving linear equations using inverse operations involving 2 steps with mixed operations with integer solutions (pronumeral always in numerator position)	• solve linear equations using inverse operations involving 2 steps with mixed operations with integer solutions (pronumeral always in numerator position)
2	Solving linear equations using inverse operations involving 2 steps with mixed operations with integer and non-integer solutions (pronumeral always in numerator position)	• solve linear equations using inverse operations involving 2 steps with mixed operations with integer and non-integer solutions (pronumeral always in numerator position)
3	Solving linear equations (integer, fraction or decimal coefficients) using inverse operations involving 2 steps with mixed operations with integer and non-integer solutions (pronumeral always in numerator position)	• solve linear equations (integer, fraction or decimal coefficients) using inverse operations involving 2 steps with mixed operations with integer and non-integer solutions (pronumeral always in numerator position)

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Number and Algebra

Linear and non-linear relationships

ACMNA179 Solve simple linear equations		
Quest: Solving equations		
Learning Journey Solving 2-step equations: variable in denominator		
Steps	**Content**	**Detail**
1	Solving linear equations using inverse operations involving 2 steps with mixed operations with integer solutions (pronumeral in numerator or denominator position)	• solve linear equations using inverse operations involving 2 steps with mixed operations with integer solutions (pronumeral in numerator or denominator position)
2	Solving linear equations using inverse operations involving 2 steps with mixed operations with integer and non-integer solutions (pronumeral in numerator or denominator position)	• solve linear equations using inverse operations involving 2 steps with mixed operations with integer and non-integer solutions (pronumeral in numerator or denominator position)
3	Solving linear equations using inverse operations involving 2 steps with mixed operations with integer and non-integer solutions (pronumeral in numerator or denominator position)	• solve linear equations using inverse operations involving 2 steps with mixed operations with integer and non-integer solutions (pronumeral in numerator or denominator position)
ACMNA180 Investigate, interpret and analyse graphs from authentic data		
Quest: Analysing graphs		
Learning Journey Distance/time graphs		
1	Matching a distance/time graph to a description of a particular journey and explaining the reasons for the choice	• match a distance/time graph to a description of a particular journey and explain the reasons for the choice
2	Recognising concepts such as change of speed and direction in distance/time graphs	• recognise concepts such as change of speed and direction in distance/time graphs
	Understanding the meaning of straight line segments with different gradients in the graph of a particular journey	• understand the meaning of straight-line segments with different gradients in the graph of a particular journey
	Recognising the significance of horizontal line segments in distance/time graphs	• recognise the significance of horizontal line segments in distance/time graphs
	Understanding which variables go on the horizontal and vertical axis	• understand which variables go on the horizontal and vertical axis
3	Comparing distance/time graphs of the same situation to decide which one is the most appropriate	• compare distance/time graphs of the same situation to decide which one is the most appropriate
4	Solving problems involving distance/time rates	• solve a variety of real-life problems involving rate of travel problems
	Calculating speeds for straight line segments of given distance/time graphs	• calculate speeds for straight-line segments of given distance/time graphs
5	Constructing distance/time graphs	• construct distance/time graphs
Learning Journey Graphs and rates extension		
1	Interpreting information using the relative positions of 2 points on a line graph, rather than a detailed scale	• interpret information using the relative positions of 2 points on a line graph, rather than a detailed scale
2	Calculating unit rates associated with ratios of fractions	• calculate unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG159 Establish the formulas for areas of rectangles, triangles and parallelograms, and use these in problem-solving		
Quest: Solve area problems		
Learning Journey Solving area problems involving rectangles		
Steps	**Content**	**Detail**
1	Applying the formula for the area of a rectangle	• apply the formula for area of a rectangle to find the area of rectangles given 2 side lengths measured in the same or different units • apply the formula for area of a rectangle to find the area of composite rectilinear figures, such as an L-shape, U-shape • apply the formula to real life contexts
2	Investigating and comparing the areas of rectangles that have the same perimeter	• investigate and compare the areas of rectangles that have the same perimeter, eg compare the areas of all possible rectangles with whole-number dimensions and a perimeter of 20 centimetres
3	Finding the dimensions of rectangles and squares given their areas	• find the possible dimensions of rectangles and squares given their areas
Learning Journey Solving area problems involving triangles		
1	Applying the formula to find the areas of right-angled triangles	• apply the formula to find the areas of right-angled triangles
2	Applying the formula to find the areas of non right-angled triangles	• apply the formula to find the areas of triangles in which the perpendicular height meets the base within the length of the base • apply the formula to find the areas of triangles in which the perpendicular height meets the base outside the length of the base
3	Finding the dimensions of a right-angled triangle given its area	• find the dimensions of a right-angled triangle given its area and either its base or height by using the formula for the area of a triangle
4	Finding the dimensions of a non right-angled triangle given its area	• find the dimensions of non right-angled triangles given its area and either its base or height using the formula for the area of a triangle • find the dimensions of non right-angled triangles in which the perpendicular height meets the base outside the length of the base given its area and either its base or height by using the formula for the area of a triangle
5	Solving real-life problems involving calculating the area of triangles	• solve real-life problems involving calculating the area of triangles
Learning Journey Solving area problems involving parallelograms		
1	Finding the area of a parallelogram using a formula	• apply the formula to find the area of parallelograms in different orientations • apply the formula to find the area of parallelograms in different orientations which include more dimensions than are necessary to calculate the area
2	Finding the dimensions of a parallelogram given its area	• find the dimensions of a parallelogram given its area and either its length or width by using the formula for the area of a parallelogram • find the dimensions of a parallelogram in different orientations given its area and either its length or width by using the formula for the area of a parallelogram
3	Solving real-life problems involving calculating the area of parallelograms	• solve real-life problems involving calculating the area of parallelograms
Learning Journey Solving area problems: simple composite figures		
1	Calculating the area of composite shapes constructed from triangles and special quadrilaterals	• apply area formulas for a variety of composite shapes to calculate their area

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Using units of measurement

ACMMG160 Calculate volumes of rectangular prisms		
Quest: Volume of rectangular prisms		
Learning Journey Volume of rectangular prisms		
Steps	**Content**	**Detail**
1	Calculating the volumes of rectangular prisms using additive and multiplicative strategies	• describe rectangular prisms in terms of layers • use repeated addition to find the volumes of rectangular prisms • calculate the volumes of rectangular prisms in cubic centimetres and cubic metres including calculating the volume given the net for the shape • record calculations used to find the volumes of rectangular prisms

Shape

ACMMG161 Draw different views of prisms and solids formed from combinations of prisms		
Quest: Exploring different views of prisms and solids		
Learning Journey Exploring different views of prisms and solids		
Steps	**Content**	**Detail**
1	Drawing (in two dimensions) prisms from different views by connecting cubes, including top, side, front and back views	• draw from connecting cubes (in two dimensions) prisms from different views, including top, side, front and back views
2	Drawing (in two dimensions) solids formed from combinations of prisms by connecting cubes, from different views, including top, side, front and back views	• draw from connecting cubes (in two dimensions) solids formed from combinations of prisms, from different views, including top, side, front and back views
3	Drawing (in two dimensions) prisms from different views, including top, side, front and back views	• draw (in two dimensions) prisms from different views, including top, side, front and back views
	Drawing (in two dimensions) solids formed from combinations of prisms, from different views, including top, side, front and back views	• draw (in two dimensions) solids formed from combinations of prisms, from different views, including top, side, front and back views
4	Identifying prisms from their cross-section	• identify the cross-sections of different prisms
	Drawing the cross-sections of prisms	• draw the cross-sections of prisms

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Location and transformation

ACMMG181 Describe translations, reflections in an axis and rotations of multiples of 90˚ on the Cartesian plane using coordinates. Identify line and rotational symmetries		
Quest: Transformations and symmetry		
Learning Journey Transformations on the Cartesian plane		
Steps	**Content**	**Detail**
1	Plotting transformations of points on the Cartesian plane	• plot and state the coordinates of the image of a point on the Cartesian plane resulting from 1 or more translations
2	Plotting and stating the coordinates of the image of a given point on the Cartesian plane resulting from reflection in either the x-axis or y-axis	• plot and state the coordinates of the image of a given point on the Cartesian plane resulting from reflection in either the x-axis or y-axis
3	Plotting and stating the coordinates of the image of a given point on the Cartesian plane resulting from rotation of multiples of 90° about the origin	• plot and state the coordinates of the image of a given point on the Cartesian plane resulting from a rotation of 90° about the origin • plot and state the coordinates of the image of a given point on the Cartesian plane resulting from a rotation of 180° about the origin • plot and state the coordinates of the image of a given point on the Cartesian plane resulting from a rotation of 270° about the origin
Learning Journey Line and rotational symmetry		
1	Identifying line symmetry	• identify, draw and determine the total number of lines of symmetry on designs and shapes, including special triangles, quadrilaterals and polygons • complete symmetrical designs and shapes given their line of symmetry
2	Determining rotational symmetry	• determine whether or not given shapes and designs have rotational symmetry • determine the order of rotational symmetry for given shapes and designs
3	Determining lines (axes) of symmetry and the order of rotational symmetry of polygons, including the special quadrilaterals	• determine if particular triangles and quadrilaterals have line and/or rotational symmetry
4	Investigating the line and rotational symmetries of circles and of diagrams involving circles, such as a sector or a circle with a marked chord or tangent	• investigate if a particular circle with a marked chord or tangent, sector of a circle or a regular circle has a line and/or rotational symmetry
5	Identifying line and rotational symmetries in pictures and diagrams	• identify if a picture or diagram has a line and/or rotational symmetry

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Geometric reasoning

ACMMG163 Identify corresponding, alternate and co-interior angles when two straight lines are crossed by a transversal		
Quest: Angle relationships and parallel lines		
Learning Journey Angles at a point		
Steps	**Content**	**Detail**
1	Investigating and defining complementary angles	• define complementary angles and identify them in diagrams
	Calculating complementary angles	• calculate the size of an unknown angle in a diagram and explain how this is done (using complementary angles)
	Investigating and defining supplementary angles	• define supplementary angles and identify them in diagrams
	Calculating supplementary angles	• calculate the size of an unknown angle in a diagram and explain how this is done (using supplementary angles)
2	Investigating and identifying adjacent angles	• identify adjacent angles within a diagram
3	Calculating where angles form a revolution	• calculate the size of an unknown angle in a diagram and explain how this is done (using knowledge of angles that add to 360°)
4	Identifying and naming right angles, straight angles, vertically opposite angles and angles of complete revolution embedded in diagrams	• identify and naming right angles, straight angles, vertically opposite angles and angles of complete revolution embedded in diagrams
5	Applying geometric reasoning for adjacent angle relationships	• apply theorems of complementary angles, supplementary angles, vertically opposite and adjacent angles, calculating unknown angles • apply theorems for adjacent angles represented by variables in multi-step problems, writing equations to solve for an unknown angle, checking the reasonableness of the answer • apply theorems of complementary angles, supplementary angles, vertically opposite and adjacent angles in multi-step problems, calculating unknown angles and stating all relationships used
Learning Journey Parallel and perpendicular line conventions		
1	Identifying perpendicular and parallel lines	• name and record perpendicular lines using the conventional notation • define parallel lines and identify them in pictures, designs, diagrams and the environment, using conventional notation to mark them • name and record parallel lines using the conventional notation
Learning Journey Angle relationships on parallel lines		
1	Exploring special pairs of angles on parallel lines	• define, identify and draw transversals on sets of 2 or more parallel lines • define and identify pairs of equal corresponding angles when 2 or more parallel lines are cut by a transversal • define and identify pairs of equal alternate angles when 2 or more parallel lines are cut by a transversal • define and identify pairs of supplementary cointerior angles when 2 or more parallel lines are cut by a transversal
2	Applying geometric reasoning with corresponding angles on parallel lines	• use corresponding angles on parallel lines to calculate unknown angles represented by variables
3	Applying geometric reasoning with alternate angles on parallel lines	• use alternate angles on parallel lines to calculate unknown angles represented by variables

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Geometric reasoning

Steps	Content	Detail
ACMMG163 Identify corresponding, alternate and co-interior angles when two straight lines are crossed by a transversal		
Quest: Angle relationships and parallel lines		
Learning Journey Angle relationships on parallel lines		
4	Applying geometric reasoning with co-interior angles on parallel lines	• use cointerior angles on parallel lines to calculate unknown angles represented by variables
5	Applying geometric reasoning with angles on parallel lines by choosing the appropriate angle relationship	• choose and apply the appropriate angle property to calculate unknown angles on parallel lines represented by variables
ACMMG164 Investigate conditions for two lines to be parallel and solve simple numerical problems using reasoning		
Quest: Parallel lines and geometric reasoning		
Learning Journey Proving parallel lines		
1	Proving lines are parallel	• prove or disprove that a pair of lines are parallel using the relationships between corresponding angles, alternate angles, and cointerior angles
Learning Journey Geometric reasoning using angle properties		
1	Applying geometric reasoning with angles at a point and angles on parallel lines	• apply theorems of angles at a point and angles on parallel lines to solve numerical geometric problems involving up to 3 theorems/steps, giving a reason for each step of the solution
ACMMG166 Demonstrate that the angle sum of a triangle is 180° and use this to find the angle sum of a quadrilateral		
Quest: Solving problems involving interior angle sums		
Learning Journey Solving problems involving interior angle sums		
1	Exploring and proving the interior angle sum of a triangle	• calculate an unknown angle represented by a variable within a triangle, given the other 2 angles
2	Finding the interior angle sum of a quadrilateral	• calculate an unknown angle/s represented by a variable/s within quadrilaterals, given the appropriate angles
ACMMG165 Classify triangles according to their side and angle properties and describe quadrilaterals		
Quest: Triangles and quadrilaterals		
Learning Journey Labelling and naming conventions		
1	Labelling common shapes	• label and name triangles (eg triangle ABC or ΔABC) and quadrilaterals (eg ABCD) in text and on diagrams • use the common conventions to mark equal intervals on diagrams
Learning Journey Geometry conventions		
1	Using the language and conventions of geometry	• define, name, label and draw points using capital letters • define, name, label and draw lines using capital letters • define, name, label and draw rays using capital letters • define, name, label and draw line segments using capital letters • define, name, label and draw angles using capital letters • name, label and draw triangles using capital letters • name, label and draw quadrilaterals and other polygons using capital letters • use common conventions to label right angles and equal angles on diagrams • use common conventions to label equal line segments on diagrams

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Geometric reasoning

ACMMG165 Classify triangles according to their side and angle properties and describe quadrilaterals		
Quest: Triangles and quadrilaterals		
Learning Journey Properties of triangles		
Steps	**Content**	**Detail**
1	Classifying types of triangles	• recognise and classify types of triangles on the basis of their properties (acute-angled, right-angled, obtuse-angled, equilateral, isosceles and scalene triangles) • recognise that a given triangle may belong to more than 1 class
2	Sketching and labelling triangles from a worded or verbal description	• determine whether the triangle exists according to its physical description
Learning Journey Convex and non-convex quadrilaterals		
1	Distinguishing between convex and non-convex quadrilaterals	• distinguish between convex and non-convex quadrilaterals using the fact that the diagonals of a convex quadrilateral lie inside the figure • distinguish between convex and non-convex quadrilaterals using the fact that a non-convex quadrilateral that has an interior angle greater than 180 degrees
Learning Journey Properties of quadrilaterals		
1	Investigating properties of special quadrilaterals: rectangles	• prove a quadrilateral is a rectangle using properties
	Investigating properties of special quadrilaterals: squares	• prove a quadrilateral is a square using properties
2	Investigating properties of special quadrilaterals: parallelograms	• prove a quadrilateral is a parallelogram using properties
3	Investigating properties of special quadrilaterals: rhombuses	• prove a quadrilateral is a rhombus using properties
4	Investigating properties of special quadrilaterals: trapeziums/trapezoids	• prove a quadrilateral is a trapezium using properties
5	Investigating properties of special quadrilaterals: kites	• prove a quadrilateral is a kite using properties
Learning Journey Reasoning, sketching and describing quadrilaterals		
1	Reasoning about special quadrilaterals on the basis of their properties	• classify a set of quadrilaterals based on their properties • identify a given quadrilateral from its description • identify a given quadrilateral from a diagram
2	Describing special quadrilaterals	• describe a quadrilateral in sufficient detail for it to be sketched
3	Reasoning about triangles and special quadrilaterals	• use the properties of special triangles and quadrilaterals to solve simple numerical problems with appropriate reasoning • recognise special types of triangles and quadrilaterals embedded in composite figures or drawn in various orientations
Learning Journey Using properties of triangles & quadrilaterals		
1	Reasoning about triangles and special quadrilaterals	• use the properties of special triangles and quadrilaterals to solve simple numerical problems with appropriate reasoning • recognise special types of triangles and quadrilaterals embedded in composite figures or drawn in various orientations
2	Determining unknown sides and angles embedded in diagrams, using the properties of special triangles and quadrilaterals, giving reasons	• determine unknown sides and angles embedded in diagrams, using the properties of special triangles and quadrilaterals, giving reasons

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Mathletics

Statistics and Probability

Chance

ACMSP167 Construct sample spaces for single-step experiments with equally likely outcomes		
Quest: Chance experiments and sample spaces		
Learning Journey Language of chance experiments		
Steps	**Content**	**Detail**
1	Understanding the language around chance	• understand that the term 'chance experiment' is used when referring to actions such as tossing a coin, rolling a dice or randomly selecting an object from a bag • understand that the term 'outcome' is used to describe a possible result of a chance experiment and list all of the possible outcomes for a single-step experiment • understand that the term 'sample space' is used to describe a list of all of the possible outcomes for a chance experiment • use the term 'probability' to describe the numerical value that represents the likelihood of an outcome of a chance experiment • arrange the likelihood of chance experiment outcomes in order from least likely to most likely (and vice versa)
Learning Journey Sample spaces		
1	Identifying equally likely outcomes in single-step chance experiments	• identify equally likely outcomes in single-step chance experiments
2	Identifying the sample space for a probability experiment involving 1 event	• identify the sample space for a probability experiment involving 1 event
3	Identifying the sample space for a probability experiment involving 2 independent events	• identify the sample space (where the combined sample space has 36 or fewer elements) for a probability experiment involving 2 independent events
4	Listing the outcomes for chance experiments where the outcomes are not equally likely to occur and assign probabilities to the outcomes using fractions	• list the outcomes for chance experiments where the outcomes are not equally likely to occur and assign probabilities to the outcomes using fractions
Learning Journey Chance experiments		
1	Describing single-step chance experiments in which the outcomes are equally likely	• describe single-step chance experiments in which the outcomes are equally likely
2	Describing single-step chance experiments in which the outcomes are equally and not equally likely	• describe single-step chance experiments in which the outcomes are equally and not equally likely
3	Creating and conducting a chance experiment given equally probable events	• determine the theoretical probability of a series of events using tree diagrams • conduct the chance experiment with both small and large numbers of trials using digital technologies • compare the expected probabilities with the observed probabilities after both small and large numbers of trials for the chance experiment given equally probable events
4	Creating and conducting a chance experiment given unequally probable events	• determine the theoretical probability of a series of unequally probable events using tree diagrams • compare the expected probabilities with the observed probabilities after both small and large numbers of trials, given unequally probable events

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Statistics and Probability

Chance

ACMSP168 Assign probabilities to the outcomes of events and determine probabilities for events		
Quest: Probability		
Learning Journey Language of probability		
Steps	**Content**	**Detail**
1	Recognising that a probability of 0 is for events that are impossible and a probability of 1 for events that are certain to occur	• recognise that a probability of 0 is for events that are impossible and a probability of 1 for events that are certain to occur
2	Relating calculated probabilities with the language of chance and the likelihood number line	• relate calculated probabilities with the language of chance and the likelihood number line
3	Assigning numerical probabilities with their associated language	• assign language such as impossible, highly unlikely, unlikely, even chance, likely, highly likely and certain to the known probabilities of outcomes occurring • allocate words such as impossible, highly unlikely, unlikely, even chance, likely, highly likely and certain along a number line from 0 to 1 representing their respective probabilities
Learning Journey Understanding basic probability		
1	Explaining the meaning of 0, 1/2 and 1 in a given chance situation, using the language of chance	• explain the meaning of 0, 1/2 and 1 in a given chance situation, using the language of chance
2	Applying probabilities to simple events by reasoning about equally likely outcomes	• apply probabilities to simple events by reasoning about equally likely outcomes
3	Expressing the theoretical probability of an event formally	• express the theoretical probability of an event, given a number of equally likely outcomes in the sample space, as P(event) = number of favourable outcomes ÷ total number of outcomes
4	Expressing probabilities as decimals, fractions and percentages	• express probabilities as decimals, fractions and percentages
	Interpreting probabilities expressed as fractions, percentages or decimals	• interpret probabilities expressed as fractions, percentages or decimals
5	Calculating the probability of an event of a single-step experiment using cards, dice, spinners, etc	• calculate the probability of an event of a single-step experiment using cards, dice, spinners, etc
ACMSP169 Identify and investigate issues involving numerical data collected from primary and secondary sources		
Quest: Collecting and interpreting data		
Learning Journey Issues with data from primary & secondary sources		
1	Identifying and investigating issues involving numerical data collected from primary and secondary sources	• identify the difference between data collected from primary and secondary sources, eg data collected in the classroom compared with data drawn from a media source
2	Exploring issues involved in constructing and conducting surveys, such as sample size, bias, type of data required, and ethics	• detect and discuss bias, if any, in the selection of a sample

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP169 Identify and investigate issues involving numerical data collected from primary and secondary sources		
Quest: Collecting and interpreting data		
Learning Journey Collecting and interpreting data		
Steps	**Content**	**Detail**
1	Constructing appropriate survey questions and a related recording sheet in order to collect both numerical and categorical data about a matter of interest	• construct a recording sheet that allows efficient collection of the different types of data expected • decide whether a census or a sample is more appropriate to collect the data required to investigate the matter of interest
2	Collecting and interpreting information from secondary sources, presented as tables and/or graphs, about a matter of interest	• collect and interpret information from secondary sources, presented as tables and/or graphs, about a matter of interest, eg sporting data, information about the relationship between wealth or education and the health of populations of different countries • interpret and use scales on graphs, including those where abbreviated measurements are used, eg '50' on a vertical axis representing thousands is interpreted as '50 000' • identify features on graphical displays that may mislead and result in incorrect interpretation, eg displaced zeros, the absence of labelling on 1 or both axes, potentially misleading units of measurement
3	Using spreadsheets or statistical software packages to tabulate and graph data	• use spreadsheets or statistical software packages to tabulate and graph data
4	Discussing ethical issues that may arise from collecting and representing data	• discuss ethical issues that may arise from collecting and representing data
ACMSP170 Construct and compare a range of data displays including stem-and-leaf plots and dot plots		
Quest: Representing data		
Learning Journey Tallies and frequency distribution tables		
1	Using a tally to organise data into a frequency distribution table	• use a tally to organise data into a frequency distribution table
Learning Journey Frequency histograms and polygons		
1	Constructing and interpreting frequency histograms and polygons	• construct and interpret frequency histograms and polygons
Learning Journey Frequency histograms and polygons: grouped data		
1	Interpreting a discrete data set from its histogram and polygon where grouping is required	• interpret a discrete data set from its histogram and polygon where grouping is required
2	Constructing histograms for discrete data sets where grouping is required	• construct histograms for discrete data sets where grouping is required
3	Constructing combined histograms and polygons for discrete data sets where grouping is required	• construct combined histograms and polygons for discrete data sets where grouping is required

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP170 Construct and compare a range of data displays including stem-and-leaf plots and dot plots		
Quest: Representing data		
Learning Journey Dot plots		
Steps	**Content**	**Detail**
1	Interpreting dot plots	• interpret dot plots
2	Constructing dot plots	• construct dot plots • explain the importance of aligning data points when constructing dot plots
Learning Journey Ordered stem-and-leaf plots		
1	Interpreting ordered stem-and-leaf plots with whole numbers and simple decimal values	• interpret ordered stem-and-leaf plots with whole numbers and simple decimal values
2	Constructing ordered stem-and-leaf plots with whole numbers	• construct ordered stem-and-leaf plots with whole numbers only
3	Constructing ordered stem-and-leaf plots with whole numbers and simple decimal values	• construct ordered stem-and-leaf plots with whole numbers and simple decimal values
Learning Journey Divided bar graphs		
1	Interpreting divided bar graphs	• interpret divided bar graphs
2	Constructing divided bar graphs with the use of digital technology	• construct divided bar graphs with the use of digital technology
3	Constructing divided bar graphs without the use of digital technology	• construct divided bar graphs without the use of digital technology • calculate the length of the bar required for each section of divided bar graphs
Learning Journey Sector graphs		
1	Interpreting sector graphs	• interpret sector graphs
2	Constructing sector graphs with the use of digital technology	• construct sector graphs with the use of digital technology
3	Constructing sector graphs without the use of digital technology	• calculate the angle at the centre required for each sector of sector graphs
Learning Journey Line graphs		
1	Interpreting line graphs	• interpret line graphs
2	Constructing line graphs with the use of digital technology	• construct line graphs with the use of digital technology
	Constructing line graphs without the use of digital technology	• construct line graphs for time series data
Learning Journey Interpreting a variety of different graphs		
1	Interpreting a variety of graphs, including dot plots, stem-and-leaf plots, divided bar graphs, sector graphs and line graphs	• interpret a variety of graphs, including dot plots, stem-and-leaf plots, divided bar graphs, sector graphs and line graphs • calculate the percentage of the whole represented by different categories in a divided bar graph or sector graph • draw conclusions from data displayed in a graph, eg 'The graph shows that the majority of Year 8 students who play a musical instrument play a string instrument' • critique ways in which data is presented in sector graphs, line graphs, bar graphs and pictographs

Australian Curriculum Year 7

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP171 Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data		
Quest: Mean, Median, Mode and Range		
Learning Journey Calculating the mean		
Steps	**Content**	**Detail**
1	Calculating the mean of a set of data using mean = sum of data values/number of data values	• calculate the mean of a set of data using mean = sum of data values/ number of data values
2	Using the statistical functions of a spreadsheet to determine the mean for large sets of data	• use the statistical functions of a spreadsheet to determine the mean for large sets of data
Learning Journey Median mode and range		
1	Determining the median for sets of data without the use of digital technology	• determine the median for sets of data without the use of digital technology and containing an odd number of scores • determine the median for sets of data without the use of digital technology and containing an even number of scores
2	Determining the mode for sets of data without the use of digital technology	• determine the mode for sets of data without the use of digital technology
3	Determining the range for sets of data without the use of digital technology	• determine the range for sets of data without the use of digital technology
ACMSP172 Describe and interpret data displays using median, mean and range		
Quest: Using mean, median, mode to analyse data displays		
Learning Journey Using mean, median, mode to analyse data displays		
1	Calculating measures of location (mean, median and mode) and the range for data represented in a variety of statistical displays, including frequency distribution tables, frequency histograms, stem-and-leaf plots and dot plots	• Calculating measures of location (mean, median and mode) and the range for data represented in a variety of statistical displays, including frequency distribution tables, frequency histograms, stem-and-leaf plots and dot plots
2	Drawing conclusions based on the analysis of data displays using the mean, median and/or mode, and range	• draw conclusions based on the analysis of data displays using the mean, median and/or mode, and range

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Number and Algebra

Number and place value

ACMNA182 Use index notation with numbers to establish the index laws with positive integral indices and the zero index		
Quest: Investigating index laws		
Learning Journey Investigating index laws		
Steps	**Content**	**Detail**
1	Multiplying 2 or more terms with the same numerical base and a positive-integer power, leaving the solution in index form	• multiply 2 or more terms with the same numerical base and a positive-integer power, leaving the solution in index form
2	Dividing 2 or more terms with the same numerical base and a positive-integer power, leaving the solution in index form	• divide 2 or more terms with the same numerical base and a positive-integer power, leaving the solution in index form
3	Calculating an expression in which a number in index form is raised by a positive-integer power	• calculate an expression in which a number in index form is raised by a positive-integer power
4	Using the zero index rule to simplify expressions involving numbers to the power of zero	• use the zero index rule to simplify expressions involving numbers to the power of zero
ACMNA183 Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies		
Quest: Applying the four operations to integers		
Learning Journey Applying the four operations to integers		
1	Using the 4 operations with integers	• use the 4 operations to solve problems involving integers
2	Applying the order of operations to evaluate expressions involving integers with no exponents or radicals	• apply the order of operations to evaluate expressions involving integers with no exponents or radicals
3	Applying the order of operations to evaluate expressions involving integers where the operator is contained within the numerator or denominator of a fraction	• apply the order of operations to evaluate expressions involving integers, where an operator is contained within the numerator or denominator of a fraction and the result is a whole number • apply the order of operations to evaluate expressions involving integers where the operator is contained within the numerator or denominator of a fraction

Real numbers

ACMNA184 Investigate terminating and recurring decimals		
Quest: Investigate terminating and recurring decimals		
Learning Journey Investigate terminating and recurring decimals		
Steps	**Content**	**Detail**
1	Converting fractions to terminating decimals by manipulating the denominator to be a power of 10	• convert fractions to terminating decimals by manipulating the denominator to be a power of 10 • convert improper fractions to terminating decimals by manipulating the denominator to be a power of 10 • convert mixed numerals to terminating decimals by manipulating the denominator to be a power of 10

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Real numbers

ACMNA186 Investigate the concept of irrational numbers, including π		
Quest: Irrational numbers		
Learning Journey Investigating irrational numbers		
Steps	**Content**	**Detail**
1	Describing, informally, the properties of irrational numbers	• describe, informally, the properties of irrational numbers
Learning Journey Exploring irrational numbers (surds)		
1	Describing, informally, the properties of irrational numbers	• describe, informally, the properties of irrational numbers
2	Using rational approximations of irrational numbers to compare the size of irrational numbers	• use rational approximations of irrational numbers to compare the size of irrational numbers
3	Approximating the location of irrational numbers on a number line	• approximate the location of irrational numbers on a number line
ACMNA187 Solve problems involving the use of percentages, including percentage increases and decreases, with and without digital technologies		
Quest: Working with percentages		
Learning Journey Increasing and decreasing amounts		
1	Increasing and decreasing amounts by percentages (calculator method)	• increase and decrease a quantity by a given percentage using the calculator method
2	Increasing and decreasing amounts by percentages (written and mental methods)	• increase an amount by first calculating the percentage increase value of the original amount, and then adding that result to the original amount • decrease an amount by first calculating the percentage decrease value of the original amount, and then subtracting that result from the original amount
3	Recognising and using equivalences when calculating percentage increases and decreases	• increase an amount by a percentage by multiplying the original amount by 1 + the percentage increase expressed as a decimal • decrease an amount by a percentage by multiplying the original amount by 1 - the percentage decrease expressed as a decimal • decrease an amount by a percentage by calculating the complementary percentage of that amount
Learning Journey Problem solving involving percentages		
1	Using the unitary method to solve problems involving percentages (written method)	• use the unitary method to find the original quantity/value following a percentage increase/decrease, eg find the original value, given the value after an increase of 20% • find original value after a percentage increase/decrease
2	Using the unitary method to solve problems involving percentages (calculator method)	• use the unitary method with a calculator to solve problems involving percentages, eg find the original value given the value after an increase of 20% • find the original value after a percentage increase/ decrease
3	Interpreting and using nutritional information panels on product packaging where percentages are involved	• interpret and use nutritional information panels on product packaging where percentages are involved
	Interpreting and using statements about the environment involving percentages, eg energy use for different purposes such as lighting	• interpret and use statements about the environment involving percentages, eg energy use for different purposes, such as lighting
4	Solving real-life problems involving percentages	• solve a variety of real-life problems involving percentages, including percentage composition problems and problems involving money

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Real numbers

ACMNA188 Solve a range of problems involving rates and ratios, with and without digital technologies		
Quest: Rates and ratios		
Learning Journey Solve problems involving ratios		
Steps	**Content**	**Detail**
1	Dividing a given quantity into 2 parts in a given part: whole ratio	• divide a given quantity into 2 parts in a given part: whole ratio
2	Solving a variety of real-life problems involving dividing quantities into a given ratio	• solve a variety of real-life problems involving dividing quantities into a given ratio
Learning Journey Ratios involving more than two parts		
1	Simplifying ratios using highest common factors (ratio composed of 3 or more numbers)	• simplify ratios using highest common factors
2	Dividing a quantity into a given ratio (ratio composed of 3 or more numbers)	• divide a quantity in a given ratio
3	Applying the unitary method to ratio problems (ratio composed of 3 or more numbers)	• apply the unitary method to ratio problems
Learning Journey Converting ratios		
1	Converting units in a ratio into the same unit then simplifying	• convert units of a ratio into the same unit • simplify ratios
2	Converting between units of measurement using ratios	• convert between units of measurement using ratios
Learning Journey Using rates		
1	Introducing rates	• use rates to compare quantities measured in different units
2	Converting given information into a simplified rate	• convert given information into a simplified rate
3	Comparing rates	• compare 2 quantities of different rates
4	Determining an amount for a given time period given a rate	• determine an amount for a given time period given a unit rate • determine an amount for a given time period given a rate
5	Solving problems comparing 2 given rates by simplifying	• solve problems comparing 2 given rates by simplifying

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Money and financial mathematics

ACMNA189 Solve problems involving profit and loss, with and without digital technologies		
Quest: Solving problems involving profit and loss		
Learning Journey Solving problems involving profit and loss		
Steps	**Content**	**Detail**
1	Understanding the financial terms 'profit' and 'loss'	• understand the meaning of the terms 'cost price', 'sale price', 'profit and loss' and the relationships between them
2	Solving problems involving profit and loss with the use of digital technology	• calculate the selling price, given the percentage profit/loss on the cost price with the use of digital technology • express profit/loss as a percentage of the cost price with the use of digital technology • calculate the cost price, given the selling price and percentage profit/loss with the use of digital technology
3	Solving problems involving profit and loss without the use of digital technology	• calculate the selling price, given the percentage profit/loss on the cost price without the use of digital technology • express profit/loss as a percentage of the cost price without the use of digital technology • calculate the cost price, given the selling price and percentage profit/loss without the use of digital technology
4	Solving complex problems involving multiple steps	• solve complex problems involving multiple steps

Patterns and algebra

ACMNA190 Extend and apply the distributive law to the expansion of algebraic expressions		
Quest: Extending and applying the distributive law		
Learning Journey Extending and applying the distributive law		
Steps	**Content**	**Detail**
1	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive integers and b is a variable with coefficient of 1	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive integers and b is a variable with coefficient of 1
2	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive or negative integers and b is a variable with coefficient of 1	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive or negative integers and b is a variable with coefficient of 1
3	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b, and c can be positive numbers or variables (coefficients are 1)	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b, and c can be positive numbers or variables (coefficients are 1)
4	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients 1 or -1)	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients 1 or -1)
5	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients integers not limited to 1)	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients integers not limited to 1)

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Number and Algebra

Patterns and algebra

ACMNA191 Factorise algebraic expressions by identifying numerical factors		
Quest: Factorising algebraic expressions		
Learning Journey Factorising algebraic expressions		
Steps	**Content**	**Detail**
1	Decomposing (factorising) algebraic expressions by identifying numerical and algebraic factors	• decompose (factorise) algebraic expressions by identifying numerical and algebraic factors and writing it as a product of these
2	Factorising algebraic expressions by identifying numerical factors	• factorise algebraic expressions by finding a common numerical factor and bringing it out the front of the brackets with its product inside the brackets
3	Factorising algebraic expressions by identifying negative numerical factors	• factorise algebraic expressions by finding a common negative numerical factor and bringing it out the front of the brackets with its product inside the brackets
4	Factorising algebraic expressions by identifying only algebraic factors	• factorise algebraic expressions by finding a common algebraic factor and bringing it out the front of the brackets with its product inside the brackets
5	Factorising algebraic expressions by identifying algebraic and numerical factors	• factorise algebraic expressions by finding a common algebraic and numerical factor and bringing it out the front of the brackets with its product inside the brackets
ACMNA192 Simplify algebraic expressions involving the four operations		
Quest: Simplifying algebraic expressions using mixed operations		
Learning Journey Simplifying algebraic expressions using mixed operations		
1	Simplifying algebraic expressions involving the 4 operations	• simplify a range of algebraic expressions, including those involving mixed operations • apply the order of operations to simplify algebraic expressions

Linear and non-linear relationships

ACMNA193 Plot linear relationships on the Cartesian plane with and without the use of digital technologies		
Quest: Linear relationships		
Learning Journey Working with Linear Sequences		
Steps	**Content**	**Detail**
1	Investigating and extending numeric and geometric patterns represented in a table	• investigate and extend numeric patterns represented in a table • investigate and extend geometric patterns represented in a table
2	Finding the nth term of linear sequences arising from a given set of numbers or sequences generated from concrete/visual representations with integer coefficients of n	• find the nth term of increasing linear sequences arising from a given set of numbers or sequences generated from concrete/visual representations with integer coefficients of n • find the nth term of decreasing linear sequences arising from a given set of numbers or sequences generated from concrete/visual representations with integer coefficients of n

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Linear and non-linear relationships

ACMNA193 Plot linear relationships on the Cartesian plane with and without the use of digital technologies		
Quest: Linear relationships		
Learning Journey Working with Linear Sequences		
Steps	**Content**	**Detail**
3	Finding the nth term of linear sequences arising from a given set of numbers or sequences generated from concrete/visual representations with decimal coefficients of n	• find the nth term of increasing linear sequences arising from a given set of numbers or sequences generated from concrete/visual representations with decimal coefficients of n • find the nth term of decreasing linear sequences arising from a given set of numbers or sequences generated from concrete/visual representations with decimal coefficients of n
	Finding the nth term of linear sequences arising from a given set of numbers or sequences generated from concrete/visual representations with fractional coefficients of n	• find the nth term of increasing linear sequences arising from a given set of numbers or sequences generated from concrete/visual representations with fractional coefficients of n • find the nth term of a decreasing linear sequences arising from a given set of numbers or sequences generated from concrete/visual representations with fractional coefficients of n
4	Using the nth term rule for a linear series	• use the nth term rule to find missing terms of the sequence, eg 100th term • use the nth term rule to determine whether a number exists in a sequence
5	Solving problems involving the use of the nth term formula for a linear sequence	• solve problems involving the use of the nth term formula for a linear sequence
Learning Journey Table of values		
1	Investigating linear relationships on Cartesian plane (number plane) for number and geometric (spatial) patterns	• identify a table of values matching a linear relationship plotted on the number plane (with and without digital technology) • identify the table of values for a given number pattern that matches the points plotted on a number plane • describe the linear relationship and the rules (term-to-term and also position-to-term)
ACMNA194 Solve linear equations using algebraic and graphical techniques. Verify solutions by substitution		
Quest: Solving linear equations		
Learning Journey Solving 3-step equations		
1	Solving linear equations (integer coefficients) using inverse operations involving 3 steps with mixed operations with integer solutions	• solve linear equations (integer coefficients) using inverse operations involving 3 steps with mixed operations with integer solutions
2	Solving linear equations (integer coefficients) using inverse operations involving 3 steps with mixed operations with integer and non-integer solutions	• solve linear equations (integer coefficients) using inverse operations involving 3 steps with mixed operations with integer and non-integer solutions
3	Solving linear equations (integer, fraction or decimal coefficients) using inverse operations involving 3 steps with mixed operations with integer and non-integer solutions	• solve linear equations (integer, fraction or decimal coefficients) using inverse operations involving 3 steps with mixed operations with integer and non-integer solutions
Learning Journey Solving equations with variable on both sides		
1	Solving linear equations (integer coefficients) using inverse operations involving pronumerals on both sides of the equation	• solve linear equations (integer coefficients) using inverse operations involving pronumerals on both sides of the equation
2	Solving linear equations (integer, fraction or decimal coefficients) using inverse operations involving pronumerals on both sides of the equation	• solve linear equations (integer, fraction or decimal coefficients) using inverse operations involving pronumerals on both sides of the equation

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Number and Algebra

Linear and non-linear relationships

ACMNA194 Solve linear equations using algebraic and graphical techniques. Verify solutions by substitution		
Quest: Solving linear equations		
Learning Journey Solving equations involving brackets		
Steps	**Content**	**Detail**
1	Solving linear equations (integer coefficients) using inverse operations involving expanding brackets	• solve linear equations (integer coefficients) using inverse operations involving expanding brackets
2	Solving linear equations (integer, fraction or decimal coefficients) using inverse operations involving expanding brackets	• solve linear equations (integer, fraction or decimal coefficients) using inverse operations involving expanding brackets
Learning Journey Solving linear equations graphically		
1	Solving linear equations using graphical techniques	• use graphs of linear relationships to solve a corresponding linear equation, with and without the use of digital technologies
2	Graph two intersecting lines on the same set of axes and read off the point of intersection	• use tables of values to plot two straight lines on a single Cartesian plane • read the point of intersection of two plotted straight lines on a single Cartesian plane

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Using units of measurement

ACMMG195 Choose appropriate units of measurement for area and volume and convert from one unit to another		
Quest: Units of area and volume		
Learning Journey Choosing and converting units of area		
Steps	**Content**	**Detail**
1	Choosing an appropriate unit to measure the areas of different shapes and surfaces	• choose an appropriate unit to measure the areas of different shapes and surfaces, eg floor space, fields
2	Converting between different metric units of area (square millimetres, square centimetres, square metres, square kilometres, hectares)	• convert between square millimetres and square centimetres and vice versa • convert between square centimetres and square metres and vice versa • convert between square metres and hectares and vice versa • convert between square metres and square kilometres and vice versa
Learning Journey Choosing and coverting units of volume		
1	Choosing appropriate units to measure the capacities of a variety of containers	• choose appropriate units to measure the capacities of a variety of containers, eg millilitres for a drinking glass, litres for a water urn
2	Converting between metric units of volume and capacity (mL, L, kL and ML)	• convert between metric units of volume: $1km^3 = 1000000m^3$, $1m^3 = 10000cm^3$, $1cm^3 = 1000mm^3$ • convert between metric units of capacity: 1ML = 1000000L, 1kL = 1000L, 1L = 1000mL • convert between metric units of volume and capacity: $1cm^3 = 1mL$, $1m^3 = 1000L$
ACMMG196 Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites		
Quest: Perimeter and area of quadrilaterals		
Learning Journey Finding the perimeter		
1	Finding perimeters of special quadrilaterals	• find the perimeter of parallelograms, trapeziums, rhombuses and kites • apply knowledge of geometric markings to find the perimeters of special quadrilaterals
2	Solving problems involving perimeters of regular polygons	• solve problems involving the perimeters of regular polygons • solve problems involving perimeters of regular polygons with dimensions given in different units
3	Solving problems involving perimeters of composite polygons	• solve problems involving perimeters of composite polygons formed using only triangles, squares, rectangles or parallelograms • solve problems involving perimeters of composite polygons formed using regular polygons • solve problems involving perimeters of composite polygons formed using only triangles, squares, rectangles or parallelograms with dimensions given in different units • solve problems involving perimeters of composite polygons formed using regular polygons with dimensions given in different units

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Using units of measurement

ACMMG196 Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites		
Quest: Perimeter and area of quadrilaterals		
Learning Journey Solving area problems involving trapeziums		
Steps	**Content**	**Detail**
1	Finding the area of a trapezium using the formula	• apply the formula to find the areas of trapeziums of different orientations and shapes, including 4 unequal sides with no right angles, 2 right angles and isosceles trapezium • apply the formula to find the area of trapeziums in different orientations which include dimensions that are not necessary to calculate the area
2	Finding the dimensions of a trapezium given its area	• find the dimensions of a trapezium given its area and 2 of either its height, roof or base by using the formula for the area of a trapezium • find the dimensions of a trapezium in different orientations given its area and 2 of either its height, roof or base by using the formula for the area of a trapezium
3	Solving real-life problems involving calculating the area of trapeziums	• solve real-life problems involving calculating the area of trapeziums
Learning Journey Solving area problems involving rhombuses		
1	Finding the area of a rhombus using the formula	• apply the formula to find the area of rhombuses in different orientations • apply the formula to find the area of rhombuses in different orientations which include dimensions that are not necessary to calculate the area
2	Finding the dimensions of a rhombus given its area	• find the dimensions of a rhombus given its area by using the formula for the area of a rhombus • find the dimensions of a rhombus in different orientations given its area by using the formula for the area of a rhombus
3	Solving real-life problems involving calculating the area of rhombus'	• solve real-life problems involving calculating the area of rhombus
Learning Journey Solving area problems involving kites		
1	Finding the area of a kite using the formula	• apply the formula to find the area of kites in different orientations • apply the formula to find the area of kites in different orientations which include dimensions that are not necessary to calculate the area
2	Finding the dimensions of a kite given its area	• find the dimensions of a kite given its area and either its length or width by using the formula for the area of a kite • find the dimensions of a kite in different orientations given its area and either its length or width by using the formula for the area of a kite
3	Solving real-life problems involving calculating the area of kites	• solve real-life problems involving calculating the area of kites

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG197 Investigate the relationship between features of circles such as circumference, area, radius and diameter. Use formulas to solve problems involving circumference and area		
Quest: Working with circles		
Learning Journey Identifying parts of circles		
Steps	**Content**	**Detail**
1	Identifying parts of a circle	• identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment
Learning Journey Working with circumferences of circles		
1	Finding circumferences	• develop and use the formulas to find the circumferences of circles in terms of the diameter d or radius r
2	Finding the diameter and/or radius of a circle given its circumference	• find the diameter and/or radius of a circle given its circumference
Learning Journey Finding perimeters of parts of circles		
1	Finding the perimeters of quadrants and semicircles	• find the perimeters of quadrants and semicircles given the appropriate information • find the diameter and/or radius of a semicircle/quadrant given the perimeter
2	Finding the perimeters of simple composite figures	• find the perimeters of simple composite figures consisting of 2 shapes, including quadrants and semicircles
3	Finding the perimeters of composite figures	• find the perimeters of composite figures containing 3 or more shapes consisting, including quadrants and semicircles
Learning Journey Finding arc lengths and perimeters of sectors		
1	Finding arc lengths and the perimeters of sectors	• find the arc length of a sector • find the perimeter of a sector
2	Solving problems involving perimeters of sectors	• find the diameter and/or radius of a sector given the arc length and angle • find the perimeters of complex composite figures • solve problems involving arcs and sectors
3	Solving problems involving circles with exact answers	• solve a variety of practical problems involving circles and parts of circles, giving an exact answer in terms of π
	Solving problems involving circles with approximate answers	• solve a variety of practical problems involving circles and parts of circles, giving an approximate answer using a calculator's π function
Learning Journey Solving area problems involving circles		
1	Finding the area of a circle using the formula	• apply the formula to find the areas of circles given the radius • apply the formula to find the areas of circles given the diameter
2	Finding the dimensions of a circle given its area	• find the radius of a circle given its area using the formula for the area of a circle • find the diameter of a circle given its area using the formula for the area of circle
3	Solving real-life problems involving calculating the area of circles	• solve real-life problems involving calculating the area of circles

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG197 Investigate the relationship between features of circles such as circumference, area, radius and diameter. Use formulas to solve problems involving circumference and area		
Quest: Working with circles		
Learning Journey Solving area problems involving parts of circles		
Steps	**Content**	**Detail**
1	Finding the area of a semicircle or quadrant of a circle	• find the area of a semicircle or quadrant of a circle • find the diameter or radius of a semicircle or quadrant given its area • find the diameter or radius of a semicircle or quadrant given its area within the context of a problem
2	Applying the area of a sector formula with angle given in degrees: $A = \Theta/360 \times \pi \times r^2$	• find the area of a sector using the formula where radius is given and angle is given in degrees • find the radius of a sector using the formula where the area is given and angle is given in degrees • find the angle of a sector in degrees using the formula where the area and radius are given • find the unknown variable using the area of a sector formula in the context of a problem in degrees
3	Finding the area of composite shapes involving circles, semicircles and quadrants	• find the area of composite shapes involving circles, semicircles and quadrants • find the area of composite shapes involving circles, semicircles and quadrants within the context of a problem
4	Finding the area of composite shapes involving circles, semicircles and quadrants giving an exact answer in terms of pi	• find the area of composite shapes involving circles, semicircles and quadrants giving an exact answer in terms of pi • find the area of composite shapes involving circles, semicircles and quadrants within the context of a problem giving an exact answer in terms of pi
ACMMG198 Develop formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume		
Quest: Working with prisms		
Learning Journey Finding the volume of prisms		
1	Developing methods and formulas to find the volume of any prism	• recognise the area of the 'base' of a prism as being identical to the area of its uniform cross-section
2	Finding the volume of prism with a composite/irregular polygon uniform cross-section, given their perpendicular heights and area of their cross-sections all in the same units	• find the volume of prism with a composite/irregular polygon uniform cross-section, given their perpendicular heights and area of their cross-sections all in the same units
3	Finding the volume of prism with a composite/irregular polygon with uniform cross-section, given their perpendicular heights and dimensions of the cross-sections all in the same units	• find the volume of prism with a composite/irregular polygon with uniform cross-section, given their perpendicular heights and dimensions of the cross-sections all in the same units
4	Finding the volume of prism with a composite/irregular polygon uniform cross-section, given their perpendicular heights and area of their cross-sections all in different units	• find the volume of prism with a composite/irregular polygon uniform cross-section, given their perpendicular heights and area of their cross-sections all in different units

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG198 Develop formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume		
Quest: Working with prisms		
Learning Journey Finding the volume of prisms		
Steps	**Content**	**Detail**
5	Finding the volume of prism with a composite/ irregular polygon with uniform cross-section, given their perpendicular heights and dimensions of the cross-sections all in different units	• find the volume of prism with a composite/irregular polygon with uniform cross-section, given their perpendicular heights and dimensions of the cross-sections all in different units
Learning Journey Finding the volume of rectangular prisms		
1	Finding the volumes of rectangular prisms, given their perpendicular heights and the dimensions of their uniform cross-sections	• find the volumes of rectangular prisms, given their perpendicular heights and the dimensions of their uniform cross-sections
	Finding the volume of a rectangular prism given the area of the uniform cross-section and perpendicular height in the same units	• find the volume of a rectangular prism given the area of the uniform cross-section and perpendicular height in the same units
2	Finding the volume of a rectangular prism given the area of the uniform cross-section and perpendicular height in different units	• find the volume of a rectangular prism given the area of the uniform cross-section and perpendicular height in different units
3	Finding the height or area of the uniform cross-section given the volume in the same units	• find the height or area of the uniform cross-section given the volume in the same units
4	Finding the height/area of the uniform cross-section given the volume in different units	• find the height/area of the uniform cross-section given the volume in different units
	Finding a missing dimension of a rectangular prism given the volume in different units	• find a missing dimension of a rectangular prism given the volume in different units
Learning Journey Finding the volume of triangular prisms		
1	Finding the volume of a triangular prism given the area of the uniform cross-section and perpendicular height in the same units	• find the volume of a triangular prism given the area of the uniform cross-section and perpendicular height in the same units
	Finding the volume of triangular prisms, given their perpendicular heights and dimensions of their uniform cross-sections all in the same units	• find the volume of triangular prisms, given their perpendicular heights and dimensions of their uniform cross-sections all in the same units
2	Finding the volume of a triangular prism given the area of the uniform cross-section and perpendicular height in different units	• find the volume of a triangular prism given the area of the uniform cross-section and perpendicular height in different units
	Finding the volume of triangular prisms, given their perpendicular heights and dimensions of their uniform cross-sections all in different units	• find the volume of triangular prisms, given their perpendicular heights and dimensions of their uniform cross-sections all in different units
3	Finding the volume of triangular prisms, given their perpendicular heights, dimensions of their uniform cross-sections and additional measurements not required for the calculation in the same/ different units	• find the volume of triangular prisms, given their perpendicular heights, dimensions of their uniform cross-sections and additional measurements not required for the calculation in the same/ different units
4	Finding a missing dimension of a triangular prism given the volume in the same units	• find a missing dimension of a triangular prism given the volume in the same units
	Finding a missing dimension of a triangular prism given the volume in different units	• find a missing dimension of a triangular prism given the volume in different units

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG198 Develop formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume		
Quest: Working with prisms		
Learning Journey Solving problems involving prisms		
Steps	**Content**	**Detail**
1	Solving a variety of practical problems involving the volumes and capacities of right prisms	• solve a variety of practical problems involving the volumes and capacities of right prisms • find the height or area of a prism with a composite/irregular polygon with uniform cross-section given the volume in the same units • find the height or area of a prism with a composite/irregular polygon with uniform cross-section given the volume in different units
ACMMG199 Solve problems involving duration, including using 12- and 24-hour time within a single time zone		
Quest: Solve problems involving time		
Learning Journey Solving problems involving time		
1	Ordering a series of events according to the time taken to complete each one	• order a series of events according to the time taken to complete each one
2	Calculating the elapsed time of events using start and finish times using only 12-hour time	• calculate the elapsed time of events using start and finish times using only 12-hour time
	Calculating the elapsed time of events using start and finish times using 12-hour and 24-hour time	• calculate the elapsed time of events using start and finish times using 12-hour and 24-hour time
3	Calculating the starting time of events given the elapsed time and the finishing time using only 12-hour time	• calculate the starting time of events given the elapsed time and the finishing time using only 12-hour time
	Calculating the starting time of events given the elapsed time and the finishing time using 12-hour and 24-hour time	• calculate the starting time of events given the elapsed time and the finishing time using 12-hour and 24-hour time
4	Calculating the finishing time of events given the elapsed time and the finish times using only 12-hour time	• calculate the finishing time of events given the elapsed time and the finish times using only 12-hour time
	Calculating the finishing time of events given the elapsed time and the finish times using only 12-hour and 24-hour time	• calculate the finishing time of events given the elapsed time and the finish times using 12-hour and 24-hour time
5	Solving problems within a given context involving starting and finishing times of events and elapsed time using only 12-hour time	• solve problems within a given context involving starting and finishing times of events and elapsed time using only 12-hour time
	Solving problems within a given context involving starting and finishing times of events and elapsed time using 12-hour and 24-hour time	• solve problems within a given context involving starting and finishing times of events and elapsed time using 12-hour and 24-hour time
Learning Journey Rounding and converting time		
1	Introducing the calculator button degrees, minutes, seconds	• add and subtract time using the 'degrees-minutes-seconds' button on the calculator
2	Rounding time measurements to the nearest hour, minute or second	• round time measurements to the nearest hour, minute or second
3	Converting time given in decimal form into hours, minutes and seconds	• convert time given in decimal form into hours, minutes and seconds
4	Converting time given in hours, minutes and seconds into decimal form	• convert time given in hours, minutes and seconds into decimal form

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Geometric reasoning

ACMMG200 Define congruence of plane shapes using transformations		
Quest: Defining and working with congruence		
Learning Journey Defining and working with congruence		
Steps	**Content**	**Detail**
1	Identifying congruent figures by superimposing them through a combination of rotations, reflections and translations	• identify congruent figures by superimposing them through a combination of rotations, reflections and translations
2	Matching sides and angles of 2 congruent polygons	• determine which angles and sides of a polygon are matched to another polygon's sides and angles
3	Determining the condition for 2 circles or parts of circles to be congruent	• determine when 2 circles are congruent according to their radii/diameters • determine when 2 semi-circles are congruent according to their radii/diameters • determine when 2 sectors are congruent according to equal internal angles at the centre and radii/diameters
ACMMG201 Develop the conditions for congruence of triangles		
Quest: Determining congruence in triangles		
Learning Journey Determining congruence in triangles		
1	Determining if 2 triangles are congruent using the SSS test	• use the SSS test to determine if 2 or more triangles are congruent
2	Determining if 2 triangles are congruent using the SAS test	• use the SAS test to determine if 2 or more triangles are congruent
3	Determining if 2 triangles are congruent using the AAS test	• use the AAS test to determine if 2 or more triangles are congruent
4	Determining if 2 triangles are congruent using the RHS test	• use the RHS test to determine if 2 or more triangles are congruent
5	Using the congruency tests to identify a pair of congruent triangles from a selection of 3 or more triangles or from triangles embedded in a diagram	• use the congruency tests (SSS, SAS, AAS, RHS) to identify a pair of congruent triangles from a selection of 3 or more triangles or from triangles embedded in a diagram
ACMMG202 Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning		
Quest: Using properties of congruent triangles		
Learning Journey Using properties of congruent triangles		
1	Applying the properties of congruent triangles to find an unknown side and/or angle in a diagram, giving a reason	• apply the properties of congruent triangles to determine a missing angle or length by observing a congruent triangle that has the matching length or angle

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Mathletics

Statistics and Probability

Chance

ACMSP204 Identify complementary events and use the sum of probabilities to solve problems		
Quest: Complementary events		
Learning Journey Complementary events		
Steps	**Content**	**Detail**
1	Understanding the term 'complement' to describe events that are mutually exclusive and add to 1	• understand the term 'complement' to describe events that are mutually exclusive and add to 1
	Establishing that the sum of the probabilities of all of the possible outcomes of a single-step experiment is 1	• establish that the sum of the probabilities of all of the possible outcomes of a single-step experiment is 1
	Establishing that the sum of the probability of an event and its complement is 1	• establish that the sum of the probability of an event and its complement is 1
2	Finding the complement of an event	• find the probability of the complement of an event by using the fact that the sum of the probabilities of an event and its complement is 1
3	Identifying the complementary event for a given event, and calculating the theoretical probability that a given event will not occur	• identify the complementary event for given event, and calculate the theoretical probability that a given event will not occur • describe in words the complement of an event
ACMSP205 Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and'.		
Quest: Language of probability to describe events		
Learning Journey Language of probability to describe events		
1	Describing events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and' (both A and B)	• describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and' (both A and B) • recognise the difference between mutually exclusive and non-mutually exclusive events
2	Describing compound events using the terms 'at least', 'at most', 'not' and 'and'	• describe compound events using the terms 'at least', 'at most', 'not' and 'and'
3	Posing problems that involve the use of the terms 'at least', 'at most', 'not', 'and' and solve problems posed by others	• solve problems posed by others that involve the use of the terms 'at least', 'at most', 'not', 'and'
4	Classifying compound events	• classify compound events using inclusive 'or' and exclusive 'or'
ACMSP292 Represent events in two-way tables and Venn diagrams and solve related problems		
Quest: Venn diagrams and Two-Way tables		
Learning Journey Understanding and contructing Venn diagrams		
1	Interpreting Venn diagrams involving two or three mutually exclusive attributes	• interpret Venn diagrams involving two or three mutually exclusive attributes • describe regions in Venn diagrams representing mutually exclusive attributes
2	Interpreting Venn diagrams involving two or three non- mutually exclusive attributes	• interpret Venn diagrams involving two or three non- mutually exclusive attributes • describe individual regions or combinations of regions in Venn diagrams representing non-mutually exclusive attributes, using the language 'and', exclusive 'or', inclusive 'or', 'neither' and 'not'
3	Representing events in Venn diagrams	• represent events of 2 or 3 attributes using Venn diagrams
	Constructing Venn diagrams to represent all possible combinations of 2 attributes from given or collected data	• construct Venn diagrams to represent all possible combinations of 2 attributes from given or collected data

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Mathletics

Statistics and Probability

Chance

ACMSP292 Represent events in two-way tables and Venn diagrams and solve related problems		
Quest: Venn diagrams and Two-Way tables		
Learning Journey Using Venn diagrams to solve problems		
Steps	**Content**	**Detail**
1	Using data presented in venn diagrams to answer problems, including probability questions	• use data presented in venn diagrams to answer problems, including probability questions
2	Using given data to calculate missing values in a Venn diagram	• use given data to calculate missing values in a Venn diagram
3	Using data presented in venn diagrams to answer problems where missing values must first be found, including probability questions	• use data presented in venn diagrams to answer problems where missing values must first be found, including probability questions
Learning Journey Interpreting and constructing two-way tables		
1	Interpreting given two-way tables representing non-mutually exclusive attributes	• interpret given two-way tables representing non-mutually exclusive attributes • describe relationships displayed in two-way tables using the language 'and', exclusive 'or', inclusive 'or', 'neither' and 'not'
2	Constructing two-way tables to represent the relationships between attributes	• construct two-way tables to represent the relationships between attributes
3	Using data presented in two-way tables to answer problems, including probability questions	• use data presented in a two-way table to answer problems, including probability questions
4	Using given data to calculate missing values in a two-way table	• use given data to calculate missing values in a two-way table
5	Using data presented in two-way tables to answer problems where missing values must first be found, including probability questions	• use data presented in two-way tables to answer problems where missing values must first be found, including probability questions
Learning Journey Two-way tables and Venn diagrams		
1	Converting between representations of the relationships between 2 attributes in Venn diagrams and two-way tables	• convert between representations of the relationships between 2 attributes in Venn diagrams and two-way tables

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP284 Investigate techniques for collecting data, including census, sampling and observation		
Quest: Collecting data		
Learning Journey Collecting data		
Steps	**Content**	**Detail**
1	Classifying data/recognising variables as categorical (qualitative) or numerical (quantitative) - either discrete or continuous	• identify examples of categorical variables (eg colour, gender) discrete numerical variables (eg number of students, shoe size) and continuous numerical variables (eg height, weight)
2	Recognising and explaining the difference between a 'population' and a 'sample' selected from a population when collecting data	• recognise and explain the difference between a 'population' and a 'sample' selected from a population when collecting data
3	Investigating and determine the differences between collecting data by observation, census and sampling	• identify examples of variables for which data could be collected by observation, eg direction travelled by vehicles arriving at an intersection, native animals in a local area • identify examples of variables for which data could be collected by a census or by a sample, eg a census to collect data about the income of Australians, a sample for TV ratings
ACMSP206 Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes		
Quest: Data sampling and populations		
Learning Journey The relationship between a sample & the population		
1	Using samples to make predictions about a larger 'population' from which the sample comes	• use samples to make predictions about a larger 'population' from which the sample comes • discuss whether a prediction about a larger population, from which a sample comes, would be the same if a different sample were used
2	Inferring properties of populations or distributions from a sample, whilst knowing the limitations of sampling	• infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling
	Investigating ways in which different random samples may be drawn from the same population	• investigate ways in which different random samples may be drawn from the same population, eg random samples from a census may be chosen by gender, postcode, state, etc

Australian Curriculum Year 8

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP206 Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes		
Quest: Data sampling and populations		
Learning Journey The relationship between a sample & the population		
Steps	**Content**	**Detail**
1	Using samples to make predictions about a larger 'population' from which the sample comes	• use samples to make predictions about a larger 'population' from which the sample comes
2	Inferring properties of populations or distributions from a sample, whilst knowing the limitations of sampling	• infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling
Quest: Clusters, gaps and outliers in data		
Learning Journey Clusters, gaps and outliers in data		
1	Identifying any clusters, gaps and outliers in sets of data	• identify any clusters, gaps and outliers in sets of data • identify any clusters, gaps and outliers in sets of data when represented in different displays
2	Investigating the effect of outliers on the mean, median, mode and range by considering a small set of data and calculating each measure, with and without the inclusion of an outlier	• investigate the effect of outliers on the mean, median, mode and range by considering a small set of data and calculating each measure, with and without the inclusion of an outlier

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Real numbers

ACMNA208 Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems		
Quest: Proportion, rates, graphs & equations		
Learning Journey Unit rates		
Steps	**Content**	**Detail**
1	Understanding how to find the unit rate	• understand how to find the unit rate in a problem • understand that if the unit rate is known, then this can be used to quantify other amounts
2	Solving problems with and without digital technology involving calculations of the unit rate	• solve appropriate problems with and without digital technology using the calculation of the unit rate
3	Making comparisons using unit rates	• make comparisons using unit rates within real-life scenarios
4	Interpreting the unit rate as the slope of the line that models the relationship	• interpret the unit rate as the slope of the line that models the relationship
Learning Journey Converting rates		
1	Converting between related compound units (rates of pay, prices, density, pressure) in numerical and algebraic contexts	• convert between related compound units (rates of pay, prices, density, pressure) in numerical and algebraic contexts
	Identifying other rates in real life	• identify other forms of rates in real-life contexts
2	Converting speeds from one rate to another	• understand how to convert correctly between units of speed, eg m/s converted to km/h • convert between units of speed, eg m/s converted to km/h
3	Comparing speeds written in different rates	• understand the need to write speeds in the same rate to compare them • convert different speeds to the same rate to compare
Learning Journey Direct proportion		
1	Recognising proportional relationships between quantities	• interpret information between 2 quantities and decide if they are in a proportional relationship
	Learning relevant language in relation to direct variation/proportion	• discuss the meaning of direct variation/proportion (as 1 value increases so does the other or as 1 value decreases so does the other)
	Investigating and understanding direct variation/ proportion	• investigate situations which are examples of direct variation/ proportion • understand that x is directly proportional to y if x/y = constant (or y = kx, k being the constant) • understand that x and y are directly proportional - if a value of x increases the value of y increases in the same proportion and as the value of x decreases then the value of y decreases in the same proportion
2	Understanding what direct variation/proportion graphs look like	• understand that straight-line graphs represent direct variation/ proportion for the values given on each axis • explain why straight line graphs represent direct variation/ proportion
3	Interpreting and comparing direct variation/ proportion graphs	• interpret and compare graphs in real-life situations to make informed choices, eg mobile phone charges, temperature conversions, time/distance/speed etc

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Real numbers

ACMNA208 Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems		
Quest: Proportion, rates, graphs & equations		
Learning Journey Indirect/inverse proportion		
Steps	**Content**	**Detail**
1	Discussing indirect variation/proportion	• discuss the meaning of indirect variation/proportion, ie as 1 value increases the other decreases or as 1 value decreases the other increases
	Investigating and understanding indirect or inverse variation/proportion	• investigate situations which are examples of indirect or inverse variation/proportion • understand that x and y are indirectly proportional if, as the value of x increases, the value of y decreases and as the value of x decreases, the value of y increases
	Understanding relevant language in relation to indirect (inverse) variation/proportion	• understand that x is indirectly or inversely proportional to y if x times y = constant (ie y = constant/x)
2	Solving problems based on indirect (inverse) variation/proportion with and without digital technology	• solve problems using an understanding of indirect (inverse) variation/proportion with and without digital technology
Learning Journey Direct and inversely proportionate graphs		
1	Applying information to create indirect (inverse) variation/proportion graphs	• create tables of values for indirect (inverse) variation/ proportion problems and then plot on the number plane • understand and/or comment on the significance of the shape of a graph representing indirect variation/proportionality
2	Knowing what indirect (inverse) variation/proportion graphs look like	• know that an indirect variation/proportional relationship is represented by a non-linear curve
3	Interpreting graphs which represent direct and indirect variation/proportion	• recognise and interpret graphs representing direct and indirect variation/proportion • identify whether a linear graph represents direct or indirect variation/proportion with reference to the values on each axis
Learning Journey Interpret and use conversion graphs		
1	Interpreting conversion graphs, eg conversions between different currencies or metric and imperial measures	• interpret conversion graphs, eg conversions between different currencies or metric and imperial measures
2	Using conversion graphs to convert from 1 unit to another, eg conversions between different currencies or metric and imperial measures	• use conversion graphs to convert from one unit to another, eg conversions between different currencies or metric and imperial measures
Learning Journey The constant of proportionality		
1	Identifying the constant of proportionality (unit rate) in tables, graphs, equations, diagrams and verbal descriptions of proportional relationships	• identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams and verbal descriptions of proportional relationships
2	Representing proportional relationships by equations	• represent proportional relationships by equations
3	Determining the constant of proportionality (k = y/x) within mathematical problems	• determine the constant of proportionality (k = y/x) within mathematical problems
	Determining the constant of proportionality (k = y/x) within real-world problems	• determine the constant of proportionality (k = y/x) within real-world problems

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Real numbers

ACMNA208 Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems		
Quest: Proportion, rates, graphs & equations		
Learning Journey The constant of proportionality		
Steps	**Content**	**Detail**
4	Finding the value of the constant of variation (or proportionality) and using it to solve problems	• "ind the value of the constant of variation (or proportionality), given the appropriate information, within a direct variation/ proportion problem • use information to write a direct variation/proportion equation and find the value of the constant of variation/proportion/ proportionality • write, apply and solve equations within the context of direct variation/proportion problems
5	Solving direct variation/proportion problems in various contexts	• solve problems involving rates and directly proportional relationships in various contexts, using dynamic geometry software to construct and measure scale drawings
Learning Journey Graph equations of direct proportion		
1	Applying unitary information to create graphs	• apply the unitary information to create a table of values which can be plotted on the number plane • understand the significance of the slope and direction of the graph (as 1 value increases so does the other or as 1 value decreases so does the other)
2	Graphing proportional relationships	• graph proportional relationships • interpret the unit rate as the slope of the graph
Learning Journey Distance, speed and time problems		
1	Solving problems using D = S x T, with and without a calculator	• solve problems to calculate the distance including where time durations are expressed in 12-hour and 24-hour notation
2	Solving problems using S = D/T, with and without a calculator	• solve problems to calculate the speed including where time durations are expressed in 12-hour and 24-hour notation
3	Solving problems using T = D/S, with and without a calculator	• solve problems to calculate the time, applying the answer in 12-hour and 24-hour contexts as appropriate
4	Solving problems in context	• solve problems in context
Learning Journey Travel Graphs		
1	Interpreting information from travel graphs (time/ distance graphs) when the speed is variable, to solve problems	• interpret information from a travel graph (time/distance graph) to solve problems • interpret information from 2 travel graphs (time/distance graphs) on the same set of coordinate axes (number plane) to solve problems
2	Sketching travel graphs with variable speed	• sketch a graph from a simple description given a variable rate of change (speed)

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Number and Algebra

Real numbers

ACMNA209 Apply index laws to numerical expressions with integer indices		
Quest: Index laws with numerical expressions		
Learning Journey Mixed index laws numerical expressions		
Steps	**Content**	**Detail**
1	Applying index laws further: multiplication with integer indices (positive and negative indices)	• apply the index law for multiplying expressions with the same numerical base and integer indices (introducing negative indices) • apply the index law to simplify the multiplication of 2 or more terms with numerical bases and integer indices, leaving solutions in index form • apply the index law to simplify the multiplication of 2 or more terms with numerical bases and integer indices, evaluating the solution with and without a calculator
2	Applying index laws further: division with integer indices (positive and negative indices)	• apply the index law to simplify the division of 2 or more terms with numerical bases and integer indices (introducing negative indices) • apply the index law to simplify the division of 2 or more terms with numerical bases and integer indices, leaving solutions in index form • apply the index law to simplify the division of two or more terms with numerical bases and integer indices, evaluating the solution with and without a calculator
3	Applying index laws further: power of a power with integer indices (positive whole number bases)	• apply the index law for raising an expression in index form to another index (positive numerical bases, positive and negative integer indices) • apply the index law to simplify expressions involving raising a term written in index form to another index, leaving solutions in index form (positive numerical bases, integer indices) • apply the index law to simplify expressions involving raising a term written in index form to another index, evaluating the solution with and without a calculator (positive numerical bases, integer indices)
4	Applying index laws further: zero index (positive and negative whole number bases)	• apply the meaning of the zero index for expressions with positive and negative numerical bases • apply the zero index to simplify expressions involving the zero index and integer numerical bases
Learning Journey Index laws: positive and negative integer index		
1	Establishing the fact that a - 1 = 1/a when using numerical bases	• establish the fact that a - 1 = 1/a when using numerical bases
	Evaluating numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-1} = 1/3$ with an index of -1	• evaluate numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-1} = 1/3$ with an index of -1
2	Evaluating numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-4} = 1/3^4 = 1/81$	• evaluate numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-4} = 1/3^4 = 1/81$

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Number and Algebra

Real numbers

ACMNA210 Express numbers in scientific notation		
Quest: Express numbers in scientific notation		
Learning Journey Introducing scientific notation		
Steps	**Content**	**Detail**
1	Introducing scientific notation (also called standard form) for whole numbers	• understand that scientific notation is a way of writing numbers which has 2 parts to it • establish how to write 1, 10, 100, 1000 etc as an exponent of the 10 • write whole numbers as a number between 1 and 10 multiplied by 10, 100, 1000 etc • represent whole numbers in scientific notation
2	Introducing scientific notation (also called standard form) for rational numbers	• compare integers written in scientific notation • refer to science context for the use of scientific notation • refer to the other name for scientific notation: standard form
Learning Journey Converting: scientific not. & basic numbers		
1	Converting from scientific notation to basic numbers for very large numerals	• convert from scientific notation to basic numerals for very large numbers
2	Converting from scientific notation to basic numbers for very small numerals	• convert from scientific notation to basic numerals for very small numbers
3	Converting from basic numerals to scientific notation for very large numbers	• convert from basic numerals to scientific notation for very large numbers
4	Converting from basic numerals to scientific notation for very small numbers	• convert from basic numerals to scientific notation for very small numbers
Learning Journey Calculating and rounding with scientific notation		
1	Calculating in scientific notation	• perform calculations involving scientific notation (without a calculator) applying laws of exponents where there is 1 bracket • perform calculations involving scientific notation (without a calculator) using laws of exponents and 2 brackets to be multiplied • perform calculations involving scientific notation (without a calculator) using laws of exponents with 2 brackets involving division
2	Using the calculator for scientific notation	• establish how to use the calculator for scientific notation • perform calculations involving scientific notation (with a calculator) • solve problems in context using scientific notation, with and without a calculator
3	Rounding values in scientific notation to a given number of decimal places	• round values in scientific notation to a given number of decimal places
4	Rounding values in scientific notation to a given number of significant figures	• round values in scientific notation to a given number of significant figures
	Identifying the number of significant figures in a number when written in scientific notation	• identify the number of significant figures in a number when written in scientific notation

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Number and Algebra

Money and financial mathematics

ACMNA211 Solve problems involving simple interest		
Quest: Solve problems involving simple interest		
Learning Journey Simple interest		
Steps	**Content**	**Detail**
1	Understanding the financial term 'simple interest'	• understand the term simple interest
2	Calculating simple interest using the formula	• calculate simple interest using the formula
3	Rearranging the simple interest formula in order to make the subject the principal, interest rate or time periods, given all other information	• rearrange the simple interest formula in order to make the subject the principal, interest rate or time period, given all other information
	Calculating either the principal, the interest rate or the time periods using the rearranged simple interest formula	• calculate the principal using the rearranged simple interest formula • calculate the interest rate using the rearranged simple interest formula • calculate the time periods using the rearranged simple interest formula
4	Solving problems involving simple interest	• solve problems involving simple interest
Learning Journey Hire purchase agreements		
1	Understanding hire purchase	• understand that hire purchase (HP) schemes are used to purchase items when the amount of money is not available for the full purchase • investigate real-life scenarios of HP examples, including where there are fees applied to 'buy now and no more to pay until...' promotions • calculate the cost of purchasing items with HP, given the deposit and the details of the regular payments • calculate the cost of purchasing items with HP, given the deposit and the details of the regular payments, including where simple interest has been applied to the total cost • calculate the cost of purchasing items with a deposit and regular payments from an interest-free payments scheme • compare the difference between the cash price of items and the HP price and understand the advantages/disadvantages of using HP agreements
	Understanding the commitment of hire purchase agreements	• recognise what happens if payments are not maintained, understanding that repossession does not remove financial debt

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Number and Algebra

Patterns and algebra

ACMNA212 Extend and apply the index laws to variables, using positive integer indices and the zero index		
Quest: Index laws with variables		
Learning Journey Mixed index laws algebraic expressions		
Steps	**Content**	**Detail**
1	Applying index laws further: multiplication with integer indices (algebraic bases)	• apply the index law for multiplying expressions with the same algebraic base and integer indices • apply the index law to simplify the multiplication of 2 or more terms with algebraic bases and integer indices, leaving solutions in index form
2	Applying index laws further: division with integer indices (algebraic bases)	• apply the index law for dividing expressions with the same algebraic base and integer indices • apply the index law to simplify the division of 2 or more terms with algebraic bases and integer indices, leaving solutions in index form
3	Applying index laws further: power of a power with integer indices (algebraic bases)	• apply the index law for raising an expression in index form to another index (algebraic bases and integer indices) • apply the index law to simplify expressions involving raising a term written in index form to another index, leaving solutions in index form (algebraic bases and integer indices)
4	Applying index laws further: zero index (algebraic bases)	• apply index laws: zero index (algebraic bases) • apply the zero index to simplify expressions involving the zero index and algebraic bases
5	Applying index laws further: mixed index laws (algebraic bases)	• select the necessary index law(s) and apply them to simplify expressions of 2 or more terms involving indices with algebraic bases and the operations of multiplication, division, power of a power, and the zero index. Expressions to include positive and negative integers
ACMNA213 Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate		
Quest: Applying the distributive law		
Learning Journey Applying the distributive law		
1	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive integers and b is a variable with coefficient of 1	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive integers and b is a variable with coefficient of 1
	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive or negative integers and b is a variable with coefficient of 1	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a and c are positive or negative integers and b is a variable with coefficient of 1
2	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b, and c can be positive numbers or variables (coefficients are 1)	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b, and c can be positive numbers or variables (coefficients are 1)
	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients 1 or -1)	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients 1 or -1)
	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients integers not limited to 1)	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law) where a, b and c can be positive or negative numbers or variables (coefficients integers not limited to 1)

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Number and Algebra

Patterns and algebra

ACMNA213 Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate		
Quest: Applying the distributive law		
Learning Journey Applying the distributive law		
Steps	**Content**	**Detail**
3	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law). Coefficients of pronumerals to be positive integers. Involve indices where power is a positive integer.	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law). Coefficients of pronumerals to be positive integers. Involve indices where power is a positive integer.
	Expanding algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law). Coefficients of pronumerals to be positive or negative integers. Involve indices where power is a positive integer.	• expand algebraic expressions in the form a(b + c) by removing grouping symbols (distributive law). Coefficients of pronumerals to be positive or negative integers. Involve indices where power is a positive integer.
4	Expanding algebraic expressions by removing grouping symbols and collecting like terms where applicable	• expand algebraic expressions by removing grouping symbols and collecting like terms where applicable

Linear and non-linear relationships

ACMNA214 Find the distance between two points located on the Cartesian plane using a range of strategies, including graphing software		
Quest: Finding the distance between two points		
Learning Journey Distance between two points without the formula		
Steps	**Content**	**Detail**
1	Understanding that the shortest distance on a Cartesian plane between 2 points is a straight line	• understand that the shortest distance on a Cartesian plane between 2 points is a straight line
	Using graphing software to find the distance between 2 points on the Cartesian plane	• use graphing software to find the distance between 2 points on the Cartesian plane
2	Using the interval between 2 points on the Cartesian plane as the hypotenuse of a right-angled triangle and apply Pythagoras' theorem to determine the length of the interval joining the 2 points (ie 'the distance between the 2 points')	• use the interval between 2 points on the Cartesian plane as the hypotenuse of a right-angled triangle and apply Pythagoras' theorem to determine the length of the interval joining the 2 points (ie 'the distance between the 2 points') • describe how the distance between (or the length of the interval joining) 2 points can be calculated using Pythagoras' theorem

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Linear and non-linear relationships

ACMNA214 Find the distance between two points located on the Cartesian plane using a range of strategies, including graphing software		
Quest: Finding the distance between two points		
Learning Journey Distance between two points using the formula		
Steps	**Content**	**Detail**
1	Using Pythagoras' theorem to establish the formula for the distance, d, between 2 points (x1, y1) and (x2, y2) on the Cartesian plane: d = √((x2 − x1)2 + (y2 − y1)2)	• use Pythagoras' theorem to establish the formula for the distance, d, between 2 points (x1, y1) and (x2, y2) on the Cartesian plane: d = √((x2 − x1)2 + (y2 − y1)2) • explain the meaning of each of the pronumerals in the formula for distance
	Using the formula to find the distance between 2 points on the Cartesian plane	• use the formula to find the distance between 2 points on the Cartesian plane
2	Using the formula to find the distance of the interval joining 2 points in order to solve a problem in a given context	• use the formula to find the distance of the interval joining two points on the Cartesian plane in order to solve a problem in a given context • use the formula to find the distance of the interval joining 2 points on a diagram in order to solve a real-life problem in a given context
ACMNA294 Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software		
Quest: Midpoint & gradient of line segments		
Learning Journey Finding the midpoint without the formula		
1	Determining the midpoint of an interval using a diagram	• determine the midpoint of an interval using a diagram
2	Using the process for calculating the 'mean' to find the midpoint, M, of the interval joining 2 points on the Cartesian plane	• use the process for calculating the 'mean' to find the midpoint, M, of the interval joining 2 points on the Cartesian plane • explain how the concept of mean ('average') is used to calculate the midpoint of an interval
3	Using graphing software to find the midpoint of an interval	• use graphing software to find the midpoint of an interval
Learning Journey Finding the midpoint using the formula		
1	Establishing the formula for the midpoint, M, of the interval joining 2 points (x1, y1) and (x2, y2) on the Cartesian plane M(x, y) = ((x1 + x2)/2,(y1 + y2)/2)	• establish the formula for the midpoint, M, of the interval joining 2 points (x1, y1) and (x2, y2) on the Cartesian plane M(x, y) = ((x1 + x2)/2, (y1 + y2)/2) • explain the meaning of each of the pronumerals in the formula for midpoint
	Using the formula to find the midpoint of the interval joining 2 points on the Cartesian plane	• use the formula to find the midpoint of the interval joining 2 points on the Cartesian plane
2	Using the formula to find the midpoint of the interval joining 2 points in order to solve a problem in a given context	• use the formula to find the midpoint of the interval joining 2 points on the Cartesian plane in order to solve a problem in a given context • use the formula to find the midpoint of the interval joining 2 points on a map in order to solve a real-life problem in a given context
3	Using the midpoint formula to find the missing point on the line interval given 1 point and the midpoint	• use the midpoint formula to find the missing point on the line interval given 1 point and the midpoint • explain the significance of the order and location of the coordinates in the formula

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Linear and non-linear relationships

ACMNA294 Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software		
Quest: Midpoint & gradient of line segments		
Learning Journey Finding the midpoint without the formula		
Steps	**Content**	**Detail**
1	Plotting and joining 2 points to form an interval on the Cartesian plane and form a right-angled triangle by drawing a vertical side from the higher point and a horizontal side from the lower point	• plot and join 2 points to form an interval on the Cartesian plane and form a right-angled triangle by drawing a vertical side from the higher point and a horizontal side from the lower point
2	Using the interval between 2 points on the Cartesian plane as the hypotenuse of a right-angled triangle and use the relationship gradient = rise/run to find the gradient of the interval joining the 2 points	• use the interval between 2 points on the Cartesian plane as the hypotenuse of a right-angled triangle and use the relationship gradient = rise/run to find the gradient of the interval joining the 2 points • describe the meaning of the gradient of an interval joining 2 points and explain how it can be found • distinguish between positive and negative gradients from a diagram
3	Using graphing software to find the gradient of an interval	• use graphing software to find the gradient of an interval
Learning Journey Finding the gradient using the formula		
1	Using the relationship gradient = rise/run to establish the formula for the gradient, m, of the interval joining two points (x1, y1) and (x2, y2) on the Cartesian plane m = (y2 − y1) / (x2 − x1)	• use the relationship gradient=rise/run to establish the formula for the gradient, m, of the interval joining 2 points (x1, y1) and (x2, y2) on the Cartesian plane • explain the meaning of each of the pronumerals in the formula for the gradient
	Using the formula to find the gradient of the interval joining 2 points on the Cartesian plane	• use the formula to find the gradient of the interval joining 2 points on the Cartesian plane
2	Using the formula to find the gradient of the interval joining 2 points in order to solve a problem in a given context	• use the formula to find the gradient of the interval joining 2 points on the Cartesian plane in order to solve a problem in a given context • use the formula to find the gradient of the interval joining 2 points on a diagram in order to solve a real-life problem in a given context
	Explaining why the formula m = (y1 − y2)/(x1 − x2) gives the same value for the gradient as m = y2 − y1 / x2 − x1	• explain why the formula m = (y1 − y2)/(x1 − x2) gives the same value for the gradient as m = (y2 − y1)/(x2 − x1)
	Explaining the significance of the y-coordinates being in the numerator and the x-coordinates in the denominator	• explain the significance of the y-coordinates being in the numerator and the x-coordinates in the denominator
ACMNA215 Sketch linear graphs using the coordinates of two points and solve linear equations		
Quest: Linear graphs & solving linear equations		
Learning Journey Vertical and horizontal lines		
1	Graphing horizontal linear relationships from the equation where there is no x involved	• graph horizontal linear relationships from the equation where there is no x involved • know that a horizontal line has a zero gradient
	Explaining the significance of the y-coordinates being in the numerator and the x-coordinates in the denominator	• explain the significance of the y-coordinates being in the numerator and the x-coordinates in the denominator
	Finding the equation of a given horizontal line	• find the equation of a given horizontal line

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Linear and non-linear relationships

ACMNA215 Sketch linear graphs using the coordinates of two points and solve linear equations		
Quest: Linear graphs & solving linear equations		
Learning Journey Vertical and horizontal lines		
Steps	**Content**	**Detail**
2	Graphing vertical linear relationships from the equation where there is no y involved	• graph vertical linear relationships from the equation where there is no y involved • know that a vertical line has an infinite gradient
	Finding the equation of a given vertical line	• find the equation of a given vertical line
3	Identifying the x-axis as the line y = 0 and the y-axis as the line x = 0	• identify the x-axis as the line y = 0 and the y-axis as the line x = 0 • explain why the x- and y-axes have these equations
Learning Journey Finding and using x and y-intercepts		
1	Establishing and using the fact that substituting y = 0 into a linear equation will give you the x-intercept	• establish that substituting y = 0 into a linear equation will give you the x-intercept • substitute y = 0 into a linear equation in order to find the x-intercept • reproduce the x-intercept in coordinate form
2	Establishing and using the fact that substituting x = 0 into a linear equation will give you the y-intercept	• establish that substituting x = 0 into a linear equation will give you the y-intercept • substitute x = 0 into a linear equation in order to find the y-intercept • reproduce the y-intercept in coordinate form
3	Finding the x and y-intercepts of any linear graphs	• find the x and y-intercepts of any linear graphs by substituting in x=0 for the y-intercept and y = 0 for the x-intercept • explain why you can find the x and y-intercepts of any linear graphs by substituting in x =0 for the y-intercept and y = 0 for the x-intercept
4	Graphing a linear relationship on the Cartesian plane using the x and y intercepts	• graph a linear relationship on the Cartesian plane by finding the x and y intercepts and ruling a line through them
Learning Journey Graphing using a table of values		
1	Graphing a linear relationship on the Cartesian plane using a table of values	• graph a linear relationship on the Cartesian plane using a table of values • graph the number pairs on the Cartesian plane • apply an appropriate scale to a Cartesian plane
Learning Journey Graphing using the gradient-intercept method		
1	Investigating what the values of m and b mean graphically when an equation is given in the form y = mx + b	• investigate what the values of m and b mean graphically when an equation is given in the form y = mx + b
	Establishing that when given in the form y = mx + b, m is the gradient in the form rise/run	• establish that when given in the form y = mx + b, m is the gradient in the form rise/run • understand that the gradient is the same between any 2 points on a line
	Understanding that the gradient is the slope of a line in the form rise/run	• understand that the gradient is the slope of a line in the form rise/run • understand how a negative and positive gradient differ
2	Graphing a linear relationship on the Cartesian plane using the gradient and y-intercept when the equation is in the form y = mx + b	• graph a linear relationship on the Cartesian plane using the gradient and y-intercept when the equation is in the form y = mx + b by first plotting the y-intercept • find a second point on the line using the gradient in the form rise/run • use correct graphing conventions when graphing (arrows, line to the edge etc)
3	Graphing a linear relationship on the Cartesian plane using the gradient and y-intercept when the equation is not in the form y = mx + b by rearranging to be in this form	• graph a linear relationship on the Cartesian plane using the gradient and y-intercept when the equation is not in the form y = mx + b by rearranging to be in this form first

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Linear and non-linear relationships

ACMNA215 Sketch linear graphs using the coordinates of two points and solve linear equations		
Quest: Linear graphs & solving linear equations		
Learning Journey Comparing linear relationships		
Steps	**Content**	**Detail**
1	Comparing linear relationships on the Cartesian plane without the use of digital technology	• graph more than 1 line on the same set of axes and compare the graphs to determine similarities and differences • identify similarities and differences between groups of linear relationships
2	Comparing linear relationships on the Cartesian plane with the use of digital technology	• graph more than 1 line on the same set of axes and compare the graphs to determine similarities and differences • identify similarities and differences between groups of linear relationships
Learning Journey Further linear equations		
1	Solving equations involving multiple sets of brackets	• solve equations involving multiple sets of brackets
2	Solving equations involving brackets with pronumerals on both sides	• solve equations involving brackets with pronumerals on both sides
ACMNA296 Graph simple non-linear relations with and without the use of digital technologies and solve simple related equations		
Quest: Graph & solve non-linear relationships		
Learning Journey Graphing simple non-linear relations		
1	Graphing simple quadratics by completing a table of values	• graph simple quadratics by completing a table of values • compare graphs of quadratics drawn from a table of values with quadratics drawn using digital technology
2	Graphing simple circles by completing a table of values	• graph simple circles by completing a table of values • compare graphs of circles drawn from a table of values with quadratics drawn using digital technology
3	Graphing simple exponentials by completing a table of values	• graph simple exponentials by completing a table of values • compare graphs of exponentials drawn from a table of values with exponentials drawn using digital technology
4	Comparing the graphs of a variety of simple non-linear relationships	• compare the graphs of a variety of simple non-linear relationships
Learning Journey Solving simple non-linear relationships		
1	Solving simple quadratic equations by inspection eg x2 = 49	• solve simple quadratic equations by inspection eg x2 = 49
2	Solving simple cubic equations of the form a x 3 = k, leaving answers in exact form and as decimal approximations	• solve simple cubic equations of the form a x 3 = k, leaving answers in exact form • solve simple cubic equations of the form a x 3 = k, leaving answers as decimal approximations
3	Solving exponential equations containing equal bases	• solve exponential equations containing equal bases (linear exponents only) eg: 53x = 57x − 2 • solve exponential equations containing equal bases (non-linear exponents) eg: 2 x 2 = 23x − 4 • solve exponential equations containing equal bases where one side requires reciprocation prior to solving (linear exponents only) eg: 44 − 3x = 1/4x − 2

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra

Linear and non-linear relationships

ACMNA296 Graph simple non-linear relations with and without the use of digital technologies and solve simple related equations		
Quest: Graph & solve non-linear relationships		
Learning Journey Parabolas		
Steps	**Content**	**Detail**
1	Understanding the language and important features of parabolas	• understand the language of parabolas, turning point (vertex), concavity, roots, x-intercept, y-intercept, axis of symmetry • understand the important features to be marked on a parabola; y-intercept, x-intercept(s)/ roots, turning point (vertex)
	Understanding that a parabola is the locus of a point that stays equidistant from a point and a line	• understand that a parabola is the locus of a point that stays equidistant from a point and a line
	Understanding that y = ax2 + bx + c is the general equation of a parabola and manipulate equations to be in this form	• understand that y = ax2 + bx + c is the general equation of a parabola • manipulate equations to be in the form y = ax2 + bx + c
	Investigating how the parabola with the equation y = ax2 changes as the value of a is changed using digital technology	• investigate how the parabola with the equation y = ax2 changes as the value of a is changed using digital technology • describe the features of the graph and how they change as the value of 'a' changes for both positive and negative values of 'a' • understand that the sign of the coefficient of x2 (a) is what makes a parabola concave up or down. If a > 0 the parabola is concave up, If a < 0 the parabola is concave down
2	Investigating how the parabola with the equation y = ax2 + k changes as the value of k is changed using digital technology	• investigate how the parabola with the equation y = ax2 + k changes as the value of k is changed using digital technology • describe the features of the graph and how they change as the value of k changes for both positive and negative values of k • describe the repositioning of y = ax2 + c as vertical shift from y = ax2 according to the value of c
3	Finding y-intercept for the graph of y = ax2 + bx + c, given a, b and c by substituting in x = 0	• find y-intercept for the graph of y = ax2 + bx + c, given a, b and c by substituting in x = 0 • explain why c will always be the y-intercept
4	Graphing parabolas in the form y = ax2 + k with different values of a and k	• graph parabolas in the form y = ax2 + k with different values of a and k
5	Determining the equation of a parabola, given a graph of the parabola with the main features clearly indicated	• determine the equation of a parabola, given a graph of the parabola with the main features clearly indicated
Learning Journey Exponential Graphs		
1	Recognising and describing an exponential graph	• recognise a exponential graph to be in the form of an equation with the variable being in the exponent • describe an exponential graph
2	Graphing exponential relationships with the equation in the form y = ax	• graph exponential relationships with the equation in the form y=ax for various values of a • compare features and describe how the graph changes as the value of a changes • identify that all exponential equations of the form y = ax will have a y-intercept of (0, 1)
3	Graphing exponential relationships with the equation in the form y = ax + b	• graph exponential relationships with the equation in the form y = ax + b for various values of a and b • compare features and describe how the graph changes as the values of a and b change
4	Graphing exponential relationships with the equation in the form y = a - x + b	• graph exponential relationships with the equation in the form y = a - x + b for various values of a and b • compare features and describe how the graph changes as the values of a and b change

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Number and Algebra

Distance between two points using the formula

ACMNA296 Graph simple non-linear relations with and without the use of digital technologies and solve simple related equations		
Quest: Graph & solve non-linear relationships		
Learning Journey Circles		
Steps	**Content**	**Detail**
1	Sketching circles of the form $x^2 + y^2 = r^2$ where r is the radius of the circle	• sketch circles of the form $x^2 + y^2 = r^2$ where r is the radius of the circle

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Using units of measurement

ACMMG216 Calculate areas of composite shapes		
Quest: Areas of composite shapes		
Learning Journey Areas of composite shapes		
Steps	**Content**	**Detail**
1	Identifying possible dissections of composite shapes to facilitate calculating the area of the composite shape	• identify possible dissections of composite shapes to facilitate calculating the area of the composite shape
2	Calculating the areas of composite figures by dissection into triangles, special quadrilaterals, quadrants, semicircles and sectors	• calculate the areas of composite figures by dissection into triangles, special quadrilaterals, quadrants, semicircles and sectors
3	Solving a variety of practical problems involving the areas of quadrilaterals and composite shapes	• solve a variety of practical problems involving the areas of quadrilaterals and composite shapes
4	Defining an annulus and its associated terminology	• define what an annulus is including the specific requirements for a shape to be called an annulus • know the specific terms associated with an annulus: concentric circles, larger/external radius ('R'), smaller/interior radius ('r')
	Establishing and applying the area of an annulus	• establish the area of an annulus formula • find the area of an annulus by applying the area of an annulus formula • find the unknown variable using the area of an annulus formula in the context of a problem
ACMMG217 Calculate the surface area and volume of cylinders and solve related problems		
Quest: Surface area and volume of cylinders		
Learning Journey Volumes of cylinders		
1	Developing the formula for the volumes of cylinders	• develop the formula to find the volumes of cylinders by recognising the area of the 'base' of a prism as being identical to the area of its uniform cross-section and using the formula V=A base x h perpendicular • describe the volume formula of a cylinder in terms of its base area and its height
	Recognising and understanding the similarities between the volume formulas for cylinders and prisms	• recognise and understand the similarities between the volume formulas for cylinders and prisms
	Using the formula to find the volumes of cylinders	• find the volume of a right cylinder given the area of the circle cross-section and perpendicular height in the same units • find the volume of a right cylinder given the area of the circle cross-section and perpendicular height in different units
2	Finding the height or area of the circle cross-section for a right cylinder given the volume in the same units	• find the height or area of the circle cross-section for a right cylinder given the volume in the same units • find the height or area of the circle cross-section for a right cylinder given the volume in different units
3	Finding the volume of right cylinders, given their perpendicular heights and radius/diameter of their circular cross-sections all in the same units	• find the volume of right cylinders, given their perpendicular heights and radius/diameter of their circular cross sections all in the same units • find the volume of right cylinders, given their perpendicular heights and radius/diameter of their circular cross sections all in different units
4	Finding the radius, diameter or height of right cylinders, given their volume all in the same units	• find the radius, diameter or height of right cylinders, given their volume all in the same units • find the radius, diameter or height of right cylinders, given their volume all in different units
5	Solving a variety of practical problems involving the volume and capacity of right prisms and cylinders	• solve a variety of practical problems involving the volumes and capacities of right prisms and cylinders

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG217 Calculate the surface area and volume of cylinders and solve related problems		
Quest: Surface area and volume of cylinders		
Learning Journey Surface area of cylinders		
Steps	**Content**	**Detail**
1	Finding the surface area: cylinders	• find the surface area of cylinders
2	Finding the surface area of parts of cylinders	• find the surface area of parts of cylinders
3	Finding the surface area of cylinders within the context of a problem	• find the surface area of cylinders within the context of a problem
4	Finding the surface area of parts of cylinders within the context of a problem	• find the surface area of parts of cylinders within the context of a problem
ACMMG218 Solve problems involving the surface area and volume of right prisms		
Quest: Surface area and volume of right prisms		
Learning Journey Surface area of right prisms with nets		
1	Identifying nets of a three-dimensional object	• identify possible nets of a three-dimensional object
2	Constructing the net of a three-dimensional object	• construct the nets of three-dimensional object • identify each individual shape of each surface of a three-dimensional object using the net
3	Naming a right prism, given its net	• name a right prism, given its net
4	Finding the surface areas of rectangular and triangular prisms, given their net	• find the surface areas of rectangular and triangular prisms, given their net
Learning Journey Surface area problems		
1	Finding the surface area: rectangular prisms	• find the surface area of rectangular prisms
2	Finding the surface area of rectangular prisms within the context of a problem	• find the surface area of rectangular prisms within the context of a problem
3	Finding the surface area: triangular prisms (with and without Pythagoras' theorem)	• find the surface area of triangular prisms (with and without Pythagoras' theorem)
4	Finding the surface area of triangular prisms (with and without Pythagoras' theorem) within the context of a problem	• find the surface area of triangular prisms (with and without Pythagoras' theorem) within the context of a problem
Learning Journey Volumes of composite right prisms		
1	Calculating the volumes of composite right prisms with cross-sections that may be dissected into triangles and special quadrilaterals	• calculate the volumes of composite right prisms with cross-sections that may be dissected into triangles and special quadrilaterals
2	Calculating the volumes of composite right prisms with cross-sections that may be dissected into triangles and special quadrilaterals requiring the use of Pythagoras' theorem	• calculate the volumes of composite right prisms with cross-sections that may be dissected into triangles and special quadrilaterals requiring the use of Pythagoras' theorem
3	Comparing the surface areas of prisms with the same volume	• compare the surface areas of prisms with the same volume
4	Solving a variety of practical problems related to the volumes and capacities of composite right prisms with and without the use of Pythagoras' theorem	• solve a variety of practical problems related to the volumes and capacities of composite right prisms with and without the use of Pythagoras' theorem

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Using units of measurement

ACMMG219 Investigate very small and very large time scales and intervals		
Quest: Large/small amounts time, data, limits		
Learning Journey Significant figures		
Steps	**Content**	**Detail**
1	Introducing significant figures: whole numbers	• revise the value of each digit in a whole number • introduce the meaning of significant figures and relate this to whole numbers • determine how many significant figures there are in a number, no zeros present • determine how many significant figures there are in a number, where there are zeros surrounded by other digits • determine how many significant figures there are in a number, where there are zeros at the end
	Identifying what values in a number are significant	• identify what values in a number are significant, eg in the amount $10 000 000, when would you consider a change in value of one of the 0s as being a significant change to the overall amount?
	Finding the number of significant figures in numbers <1	• determine how many significant figures there are in a number, no zeros present (except before the decimal point) • determine how many significant figures there are in a number, where there are zeros surrounded by other digits • determine how many significant figures there are in a number, where there are zeros at the end after the other digits or at the start
2	Rounding significant figures and whole numbers	• round whole numbers to 1 significant figure using the appropriate rule on 5 • round whole numbers to 2 significant figures using the appropriate rule on 5 • round whole numbers to a specified number of significant figures using the appropriate rule on 5
3	Rounding significant figures and decimals >1	• revise the value of each number in a decimal >1 • determine how many significant figures there are in a number, no zeros present • determine how many significant figures there are in a number, where there are zeros surrounded by other digits • determine how many significant figures there are in a number, where there are zeros at the end
	Rounding significant figures and decimals >1 to 1 significant figure	• round decimals >1 to 1 significant figure using the appropriate rule on 5 • round decimals >1 to 2 significant figures using the appropriate rule on 5 • round decimals >1 to a specified number of significant figures using the appropriate rule on 5
4	Rounding significant figures and decimals <1 (positive)	• round decimals <1 to 1 significant figure using the appropriate rule on 5 • round decimals <1 to 2 significant figures using the appropriate rule on 5 • round decimals <1 to a specified number of significant figures using the appropriate rule on 5
	Interpreting a value when rounded to significant figures	• understand the limits between which a rounded number exists
Learning Journey Amounts of data		
1	Interpreting the meaning of prefixes for very small and very large units of measurement, such as 'nano', 'micro', 'mega', 'giga' and 'tera'	• interpret the meaning of prefixes for very small and very large units of measurement, such as 'nano', 'micro', 'mega', 'giga' and 'tera'
2	Recording measurements of digital information using correct abbreviations, eg kilobytes	• record measurements of digital information using correct abbreviations, eg kilobytes • investigate and recognise that some digital devices may use different notations to record measurements of digital information, eg 40 kB may appear as 40 K or 40 k or 40 KB
3	Converting between units of measurement of digital information, eg gigabytes to terabytes, megabytes to kilobytes	• convert between units of measurement of digital information, eg gigabytes to terabytes, megabytes to kilobytes

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Using units of measurement

ACMMG219 Investigate very small and very large time scales and intervals		
Quest: Large/small amounts time, data, limits		
Learning Journey Large and small time intervals		
Steps	**Content**	**Detail**
1	Using appropriate units of time to measure very small or very large time intervals	• use appropriate units of time to measure very small or very large time intervals
2	Converting very large and very small time intervals into different units	• convert very large and very small time intervals into different units
3	Solving problems involving the conversion of very large of very small time intervals into different units	• solve problems involving the conversion of very large of very small time intervals into different units
Learning Journey Representing large and small numbers		
1	Understanding prefixes for very large numbers	• understand prefixes for very large numbers
2	Understanding prefixes for very small numbers	• understand prefixes for very small numbers
3	Converting very large numbers written with a prefix into scientific notation and vice versa	• convert very large numbers written with a prefix into scientific notation and vice versa
4	Converting very small numbers written with a prefix into scientific notation and vice versa	• convert very small numbers written with a prefix into scientific notation and vice versa
Learning Journey Limits of accuracy		
1	Identifying the accuracy/precision of a measurement	• identify the accuracy/precision of a measurement after it has been rounded both quantitatively and qualitatively
2	Interpreting limits of accuracy	• apply and interpret limits of accuracy when rounding or truncating (including upper and lower bounds)

Geometric reasoning

ACMMG220 Use the enlargement transformation to explain similarity and develop the conditions for triangles to be similar		
Quest: Similar triangles		
Learning Journey Introducing similarity		
Steps	**Content**	**Detail**
1	Introducing similarity	• introduce the definition of similarity • introduce the symbol for similarity
	Identifying that the ratio of corresponding sides of similar shapes are proportional, including its shape and dilation	• identify the ratio in which a shape has been dilated
2	Identifying similar triangles, with coordinate grids	• identify which of a set of given triangles are similar with coordinate grids
3	Identifying similar triangles without coordinate grids	• identify which of a set of given triangles are similar without coordinate grids

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Geometric reasoning

ACMMG220 Use the enlargement transformation to explain similarity and develop the conditions for triangles to be similar		
Quest: Similar triangles		
Learning Journey Introducing similarity		
Steps	**Content**	**Detail**
4	Constructing similar triangles by enlargement	• construct and label a similar triangle to a given triangle and scaling constant by enlarging the triangle • construct and label a similar triangle to a given triangle and scaling constant by reducing the triangle
5	Using scale to analyse similar triangles	• find the missing side on a triangle given its similar figure and scale factor • find the missing angle on a triangle given its similar figure and scale factor
Learning Journey Similar triangles		
1	Understanding the importance of enlargement transformations in reasoning and proofs	• use enlargement transformations to establish and explain similarity • understand that similarity and congruence help describe relationships between geometric shapes and are important elements of reasoning and proofs
	Investigating the minimum conditions needed, and establishing the 4 tests, for 2 triangles to be similar	• investigate the minimum conditions needed, and establish the 4 tests, for 2 triangles to be similar
	Establishing and using the 4 tests for 2 triangles to be similar: if the 3 sides of a triangle are proportional to the 3 sides of another triangle, then the 2 triangles are similar	• establish and use the 4 tests for 2 triangles to be similar: if the 3 sides of a triangle are proportional to the 3 sides of another triangle, then the 2 triangles are similar
2	Establishing and using the 4 tests for 2 triangles to be similar: if 2 sides of a triangle are proportional to 2 sides of another triangle, and the included angles are equal, then the 2 triangles are similar	• establish and use the 4 tests for 2 triangles to be similar: if 2 sides of a triangle are proportional to 2 sides of another triangle, and the included angles are equal, then the 2 triangles are similar
3	Establishing and using the 4 tests for 4 triangles to be similar: if 4 angles of a triangle are equal to 4 angles of another triangle, then the 4 triangles are similar	• establish and use the 4 tests for 2 triangles to be similar: if 2 angles of a triangle are equal to 2 angles of another triangle, then the 2 triangles are similar
4	Establishing and using the 4 tests for 2 triangles to be similar: if the hypotenuse and a second side of a right-angled triangle are proportional to the hypotenuse and a second side of another right-angled triangle, then the 2 triangles are similar	• establish and use the 4 tests, for 2 triangles to be similar: if the hypotenuse and a second side of a right-angled triangle are proportional to the hypotenuse and a second side of another right-angled triangle, then the 2 triangles are similar

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Geometric reasoning

ACMMG221 Solve problems using ratio and scale factors in similar figures		
Quest: Scale factors with similar figures		
Learning Journey Scale factors		
Steps	**Content**	**Detail**
1	Using scale to analyse similar triangles	• find the missing side on a triangle given its similar figure and scale factor • find the missing angle on a triangle given its similar figure and scale factor
2	Finding the missing side on a shape given its similar figure and scale factor	• find the missing side on a shape given its similar figure and scale factor • find the missing angle on a shape given its similar figure and scale factor
3	Applying the scale factor to find unknown lengths in similar figures in a variety of practical situations	• apply the scale factor to find unknown lengths in similar figures in a variety of practical situations
4	Calculating the scale factor between an object and its image and vice versa involving similar 2D shapes	• calculate the scale factor between an object and its image and vice versa involving similar 2D shapes
	Calculating the scale factor between an object and its image and vice versa involving similar figures in a variety of practical situations	• calculate the scale factor between an object and its image and vice versa involving similar figures in a variety of practical situations
	Using scales on maps and diagrams to solve practical problems	• use scales on maps and diagrams to solve practical problems
5	Constructing scale drawings given an object and the scale factor	• construct scale drawings given an object and the scale factor
Learning Journey Area and volume scale factors		
1	Establishing the relationship between linear and area scale factors (ratio)	• investigate varying the dimensions on a shape (l and w) and its effect on the area • compare the areas of similar shapes, where the original shape has been enlarged by a given scale factor • investigate the relationship between the areas of similar shapes and the scale factor of the similar shapes • establish the relationship between the areas of similar figures and the ratio of corresponding sides (scale factor), ie for scale factor k, the effect on area is to multiply the original area by k^2 • understand and use the connection between the linear scale factor and the area scale factor to calculate the area of the enlarged shape, given the area of the original shape and the scale factor • understand and use the connection between the linear scale factor and the area scale factor to calculate the length of a missing side when the area and the related side length are known
2	Solving problems in similar figures using area ratios	• solve problems in similar figures using the knowledge of the ratio of corresponding sides and their areas

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Geometric reasoning

ACMMG221 Solve problems using ratio and scale factors in similar figures		
Quest: Scale factors with similar figures		
Learning Journey Area and volume scale factors		
Steps	**Content**	**Detail**
3	Establishing the relationship between linear and volume scale factors (ratio)	• investigate varying the dimensions on a shape (l and w) and its effect on the volume • compare the volumes of similar shapes, where the original shape has been enlarged by a given scale factor • investigate the relationship between the volumes of similar shapes and the scale factor of the similar shapes • establish the relationship between the volumes of similar figures and the ratio of corresponding sides (scale factor) ie for scale factor k, the effect on volume is to multiply the original volume by k^3 • understand and use the connection between the linear scale factor and the volume scale factor to calculate the volume of the enlarged shape, given the volume of the original shape and the scale factor • understand and use the connection between the linear scale factor and the volume scale factor to calculate the length of a missing side when the volume and the related side length are known
4	Solving problems in similar figures using volume ratios	• solve problems in similar figures using the knowledge of the ratio of corresponding sides and their volumes

Pythagoras and trigonometry

ACMMG222 Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles		
Quest: Pythagoras' Theorem		
Learning Journey Identifying sides on right-angled triangles		
Steps	**Content**	**Detail**
1	Identifying the hypotenuse as the longest side in any right-angled triangle and also as the side opposite the right angle	• identify the hypotenuse as the longest side in any right-angled triangle and also as the side opposite the right angle • describe how to identify the hypotenuse in a right-angled triangle using either the fact that it is the longest side or the side opposite the right angle
2	Identifying and labelling sides of a right-angled triangle without any angle measures given	• identify and label the hypotenuse and the 2 shorter sides of a right-angled triangle • label the hypotenuse c and the shorter sides a and b in a right-angled triangle • label the hypotenuse c and the shorter sides a and b in a right-angled triangle within a given context
Learning Journey Exploring the sides of a right-angled triangle		
1	Investigating and describing the relationship between the lengths of the sides of any right-angle triangle	• investigate the relationship between the lengths of the sides of any right-angle triangle in practical ways and using digital technologies • describe the relationship between the lengths of the sides of any right-angle triangle
2	Exploring the relationship between the lengths of the sides of a right-angled triangle in practical ways including with the use of digital technologies	• explore the relationship between the lengths of the sides of a right-angled triangle in practical ways including with the use of digital technologies

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Pythagoras and trigonometry

ACMMG222 Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles		
Quest: Pythagoras' Theorem		
Learning Journey Finding a shorter side using Pythagoras' Theorem		
Steps	**Content**	**Detail**
1	Establishing the relationship between the sides of a right-angled triangle formally and identifying that this is Pythagoras' theorem: c2 = a2 + b2	• establish the relationship between the sides of a right-angled triangle formally and identifying that this is Pythagoras' theorem: c2 = a2 + b2
	Finding the length of an unknown side (shorter sides only) using Pythagoras' theorem	• find the length of an unknown side (shorter sides only) using Pythagoras' theorem
2	Finding the length of an unknown side (shorter sides only) using Pythagoras' theorem rounding answers	• find the length of an unknown side (shorter sides only) using Pythagoras' theorem rounding answers
3	Finding the length of an unknown side (shorter sides only) using Pythagoras' theorem in a variety of practical problems within a given context with and without diagrams given	• find the length of an unknown side (shorter sides only) using Pythagoras' theorem in a variety of practical problems within a given context with and without diagrams given
Learning Journey Finding the hypotenuse using Pythagoras' Theorem		
1	Finding the length of an unknown side (hypotenuse only) using Pythagoras' theorem	• find the length of an unknown side (hypotenuse only) using Pythagoras' theorem
2	Finding the length of an unknown side (hypotenuse only) using Pythagoras' theorem rounding answers	• find the length of an unknown side (hypotenuse only) using Pythagoras' theorem rounding answers
3	Finding the length of an unknown side (hypotenuse only) using Pythagoras' theorem in a variety of practical problems within a given context with and without diagrams given	• find the length of an unknown side (hypotenuse only) using Pythagoras' theorem in a variety of practical problems within a given context with and without diagrams given
Learning Journey Solving problems involving Pythagoras' Theorem		
1	Finding the length of an unknown side (shorter side and hypotenuse) using Pythagoras' theorem	• find the length of an unknown side (shorter side and hypotenuse) using Pythagoras' theorem
	Finding the length of an unknown side (shorter side and hypotenuse) using Pythagoras' theorem rounding answers	• find the length of an unknown side (shorter side and hypotenuse) using Pythagoras' theorem rounding answers
2	Finding the length of an unknown side (shorter side and hypotenuse) using Pythagoras' theorem in a variety of practical problems within a given context with and without diagrams given	• find the length of an unknown side (shorter side and hypotenuse) using Pythagoras' theorem in a variety of practical problems within a given context with and without diagrams given
	Interpreting the information within a word question to draw a right-angled triangle diagram for the given context, showing all information	• interpret the information within a word question to draw a right-angled triangle diagram for the given context, showing all information

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Pythagoras and trigonometry

ACMMG222 Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles		
Quest: Pythagoras' Theorem		
Learning Journey Solving problems involving Pythagoras' Theorem		
Steps	**Content**	**Detail**
3	Solving a variety of practical problems involving Pythagoras' theorem within given contexts involving finding missing sides and calculating perimeters with and without diagrams given	• solve a variety of practical problems within given contexts involving finding missing sides • solve a variety of practical problems within given contexts involving finding missing sides • solve a variety of practical problems within given contexts involving calculating perimeters • solve a variety of practical problems within given contexts including when sides have different units
4	Solving a variety of problems involving unknown lengths in two-dimensional shapes that contain right-angled triangles within them	• solve a variety of problems involving unknown lengths in two-dimensional shapes that contain right-angled triangles within them
Learning Journey Exploring Pythagorean Triads		
1	Identifying a Pythagorean triad as a set of 3 numbers that satisfy Pythagoras' theorem	• identify a Pythagorean triad as a set of 3 numbers that satisfy Pythagoras' theorem • establish new Pythagorean triads by starting with another • identify that when each term of a Pythagorean triad is multiplied/divided by a constant, the resultant 3 figures also form a Pythagorean triad
Learning Journey Using the Converse of Pythagoras' Theorem		
1	Using the converse of Pythagoras' theorem to solve problems	• use the converse of Pythagoras' theorem to establish whether a triangle is a right-angled triangle
Learning Journey Solving Pythagoras' Theorem problems: exact values		
1	Finding the length of an unknown side (shorter sides only) using Pythagoras' theorem leaving answers in surd form (exact form)	• find the length of an unknown side (shorter sides only) using Pythagoras' theorem leaving answers in surd form (exact form)
2	Finding the length of an unknown side (hypotenuse only) using Pythagoras' theorem leaving answers in surd form (exact form)	• find the length of an unknown side (hypotenuse only) using Pythagoras' theorem leaving answers in surd form (exact form)
3	Finding the length of an unknown side (shorter side and hypotenuse) using Pythagoras' theorem leaving answers in surd form (exact form)	• find the length of an unknown side (shorter side and hypotenuse) using Pythagoras' theorem leaving answers in surd form (exact form)
4	Finding the length of an unknown side (shorter side and hypotenuse) using Pythagoras' theorem in a variety of practical problems within a given context with and without diagrams given, with answers given in surd form	• find the length of an unknown side (shorter side and hypotenuse) using Pythagoras' theorem in a variety of practical problems within a given context with and without diagrams given, with answers given in surd form

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Pythagoras and trigonometry

ACMMG223 Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles		
Quest: Introducing trigonometry		
Learning Journey Introducing trigonometry		
Steps	**Content**	**Detail**
1	Identifying and labelling parts of a right-angled triangle with reference to a given angle	• identify the location of the opposite, adjacent and hypotenuse in right-angled triangles of different orientation • assign and label the hypotenuse in right-angled triangles with different orientations • label 2 non-hypotenuse sides of a right-angled triangle 'opposite' and 'adjacent' with respect to a given angle
	Labelling and assigning sides and their corresponding angles in triangles	• identify sides in relation to angles in any triangle, eg side c is opposite angle C • label sides in relation to angles in any triangle, eg side c is opposite angle C
	Exploring the relationship between 2 sides as an assigned angle changes in size from 0 to 90 degrees in a right-angled triangle	• explore the relationship between each set of 2 sides with respect to the given angle and describe the relationship, eg as angle increases, the ratio of the opposite side to the hypotenuse approaches 1 • explore the relationship between each set of 2 sides with respect to the given angle and describes the relationship, eg as angle increases, the ratio of the adjacent side to the hypotenuse approaches 0 • explore the relationship between each set of 2 sides with respect to the given angle and describes the relationship, eg as angle increases, the ratio of the opposite side to the adjacent approaches infinity • explore all 3 combinations of sides using dynamic geometrical software • describe the relationship between 2 sides as an assigned angle changes in size in right-angled triangles • describe how the size of the angle changes as each ratio of 2 sides is changed
2	Establishing the sine trigonometric relationship on right-angled triangles	• establish the relationship of the opposite side to the hypotenuse with respect to a given angle as the sine of that angle • define sine ratio using correct language and notation including abbreviations, eg sine x = opposite/hypotenuse | sin x = opp/hyp
	Establishing the cosine trigonometric relationship on right-angled triangles	• establish the relationship of the adjacent side to the hypotenuse with respect to a given angle as the cosine of that angle. • define cosine ratio using correct language and notation including abbreviations, eg cosine x = adjacent/hypotenuse | cos x = adj/hyp
	Establishing the tangent trigonometric relationship on right-angled triangles	• establish the relationship of the opposite side to the adjacent with respect to a given angle as the tangent of that angle • define tangent ratio using correct language and notation including abbreviations, eg tangent x = opposite/adjacent | tan x = opp/adj
3	Determining which 2 sides each trigonometric ratio applies with reference to a given angle	• determine which 2 sides of a right-angled triangle each trigonometric ratio applies to • determine which 2 sides of a right-angled triangle each trigonometric ratio applies to using SOHCAHTOA acronym • select correct trigonometric ratio on triangles of different orientation
4	Attaining the 3 primary trigonometric ratios on simple right-angled triangles with respect to a given angle	• attain the sine ratio in a right-angled triangle of different orientations with respect to each acute angle in the triangle. Sides are either values or pronumerals • attain the cosine ratio in a right-angled triangle of different orientations with respect to each acute angle in the triangle. Sides are either values or pronumerals • attain the tangent ratio in a right-angled triangle of different orientations with respect to each acute angle in the triangle. Sides are either values or pronumerals
	Investigating the constancy of the 3 primary trigonometric ratios for a given angle in right-angled triangles using similar triangles	• investigate the constancy of the sine ratio for a given angle in right-angled triangles using similar triangles. Traditional methods and digital software to be implemented • investigate the constancy of the cosine ratio for a given angle in right-angled triangles using similar triangles. Traditional methods and digital software to be implemented • investigate the constancy of the tangent ratio for a given angle in right-angled triangles using similar triangles. Traditional methods and digital software to be implemented

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry

Pythagoras and trigonometry

ACMMG223 Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles		
Quest: Introducing trigonometry		
Learning Journey Introducing trigonometry		
Steps	**Content**	**Detail**
5	Identifying which trigonometric ratio to use given 2 sides and an angle in a right-angled triangle	• identify that the sine ratio is relevant when given the opposite and hypotenuse sides with respect to a given angle • identify that the cosine ratio is relevant when given the adjacent and hypotenuse sides with respect to a given angle • identify that the tangent ratio is relevant when given the opposite and adjacent sides with respect to a given angle
Learning Journey Calculating trigonometric ratios and angles		
1	Calculating the approximation of trigonometric ratios for a given angle measured in degrees using the calculator	• calculate the approximate value of the sine ratio for a given angle measured in whole degrees on right-angled triangles with different orientation using the calculator, eg sin 30°= 0.5 • calculate the approximate value of the cosine ratio for a given angle measured in whole degrees on right-angled triangles with different orientation using the calculator, eg cos 60°= 0.5 • calculate the approximate value of the tangent ratio for a given angle measured in whole degrees on right-angled triangles with different orientation using the calculator, eg tan 45°=1 • calculate the approximate value of each of the 3 trigonometric ratios for a given angle measured in degrees on right-angled triangles with different orientation using the calculator, rounding to a specified number of decimal places or significant figures
2	Calculating the approximation of trigonometric ratios for a given angle measured in degrees, minutes and seconds using the calculator	• calculate the approximate value of each of the 3 trigonometric ratios for a given angle measured in degrees, minutes and seconds on right-angled triangles with different orientation using the calculator, eg sin 32°43'15 = 0.54...
3	Using a calculator to find an angle correct to the nearest degree, given one of the trigonometric ratios for the angle	• use a calculator to find an angle correct to the nearest degree, given one of the trigonometric ratios for the angle
ACMMG224 Apply trigonometry to solve right-angled triangle problems		
Quest: Applying trigonometry		
Learning Journey Finding the missing side using trig ratios		
1	Using trigonometric ratios to find the length of the missing numerator side on a right angled triangles	• use the tangent ratio to calculate the length of the 'opposite' side given the respective angle and adjacent side in a right-angled triangle • use the sine ratio to calculate the length of the 'opposite' side given the respective angle and hypotenuse in a right-angled triangle • use the cosine ratio to calculate the length of the 'adjacent' side given the respective angle and hypotenuse in a right-angled triangle
2	Selecting the correct ratio in order to calculate the missing numerator side given an angle in a right-angled triangle with different orientations	• select the correct ratio in order to calculate the missing numerator side given an angle in a right-angled triangle with different orientations
3	Using trigonometric ratios to find the length of the missing denominator side on a right-angled triangles	• use the tangent ratio to calculate the length of the 'adjacent' side given the respective angle and opposite side in a right-angled triangle • use the sine ratio to calculate the length of the 'hypotenuse' side given the respective angle and opposite side in a right-angled triangle • use the cosine ratio to calculate the length of the 'hypotenuse' side given the respective angle and adjacent side in a right-angled triangle

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Pythagoras and trigonometry

ACMMG224 Apply trigonometry to solve right-angled triangle problems		
Quest: Applying trigonometry		
Learning Journey Finding the missing side using trig ratios		
Steps	**Content**	**Detail**
4	Selecting the correct ratio in order to calculate any missing denominator given an angle in a right-angled triangle with different orientations	• select the correct ratio in order to calculate any missing denominator given an angle in a right-angled triangle with different orientations
5	Solving more complex problems involving finding the missing side on a right-angled triangle	• solve a range of more complex right-angled triangle problems that involve finding the missing side given 1 angle with diagrams included • solve a range of more complex worded right-angled triangle problems that involve finding the missing side given 1 angle without diagrams included • solve a range of more complex problems involving 1 or more than 1 right-angled triangle where side lengths needs to be found. Include examples in context using metric units, eg shadows, reflections, scale models, surveying, navigation, inaccessible objects around the school (using a clinometer)
Learning Journey Finding the missing angle using trig ratios		
1	Introducing inverse trigonometric ratios as undoing the original function of the trigonometric ratio	• introduce inverse trigonometric ratios as the operator that does the opposite (or undoes) the original function of the trigonometric ratio • use inverse trigonometric functions to find an angle, given the ratio eg if sin C = 1/2, find the size of angle C C = sin-1(1/2) C = 30°
2	Using trigonometric ratios to find the size of a missing angle on a right-angled triangle	• use the inverse tangent ratio to find the size of a missing angle given the respective opposite and adjacent sides in right-angled triangles of different orientations • use the inverse sine ratio to find the size of a missing angle given the respective opposite and adjacent sides in right-angled triangles of different orientations • use the inverse cosine ratio to find the size of a missing angle given the respective opposite and adjacent sides in right-angled triangles of different orientations
3	Selecting the correct inverse ratio in order to calculate any missing angle given 2 or more sides in a right-angled triangle with different orientations	• select the correct inverse ratio in order to calculate any missing angle given 2 or more sides in a right-angled triangle with different orientations
4	Solving more complex problems involving finding the missing angle on a right-angled triangle	• solve a range of more complex right-angled triangle problems that involve finding the missing angle with diagrams included • solve a range of more complex worded right-angled triangle problems that involve finding the missing angle without diagrams included • solve a range of more complex problems involving 1 or more than 1 right-angled triangle where angle needs to be found. Include examples in context using metric units, eg shadows, reflections, scale models, surveying, navigation, inaccessible objects around the school (using a clinometer)

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Measurement and Geometry

Pythagoras and trigonometry

ACMMG224 Apply trigonometry to solve right-angled triangle problems		
Quest: Applying trigonometry		
Learning Journey Solving 2D and 3D problems using trig ratios		
Steps	**Content**	**Detail**
1	Solving various right-angled triangle problems involving two-dimensional problems	• represent word problems with a sketch with all important details • solve various two-dimensional problems involving right-angled triangles of different orientation, with or without a diagram. Sides and/or angles • develop an awareness of the use of trigonometry to solve problems in context • discuss when trigonometric ratios should be used versus when Pythagoras' theorem should be used • solve problems with points described using coordinates
2	Solving various right-angled triangle problems involving three-dimensional problems	• use the trigonometric ratios to calculate the lengths of edges and diagonals in rectangular prisms. Pythagoras can also be used in this context. Solve problems when the diagram is provided • solve various authentic three-dimensional problems involving right-angled triangles of different orientation, with or without a diagram

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Mathletics

Statistics and Probability

Chance

ACMSP225 List all outcomes for two-step chance experiments, both with and without replacement using tree diagrams or arrays. Assign probabilities to outcomes and determine probabilities for events		
Quest: List outcomes and find probabilities		
Learning Journey The fundamental counting principle		
Steps	**Content**	**Detail**
1	Understanding the fundamental counting principle	• understand the fundamental counting principle
2	Solving problems involving the fundamental counting principle	• solve problems involving the fundamental counting principle
Learning Journey Two-step chance experiments with replacement		
1	Listing all outcomes for 2-step chance experiments, with replacement and assign probabilities to outcomes	• list all outcomes for 2-step chance experiments, with replacement and assign probabilities to outcomes
2	Determining probabilities for events for 2-step chance experiments with replacement	• determine probabilities for events for 2-step chance experiments with replacement
3	Calculating probabilities of simple and compound events in 2-step chance experiments, with replacement	• calculate probabilities of simple and compound events in 2-step chance experiments, with replacement
Learning Journey Two-step chance experiments without replacement		
1	Listing all outcomes for 2-step chance experiments, without replacement and assign probabilities to outcomes	• list all outcomes for 2-step chance experiments, without replacement and assign probabilities to outcomes
2	Determining probabilities for events for 2-step chance experiments without replacement	• determine probabilities for events for 2-step chance experiments without replacement
3	Calculating probabilities of simple and compound events in 2-step chance experiments without replacement	• calculate probabilities of simple and compound events in 2-step chance experiments without replacement
ACMSP226 Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or'		
Quest: Calculating and using relative frequency		
Learning Journey Calculating and using relative frequency		
1	Identifying theoretical probabilities as being the likelihood of outcomes occurring under ideal circumstances	• identify theoretical probabilities as being the likelihood of outcomes occurring under ideal circumstances
	Predicting future relative outcomes using relative frequency	• predict future relative outcomes using relative frequency
2	Calculating probabilities of events, including events involving 'and', 'or' and 'not', from data contained in Venn diagrams representing 2 or 3 attributes	• calculate probabilities of events, including events involving 'and', 'or' and 'not', from data contained in Venn diagrams representing two or three attributes

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Statistics and Probability

Chance

ACMSP226 Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or'		
Quest: Calculating and using relative frequency		
Learning Journey Calculating and using relative frequency		
Steps	**Content**	**Detail**
3	Designing a device to produce a specified relative frequency	• design a device to produce a specified relative frequency
	Comparing relative frequency with probability and explaining possible differences	• compare relative frequency with probability and explain possible differences
	Calculating probabilities of events, including events involving 'and', 'or' and 'not', from data contained in two-way tables	• calculate probabilities of events, including events involving 'and', 'or' and 'not', from data contained in two-way tables
ACMSP227 Investigate reports of surveys in digital media and elsewhere for information on how data were obtained to estimate population means and medians		
Quest: Making population predictions from data		
Learning Journey Using data to make predictions about populations		
1	Describing bias that may exist due to the way in which the data was obtained	• describe bias that may exist due to the way in which the data was obtained
	Making predictions from a sample that may apply to the whole population	• make predictions from a sample that may apply to the whole population • consider the size of the sample when making predictions about the population
2	Investigating the appropriateness of sampling methods and sample size used in reports where statements about a population are based on a sample	• investigate the appropriateness of sampling methods and sample size used in reports where statements about a population are based on a sample

Data representation and interpretation

ACMSP228 Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly and from secondary sources		
Quest: Collecting everyday data		
Learning Journey Collecting everyday data		
Steps	**Content**	**Detail**
1	Identifying everyday questions and issues involving at least 1 numerical and at least 1 categorical-variable	• identify everyday questions and issues involving at least 1numerical and at least 1categorical-variable
2	Investigating relevant issues involving at least 1 numerical and at least 1 categorical variable using information gained from secondary sources	• investigate relevant issues involving at least 1 numerical and at least 1 categorical variable using information gained from secondary sources

Australian Curriculum Year 9

Understanding Practice and Fluency (UPF)

Statistics and Probability

Data representation and interpretation

ACMSP282 Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including 'skewed', 'symmetric' and 'bi modal'		
Quest: Construct & interpret data displays		
Learning Journey Constructing and interpreting data displays		
Steps	**Content**	**Detail**
1	Constructing frequency histograms and polygons from a frequency distribution table	• construct frequency histograms and polygons from a frequency distribution table
2	Constructing back-to-back stem-and-leaf plots to display and compare 2 like sets of numerical-data	• construct back-to-back stem-and-leaf plots to display and compare 2 like sets of numerical-data • construct back-to-back stem-and-leaf plots with decimal values to display and compare 2 like sets of numerical-data
3	Describing the shape of data displayed in stem-and-leaf plots, dot plots and histograms	• describe the shape of data displayed in stem-and-leaf plots, dot plots and histograms • describe the shape of data displayed in stem-and-leaf plots, dot plots and histograms • describe the shape of data displayed in stem-and-leaf plots, dot plots and histograms • suggest possible reasons why the distribution of a set of data may be symmetric, skewed or bi-modal
ACMSP283 Compare data displays using mean, median and range to describe and interpret numerical data sets in terms of location (centre) and spread		
Quest: Comparing data displays		
Learning Journey Comparing data displays		
1	Calculating and comparing means, medians and ranges of 2 sets of numerical data displayed in back-to-back stem-and-leaf plots	• calculate and compare means, medians and ranges of 2 sets of numerical data displayed in back-to-back stem-and-leaf plots • make comparisons between 2 like sets of data by referring to the mean, median and/or range for data displayed in back-to-back stem-and-leaf plots
2	Calculating and comparing means, medians and ranges of 2 sets of numerical data displayed in parallel dot plots	• calculate and compare means, medians and ranges of 2 sets of numerical data displayed in parallel dot plots • make comparisons between 2 like sets of data by referring to the mean, median and/or range for data displayed in parallel dot plots
3	Calculating and comparing means, medians and ranges of 2 sets of numerical data displayed in histograms	• calculate and compare means, medians and ranges of 2 sets of numerical data displayed in histograms • make comparisons between 2 like sets of data by referring to the mean, median and/or range for data displayed in histograms

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Money and financial mathematics

ACMNA229 Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies		
Quest: Compound & simple interest		
Learning Journey Compound interest		
Steps	**Content**	**Detail**
1	Investigating interest rates	• investigate and research interest rates within a given context
	Understanding the financial term compound interest	• understand compound interest and how it works in real life
	Calculating compound interest without using a formula; calculations based on simple interest (using appropriate digital technology)	• calculate compound interest based on using repeated calculations of simple interest, for up to 3 years • connect compound interest to repeated applications of simple interest calculations using a calculator
2	Establishing and calculating compound interest using a formula in the form $A = P(1 + R)^n$	• establish the formula to find compound interest, $A = P(1 + R)^n$, where A is the total amount, P is the principal, R is the rate per compounding period as a decimal and n is the number of compounding periods
3	Solving problems involving the compound interest formula finding the variables other than A	• solve problems involving the compound interest formula finding the variables other than A • calculate the interest earned on a sum of money, given the amount, the interest rate and the number of years invested using $I = A – P$
4	Solving problems involving compound interest, determining the time period required to achieve a particular total amount invested	• solve problems involving compound interest, by calculating the principal or interest rate needed to obtain a particular total amount for a compound interest investment • use a "given and check" strategy to determine the number of time periods required to obtain a particular total amount for a compound interest investment
	Solving problems involving compound interest, determining the amount of money to be invested in order to achieve a particular total amount invested after a given number of time periods with a given interest rate	• solve problems involving compound interest, determining the amount of money to be invested in order to achieve a particular total amount invested after a given number of time periods with a given interest rate
5	Calculating and comparing investments for different compounding periods	• calculate and compare investments where the interest is applied at different times, eg applied monthly or annually • identify that interest can be compounded at different time intervals (daily, weekly, fortnightly, monthly and annually) • adjust the given compounding interest rate to the rate per compounding period
Learning Journey Comparing simple and compound interest		
1	Comparing simple and compound interest situations	• compare simple and compound interest from calculations in practical situations, eg to determine the most beneficial investment or loan • compare simple and compound interest on investments over various time periods using tables, graphs or spreadsheets
	Using spreadsheets to graph and compare investments	• use a spreadsheet to graph the value of an investment of a particular amount at various compound interest rates over time
2	Comparing investments made in compound or simple interest	• compare the total amounts obtained for a particular investment when the interest is calculated as compound interest and as simple interest

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Money and financial mathematics

ACMNA229 Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies		
Quest: Compound & simple interest		
Learning Journey Appreciation and depreciation		
Steps	**Content**	**Detail**
1	Understanding the financial terms 'appreciation' and 'depreciation'	• understand the financial terms 'appreciation' and 'depreciation' • understand factors that impact appreciation and depreciation
	Understanding and calculating appreciation	• understand what appreciation is, and the types of items which appreciate in value • calculate the value of items which have appreciated, using the repeated calculation simple interest form
2	Calculating to find appreciation, based on using the compound interest formula	• use the compound interest formula to calculate appreciation on certain items
3	Understanding and calculating depreciation	• understand what depreciation is, and the types of items which depreciate in value • calculate the value of items which have depreciated, using the repeated calculation simple interest form • calculate the simple rate of depreciation on an item, given the time period of the depreciation and the value of the item after that time period • calculate how long it will take for an item to depreciate to a certain amount, given the initial value and the simple rate of depreciation • calculate the amount by which an item has depreciated by, given the initial value, the depreciation rate and the number of depreciating periods using D = P – A
4	Calculating to find depreciation, based on using the compound interest formula	• apply the compound interest formula to calculate depreciation • solve problems finding all the different variables in the compound interest formula for depreciation
5	Solving problems involving appreciation and depreciation	• solve problems involving appreciation and depreciation

Patterns and algebra

ACMNA230 Factorise algebraic expressions by taking out a common algebraic factor		
Quest: Factorising algebraic expressions		
Learning Journey Factorising		
Steps	**Content**	**Detail**
1	Factorising algebraic expressions by identifying only algebraic factors	• factorise algebraic expressions by finding a common algebraic factor and bringing it out the front of the brackets with its product inside the brackets • check factorisations by performing the reverse process (applying the distributive property)
2	Factorising algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with one pronumeral and the power of the pronumeral is 1	• factorise algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with one pronumeral and the power of the pronumeral is 1
3	Factorising algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with one pronumeral and the power of the pronumeral is an integer greater or equal to 1.	• factorise algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with one pronumeral and the power of the pronumeral is an integer greater or equal to 1.

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Patterns and algebra

ACMNA230 Factorise algebraic expressions by taking out a common algebraic factor		
Quest: Factorising algebraic expressions		
Learning Journey Factorising		
Steps	**Content**	**Detail**
4	Factorising algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with multiple pronumerals and the power of the pronumerals is an integer greater or equal to 1.	• factorise algebraic expressions by taking out a common algebraic factor where the highest common factor is a term with multiple pronumerals and the power of the pronumerals is an integer greater or equal to 1.
5	Recognising that expressions such as $24x^2y + 16xy^2 = 4xy(6x + 4y)$ may represent 'partial factorisation' and that further factorisation is necessary to 'factorise fully'	• recognise that expressions such as $24x^2y + 16xy^2 = 4xy(6x + 4y)$ may represent 'partial factorisation' and that further factorisation is necessary to 'factorise fully' • fully factorise expressions that have only been partially factorised
ACMNA231 Simplify algebraic products and quotients using index laws		
Quest: Index laws		
Learning Journey Indices: Multiplication		
1	Applying index laws further: multiplication with integer indices (positive and negative indices)	• apply the index law for multiplying expressions with the same numerical base and integer indices (introducing negative indices) • apply the index law to simplify the multiplication of 2 or more terms with numerical bases and integer indices, leaving solutions in index form • apply the index law to simplify the multiplication of 2 or more terms with numerical bases and integer indices, evaluating the solution with and without a calculator
2	Developing the index law for multiplying expressions with the same algebraic base and positive-integer indices	• develop the index law for multiplying expressions with the same algebraic base and positive-integer indices
	Applying index laws further: multiplication with integer indices (algebraic bases)	• apply the index law for multiplying expressions with the same algebraic base and integer indices • apply the index law to simplify the multiplication of 2 or more terms with algebraic bases and integer indices, leaving solutions in index form
Learning Journey Indices: Division		
1	Applying index laws further: division with integer indices (positive and negative indices)	• apply the index law to simplify the division of 2 or more terms with numerical bases and integer indices (introducing negative indices) • apply the index law to simplify the division of 2 or more terms with numerical bases and integer indices, leaving solutions in index form • apply the index law to simplify the division of two or more terms with numerical bases and integer indices, evaluating the solution with and without a calculator
2	Developing the index law for dividing expressions with the same algebraic base and positive-integer indices	• develop the index law for dividing expressions with the same algebraic base and positive-integer indices
	Applying index laws further: division with integer indices (algebraic bases)	• apply the index law for dividing expressions with the same algebraic base and integer indices • apply the index law to simplify the division of 2 or more terms with algebraic bases and integer indices, leaving solutions in index form

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Number and Algebra (AC10)

Patterns and algebra

ACMNA231 Simplify algebraic products and quotients using index laws		
Quest: Index laws		
Learning Journey Indices: Power of a power		
Steps	**Content**	**Detail**
1	Applying index laws further: power of a power with integer indices (positive whole number bases)	• apply the index law for raising an expression in index form to another index (positive numerical bases, positive and negative integer indices) • apply the index law to simplify expressions involving raising a term written in index form to another index, leaving solutions in index form (positive numerical bases, integer indices) • apply the index law to simplify expressions involving raising a term written in index form to another index, evaluating the solution with and without a calculator (positive numerical bases, integer indices)
2	Developing the index law for raising an expression in index form to another index (algebraic bases, positive-integer indices)	• develop the index law for raising an expression in index form to another index (algebraic bases, positive-integer indices)
	Applying index laws further: power of a power with integer indices (algebraic bases)	• apply the index law for raising an expression in index form to another index (algebraic bases and integer indices) • apply the index law to simplify expressions involving raising a term written in index form to another index, leaving solutions in index form (algebraic bases and integer indices)
Learning Journey Indices: zero index		
1	Applying index laws further: zero index (positive and negative whole number bases)	• apply the meaning of the zero index for expressions with positive and negative numerical bases • apply the zero index to simplify expressions involving the zero index and integer numerical bases
2	Deriving the zero index law (algebraic bases)	• derive the zero index law by using the division law of indices to show why anything to the power of 0 = 1 • understand the meaning of the zero index for expressions with algebraic bases
	Applying index laws further: zero index (algebraic bases)	• apply index laws: zero index (algebraic bases) • apply the zero index to simplify expressions involving the zero index and algebraic bases
Learning Journey Indices: Mixed basic operations with coefficient =1		
1	Applying index laws further: mixed index laws (integer bases)	• select the necessary index law(s) and apply them to simplify expressions of 2 or more terms involving indices with numerical bases and the operations of multiplication, division, power of a power, and the zero index
2	Applying index laws further: mixed index laws (algebraic bases)	• select the necessary index law(s) and apply them to simplify expressions of 2 or more terms involving indices with algebraic bases and the operations of multiplication, division, power of a power, and the zero index. Expressions to include positive and negative integers
Learning Journey Indices: Mixed basic operations with coefficient >1		
1	Simplifying expressions that involve the product of simple algebraic terms containing positive-integer indices with integer coefficients >=1	• simplify expressions that involve the product of simple algebraic terms containing positive-integer indices with integer coefficients >=1
2	Simplifying expressions that involve the quotient of simple algebraic terms containing positive-integer indices with integer coefficients >=1	• simplify expressions that involve the quotient of simple algebraic terms containing positive-integer indices with integer coefficients >=1

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Patterns and algebra

ACMNA231 Simplify algebraic products and quotients using index laws		
Quest: Index laws		
Learning Journey Indices: Mixed basic operations with coefficient >1		
Steps	**Content**	**Detail**
3	Simplifying expressions that involve the raising a power to a power involving simple algebraic terms containing positive-integer indices with integer coefficients >=1	• simplify expressions that involve the raising a power to a power involving simple algebraic terms containing positive-integer indices with integer coefficients >=1
4	Comparing expressions such as $3a^2 \times 5a$ and $3a^2 + 5a$ by substituting values for a	• compare expressions such as $3a^2 \times 5a$ and $3a^2 + 5a$ by substituting values for a
Learning Journey Indices: Negative index with numerical base		
1	Establishing the fact that a-1=1/a when using numerical bases	• establish the fact that a-1=1/a when using numerical bases
	Evaluating numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-}1 = 1/3$ with an index of -1	• evaluate numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-}1 = 1/3$ with an index of -1
2	Evaluating numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-4} = 1/3^4 = 1/81$	• evaluate numerical expressions involving a negative index by first rewriting with a positive index, eg $3^{-4} = 1/3^4 = 1/81$
Learning Journey Indices: Negative index, algebraic & numerical base		
1	Establishing the fact that a-1=1/a when using algebraic bases	• establish the fact that a-1=1/a when using algebraic bases
	Evaluating algebraic expressions involving a negative index by first rewriting with a positive index, eg $a^{-}1 = 1/a$ with an index of -1 and a coefficient of 1	• evaluate algebraic expressions involving a negative index by first rewriting with a positive index, eg $a^{-}1 = 1/a$ with an index of -1 and a coefficient of 1
2	Evaluating algebraic expressions involving a negative index by first rewriting with a positive index, eg $a^{-}1 = 1/a$ with an index of -1 and a coefficient greater or equal to 1	• evaluate algebraic expressions involving a negative index by first rewriting with a positive index, eg $a^{-}1 = 1/a$ with an index of -1 and a coefficient greater or equal to 1
Learning Journey Indices: Mixed with negative indices		
1	Simplifying expressions that involve the product of simple algebraic terms with integer coefficients >=1 with some negative powers	• simplify expressions that involve the product of simple algebraic terms containing positive-integer indices with integer coefficients >=1
2	Simplifying expressions that involve the quotient of simple algebraic terms with integer coefficients >=1 with some negative powers	• simplify expressions that involve the quotient of simple algebraic terms containing positive-integer indices with integer coefficients >=1
3	Simplifying expressions that involve the raising a power to a power involving simple algebraic terms with integer coefficients >=1 with some negative powers	• simplify expressions that involve the raising a power to a power involving simple algebraic terms containing positive-integer indices with integer coefficients >=1
	Verifying whether a given expression represents a correct simplification of another algebraic expression by substituting numbers for pronumerals	• verify whether a given expression represents a correct simplification of another algebraic expression by substituting numbers for pronumerals
4	Writing the numerical value of a given numerical fraction raised to the power of –1, leading to $(a/b)^{-1} = b/a$	• write the numerical value of a given numerical fraction raised to the power of –1, leading to $(a/b)^{-1} = b/a$

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Patterns and algebra

ACMNA232 Apply the four operations to simple algebraic fractions with numerical denominators		
Quest: Algebraic fractions		
Learning Journey Algebraic fractions: 4 ops numerical denominators		
Steps	**Content**	**Detail**
1	Simplifying expressions that involve algebraic fractions requiring addition with numerical denominators	• simplify expressions that involve algebraic fractions with numerical denominators involving addition
2	Simplifying expressions that involve algebraic fractions requiring subtraction with numerical denominators	• simplify expressions that involve algebraic fractions with numerical denominators involving subtraction
3	Simplifying expressions that involve algebraic fractions requiring multiplication with numerical denominators	• simplify expressions that involve algebraic fractions with numerical denominators involving multiplication
4	Simplifying expressions that involve algebraic fractions requiring division with numerical denominators	• simplify expressions that involve algebraic fractions with numerical denominators involving division
Learning Journey Algebraic fractions: Simplifying		
1	Simplifying algebraic fractions with pronumerals in numerator only	• simplify algebraic fractions with pronumerals in numerator only
2	Simplifying algebraic fractions with pronumerals in numerator and/or denominator	• simplify algebraic fractions with pronumerals in numerator and/or denominator
3	Simplifying algebraic fractions with pronumerals in numerator and/or denominator including those involving indices	• simplify algebraic fractions with pronumerals in numerator and/or denominator including those involving indices
ACMNA233 Expand binomial products and factorise monic quadratic expressions using a variety of strategies		
Quest: Binomial expansions & basic quadratics		
Learning Journey Expanding binomial products		
1	Expanding binomial products by finding the areas of rectangles	• expand binomial products by finding the areas of rectangles
2	Using algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient of 1 and operators are +'s	• use algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient of 1 and operators are +'s
3	Using algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient of 1 and operators can be + or -	• use algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient of 1 and operators can be + or -
4	Using algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient greater or equal to 1 and operators can be + or -	• use algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient greater or equal to 1 and operators can be + or -
5	Using algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient greater or equal to 1 and operators can be + or - and expansion involves indices	• use algebraic methods to expand binomial products in the form (a + b)(c + d) where a and c are pronumerals with coefficient greater or equal to 1 and operators can be + or - and expansion involves indices

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Patterns and algebra

ACMNA233 Expand binomial products and factorise monic quadratic expressions using a variety of strategies		
Quest: Binomial expansions & basic quadratics		
Learning Journey Binomial product special results		
Steps	**Content**	**Detail**
1	Recognising and applying the special product: $(a + b)^2 = a^2 + 2ab + b^2$	• recognise the special product: $(a + b)^2 = a^2 + 2ab + b^2$ • apply the special product: $(a + b)^2 = a^2 + 2ab + b^2$ • explain with the aid of a diagram why we have the result of the special product: $(a + b)^2 = a^2 + 2ab + b^2$ • recognise and name the special product as 'perfect squares': $(a + b)^2 = a^2 + 2ab + b^2$
2	Recognising and applying the special product: $(a - b)^2 = a^2 - 2ab + b^2$	• recognise the special product: $(a - b)^2 = a^2 - 2ab + b^2$ • apply the special product: $(a - b)^2 = a^2 - 2ab + b^2$ • explain with the aid of a diagram why we have the result of the special product: $(a - b)^2 = a^2 - 2ab + b^2$ • recognise and name the special product as 'perfect squares': $(a - b)^2 = a^2 - 2ab + b^2$
3	Recognising and applying the special product: $(a - b)(a + b) = a^2 - b^2$	• recognise the special product: $(a - b)(a + b) = a^2 - b^2$ • apply the special product: $(a - b)(a + b) = a^2 - b^2$ • recognise the special product as the 'difference of two squares': $(a - b)(a + b) = a^2 - b^2$
Learning Journey Factorising monic quadratic trinomials		
1	Factorising monic algebraic expressions involving grouping in pairs with four-term expressions	• factorise monic algebraic expressions involving grouping in pairs with four-term expressions
2	Factorising monic algebraic expressions involving quadratic trinomials	• factorise monic algebraic expressions involving quadratic trinomials
Learning Journey Further binomial expansions		
1	Simplifying a variety of expressions involving binomial products, eg $(3x + 1)(2 - x) + 2x + 4$	• simplify a variety of expressions involving binomial products, eg $(3x + 1)(2 - x) + 2x + 4$
2	Simplifying a variety of expressions involving binomial products including those with special results, eg $(x - y)^2 - (x + y)^2$	• simplify a variety of expressions involving binomial products including those with special results, eg $(x - y)^2 - (x + y)^2$
ACMNA234 Substitute values into formulas to determine an unknown		
Quest: Substituting into formulas		
Learning Journey Using authentic formula		
1	Using authentic formulas to solve problems involving substituting in known variables to solve a problem	• use authentic formulas to solve problems involving substituting in known variables to solve a problem
2	Solving equations arising from substitution into formulas, eg given $P = 2l + 2b$ and $P = 20$, $l = 6$, solve for b	• solve equations arising from substitution into formulas, eg given $P = 2l + 2b$ and $P = 20$, $l = 6$, solve for b
3	Substituting into formulas from other strands of the syllabus or from other subjects to solve problems and interpret solutions, eg $A = 1/2xy$, $v = u + at$, $C = 5/9(F - 32)$, $V = \pi r^2 h$	• substitute into formulas from other strands of the syllabus or from other subjects to solve problems and interpret solutions, eg $A = 1/2xy$, $v = u + at$, $C = 5/9(F - 32)$, $V = \pi r^2 h$

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Linear and non-linear relationships

ACMNA235 Solve problems involving linear equations, including those derived from formulas		
Quest: Problems involving linear equations		
Learning Journey Word problems		
Steps	**Content**	**Detail**
1	Translating word problems into linear equations	• translate word problems into linear equations • solve word problems involving familiar formulas, eg 'If the area of a triangle is 30 square centimetres and the base length is 12 centimetres, find the perpendicular height of the triangle' • state clearly the meaning of introduced pronumerals when using equations to solve word problems, eg 'n = number of years'
2	Solving word equations and interpret the solutions within a given context	• solve word equations and interpret the solutions within a given context • explain why the solution to a linear equation generated from a word problem may not be a solution to the given problem
ACMNA236 Solve linear inequalities and graph their solutions on a number line		
Quest: Linear inequalities and their graphs		
Learning Journey Understanding inequalities		
1	Understanding the inequality signs	• understand the meaning of the five inequality signs $<, >, \neq, \leq, \geq$ • use the correct language involved when communicating inequalities
	Checking whether an inequality is true using substitution	• check whether an inequality is true using substitution
2	Representing inequalities using the signs	• represent word statements using inequalities 'greater than' and 'less than' and vice versa • represent a written or spoken inequality using symbols $<, >, =, \neq, \leq, \geq$ • write basic true inequality statements, eg $4 < 5$
3	Representing algebraic inequalities on a number line	• represent an inequality on a number line using open or closed circles, depending on the sign to mark the end point • represent an inequality on a number line using an arrow to mark the direction in which the values hold true
4	Writing an algebraic inequality given the representation of a number line	• write an algebraic inequality given the representation of a number line
Learning Journey Solving linear inequalities		
1	Establishing and using the fact that when solving inequalities, if multiplying or dividing by a negative number, the inequality sign must be flipped	• establish and use the fact that when solving inequalities, if multiplying or dividing by a negative number, the inequality sign must be flipped • explain why when solving inequalities, if multiplying or dividing by a negative number, the inequality sign must be flipped
	Solving inequalities using inverse operations involving 1 step with integer solutions	• solve inequalities using inverse operations involving 1 step with integer solutions
	Solving inequalities using inverse operations involving 1 step with integer solutions, plotting solution on a number line	• solve inequalities using inverse operations involving 1 step with integer solutions plotting the solution on a number line
	Solving inequalities using inverse operations involving 1 step with integer and non-integer solutions	• solve inequalities using inverse operations involving 1 step with integer and non-integer solutions
	Solving inequalities using inverse operations involving 1 step with integer and non-integer solutions plotting solution on a number line	• solve inequalities using inverse operations involving 1 step with integer and non-integer solutions plotting solution on a number line

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Linear and non-linear relationships

ACMNA236 Solve linear inequalities and graph their solutions on a number line		
Quest: Linear inequalities and their graphs		
Learning Journey Solving linear inequalities		
Steps	**Content**	**Detail**
2	Solving inequalities using inverse operations involving 2 steps with integer solutions	• solve inequalities using inverse operations involving 2 steps with integer solutions
	Solving inequalities using inverse operations involving 2 steps with integer solutions, plotting solution on a number line	• solve inequalities using inverse operations involving 2 steps with integer solutions plotting the solution on a number line
	Solving inequalities using inverse operations involving 2 steps with integer and non-integer solutions	• solve inequalities using inverse operations involving 2 steps with integer and non-integer solutions
	Solving inequalities using inverse operations involving 2 steps with integer and non-integer solutions plotting solution on a number line	• solve inequalities using inverse operations involving 2 steps with integer and non-integer solutions plotting the solution on a number line
3	Solving inequalities using inverse operations involving 3 steps with integer and non-integer solutions	• solve inequalities using inverse operations involving 3 steps with integer and non-integer solutions
	Solving inequalities using inverse operations involving 3 steps with integer and non-integer solutions, plotting solution on a number line	• solve inequalities using inverse operations involving 3 steps with integer and non-integer solutions plotting the solution on a number line
	Solving inequalities with variables either side of the sign	• solve inequalities with variables either side of the sign
4	Representing and solving real-life scenario's using inequalities	• represent and solving real-life scenario's using inequalities
ACMNA237 Solve linear simultaneous equations, using algebraic and graphical techniques, including using digital technology		
Quest: Linear simultaneous equations		
Learning Journey Simultaneous equations		
1	Understanding simultaneous equations	• understand that solutions to a system of 2 linear equations in 2 variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously
	Finding an approximate solution to simultaneous equations by graphing	• find an approximate solution to simultaneous equations by graphing
	Solving simultaneous equations with 2 variables graphically	• solve simultaneous equations graphically • graph 2 intersecting lines on the same set of axes and read off the point of intersection
	Explaining the significance of the point of intersection of 2 lines in relation to it representing the only solution that satisfies both equations	• explain the significance of the point of intersection of 2 lines in relation to it representing the only solution that satisfies both equations
2	Solving simultaneous equations algebraically using the substitution method	• solve simultaneous equations algebraically using the substitution method
3	Solving simultaneous equations algebraically using the elimination method	• solve simultaneous equations algebraically using the elimination method
4	Checking the solution of simultaneous equations either graphically or algebraically	• check solution of simultaneous equation either graphically or algebraically
	Investigating and solving simultaneous equations using digital technology	• investigate and solve simultaneous equations using digital technology
5	Solving real-world and mathematical problems leading to 2 linear equations in 2 variables	• solve real-world and mathematical problems leading to 2 linear equations in 2 variables, eg given coordinates for 2 pairs of points, determine whether the line through the first pair of points intersects the line through the second pair
	Constructing a pair of simultaneous equations from text by deriving from a problem before solving	• construct a pair of simultaneous equations from text by deriving from a problem before solving

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Linear and non-linear relationships

ACMNA238 Solve problems involving parallel and perpendicular lines		
Quest: Parallel and perpendicular lines		
Learning Journey Parallel lines		
Steps	**Content**	**Detail**
1	Establishing that 2 parallel lines have equal gradients ie $m_1 = m_2$	• establish that 2 parallel lines have equal gradients, ie $m_1 = m_2$
	Solving problems involving parallel lines	• understand the characteristics of 2 lines that make them parallel and that they have the same gradients • explain why equal gradients makes 2 lines parallel • determine whether 2 given lines are parallel
2	Finding the equation of a line that is parallel to another given line using $y = mx + c$	• find the equation of a line that is parallel to another given line using $y = mx + c$
Learning Journey Perpendicular lines		
1	Establishing that 2 perpendicular lines have gradients that are the negative reciprocal of each other $m_1 = -1/m_2$	• establish that 2 perpendicular lines have gradients that are the negative reciprocal of each other, ie $m_1 = -1/m_2$
	Solving problems involving perpendicular lines	• understand the characteristics of 2 lines that make them perpendicular: $m_1m_2 = -1$ or $m_1 = -1/m_2$ • explain why equal gradients makes 2 lines perpendicular • determine whether 2 given lines are perpendicular
2	Finding the equation of a line that is perpendicular to another given line using $y = mx + c$	• find the equation of a line that is perpendicular to another given line using $y = mx + c$
Learning Journey Equations of lines: parallel & perpendicular lines		
1	Finding the equation of a line that is parallel to another given line and going through a given point	• find the equation of a line that is parallel to another given line and going through a given point
2	Finding the equation of a line that is perpendicular to another given line and going through a given point	• find the equation of a line that is perpendicular to another given line and going through a given point
3	Finding the equation of a perpendicular bisector of a line interval	• find the equation of a perpendicular bisector of a line interval
Learning Journey Problems involving parallel & perpendicular lines		
1	Solving problems involving collinearity	• understand collinearity • show that 3 given points are collinear
2	Using coordinate geometry to investigate and describe the properties of triangles and quadrilaterals	• use coordinate geometry to investigate and describe the properties of triangles and quadrilaterals
	Using coordinate geometry to investigate the intersection of the perpendicular bisectors of the sides of acute-angled triangles	• use coordinate geometry to investigate the intersection of the perpendicular bisectors of the sides of acute-angled triangles
3	Showing that 4 specified points form the vertices of particular quadrilaterals	• show that 4 specified points form the vertices of particular quadrilaterals
4	Proving that a particular triangle drawn on the Cartesian plane is right-angled	• prove that a particular triangle drawn on the Cartesian plane is right angled

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Linear and non-linear relationships

ACMNA239 Explore the connection between algebraic and graphical representations of relations such as simple quadratics, circles and exponentials using digital technology as appropriate		
Quest: Representations of non-linear relations		
Learning Journey Representations of non-linear relations		
Steps	**Content**	**Detail**
1	Graphing simple quadratics using digital technology	• graph simple quadratics using digital technology • describe the shape and connect the shape of a simple quadratic to its equation
2	Graphing simple circles using digital technology	• graph simple circles using digital technology • describe the shape and connect the shape of a simple circle to its equation
3	Graphing simple exponentials using digital technology	• graph simple exponentials using digital technology • describe the shape and connect the shape of a simple exponential to its equation
4	Comparing the graphs of a variety of simple non-linear relationships	• compare the graphs of a variety of simple non-linear relationships
	Identifying and naming different types of graphs from their equations	• identify and name different types of graphs from their equations
5	Sketching any particular curve by determining its features from its equation	• sketch any particular curve by determining its features from its equation including x and y-intercepts, turning points (if applicable), asymptotes (if applicable)
ACMNA240 Solve linear equations involving simple algebraic fractions		
Quest: Equations involving algebraic fractions		
Learning Journey Equations involving algebraic fractions		
1	Solving linear equations involving algebraic fractions	• solve a range of linear equations, including equations that involve 2 or more fractions
2	Solving monic linear equations involving algebraic fractions where at least one entire expression is in the numerator or denominator of a fraction	• solve monic linear equations involving algebraic fractions where at least one entire expression is in the numerator or denominator of a fraction
3	Solving non-monic linear equations involving algebraic fractions where at least one entire expression is in the numerator or denominator of a fraction	• solve non-monic linear equations involving algebraic fractions where at least one entire expression is in the numerator or denominator of a fraction
4	Solving non-monic linear equations involving algebraic fractions where at least one entire expression is in the numerator or denominator of a fraction and must be factorised first	• solve non-monic linear equations involving algebraic fractions where at least one entire expression is in the numerator or denominator of a fraction and must be factorised first
ACMNA241 Solve simple quadratic equations using a range of strategies		
Quest: Solving simple quadratic equations		
Learning Journey Solving simple quadratic equations		
1	Checking solutions of a quadratic equation by substituting	• check solutions of a quadratic equation by substituting
2	Solving simple quadratic equations of the form $ax^2 = c$, leaving answers as decimal approximations	• solve simple quadratic equations of the form $ax^2 = c$, leaving answers as decimal approximations
3	Solving simple quadratic equations of the form $ax^2 = c$, leaving answers in exact form	• solve simple quadratic equations of the form $ax^2 = c$, leaving answers in exact form
4	Deriving method of solving quadratic equations in the form ax2 + bx + c = 0 : factorisation	• derive a method of solving quadratic equations in the form ax2 + bx + c = 0 : factorisation
	Solving monic quadratic equations of the form ax2 +bx + c = 0 by factorisation	• solve monic quadratic equations of the form ax2 + bx + c = 0 by factorisation

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Real numbers

ACMNA264 Define rational and irrational numbers and perform operations with surds and fractional indices		
Quest: Rational & irrational numbers and surds		
Learning Journey Understanding rational and irrational numbers		
Steps	**Content**	**Detail**
1	Defining rational numbers as any number that can be represented in the form p/q, where p and q are integers and q ≠ 0	• define rational numbers as any number that can be represented in the form p/q, where p and q are integers and q ≠ 0
	Defining irrational numbers	• define irrational numbers as any number that cannot be represented in the form p/q where p and q are integers
	Understanding informally that the set of real numbers consists of rational numbers and irrational numbers	• understand informally that the set of real numbers consists of rational numbers and irrational numbers
2	Understanding the properties of rational numbers	• reflect on the commutative, associative and distributive properties of rational numbers • know that rational numbers have commutative, associative and distributive properties • apply the rules for the order of operations to calculations involving rational numbers
3	Understanding the properties of irrational numbers	• investigate the commutative, associative and distributive properties of irrational numbers • know that irrational numbers have commutative, associative and distributive properties
4	Distinguishing between rational and irrational numbers	• distinguish between rational and irrational numbers
Learning Journey Introducing surds		
1	Introducing surds	• establish that a surd is an irrational number, providing examples
	Understanding surd form	• understand surd form and its notation • read and articulate surds and fractional indices Eg:√x is the 'square root of x' or simply 'root x' • identify the benefits of using surd form over decimal form and vice versa
2	Estimating the value of a surd	• estimate the approximate value of a surd based on knowledge of perfect squares, cubes etc
	Establishing the square of a square root identity	• establish the square of a square root identity
3	Applying index laws to demonstrate appropriateness of the definition of the fractional index representing the square root	• apply index laws to demonstrate appropriateness of the definition of the fractional index representing the square root
	Identifying that surds/nth roots of a radicand can be written in index form	• identify that surds/nth roots of a radicand can be written in index form
	Identifying that the nth root of any number to the power of n is the number	• identify that the nth root of any number to the power of n is the number
	Converting from surd form (with nth root) to exponent form	• write surds in exponent form for positive fractions with a numerator of 1 • write surds in exponent form for positive/negative fractions with a numerator of 1 • write surds in exponent form for positive proper fractions with numerator greater or equal to 1 • write surds in exponent form for positive/negative proper fractions with numerator greater or equal to 1 • write surds in exponent form for positive/negative improper/vulgar fractions with numerator greater or equal to 1
4	Demonstrating that √x is undefined for x < 0 and that √x = 0 for x = 0	• demonstrate that √x is undefined for x<0 and that √x = 0 for x = 0

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10)

Real numbers

ACMNA264 Define rational and irrational numbers and perform operations with surds and fractional indices		
Quest: Rational & irrational numbers and surds		
Learning Journey Surd general rules		
Steps	**Content**	**Detail**
1	Understanding multiplication general formulae for surd rules	• understand multiplication general formulae for surd rules • formalise multiplication general formulae for surd rules
	Understanding division general formulae for surd rules	• understand division general formulae for surd rules • formalise division general formulae for surd rules
Learning Journey Simplification and addition/subtraction of surds		
1	Simplifying a surd: the radicand being a whole number	• establish the method required to simplify a surd
2	Simplifying a surd: the radicand being a whole number	• apply the method to simplify a single surd realising you need to look for a factor that is a perfect square
3	Rewriting simplified surds	• return a simplified surd into a single surd (unsimplified form)
4	Simplifying expressions involving surds in calculations: addition/subtraction where surd simplification is not necessary	• simplify surds in calculations: addition/subtraction where surd simplification is not necessary • apply simplifying surds in calculations to simplify surd additions/subtractions
5	Simplifying expressions involving surds in calculations: addition/subtraction where surd simplification is necessary	• simplify surds in calculations: addition/subtraction where surd simplification is necessary • apply simplifying surds in calculations to simplify surd additions/ subtractions
Learning Journey Multiplication and division of surds		
1	Simplifying expressions involving surds in calculations: multiplication where surd simplification is not necessary	• establish the method used to simplify the multiplication of surds where surd simplification is not necessary • apply simplifying surds to simple surd multiplication examples
2	Simplifying expressions involving surds in calculations: multiplication where surd simplification is necessary	• establish simplifying expressions involving surds in calculation to simplify the multiplication of surds with coefficients • apply simplifying expressions involving surds in calculations to simplify surd multiplication examples
3	Simplifying surds in calculations: division	• establish the method used to simplify the division of surds • apply simplifying surds n calculations to simple division examples
4	Simplifying expressions involving surds in calculations: division where the surds have coefficients	• establish the method used to simplify the division of surds with coefficients • apply the method used to simplify the division of surds with coefficients
Learning Journey Expanding brackets with surds		
1	Simplifying expressions involving surds in calculations: use of the distributive law required	• extend simplifying expressions involving surds in calculations to find solutions when examples have single brackets requiring expansion by a single value • extend simplifying expressions involving surds in calculations to find solutions when examples have single brackets requiring expansion by a surd • extend simplifying expressions involving surds in calculations to find solutions when examples have single brackets requiring expansion by a surd with a coefficient
2	Expanding and simplifying expressions involving surds in calculations: binomial expansion required	• extend expanding and simplifying expressions involving surds in calculations to find solutions when examples have 2 brackets requiring expansion • extend expanding and simplifying expressions involving surds in calculations to find solutions when examples have 2 brackets requiring expansion involving surds with coefficients
3	Expanding and simplifying expressions involving surds in calculations: expanding a square required	• expand and simplify surds in calculations: expanding a square required

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Number and Algebra (AC10A)

Real numbers

ACMNA264 Define rational and irrational numbers and perform operations with surds and fractional indices		
Quest: Rational & irrational numbers and surds		
Learning Journey Rationalising the denominator		
Steps	**Content**	**Detail**
1	Rationalising the denominator with a single surd	• rationalise the denominator with a single surd • apply this method to examples • communicate why we can multiply by a number over itself in order to rationalise
2	Rationalising the denominator of a surd which has a coefficient	• rationalise the denominator of a surd which has a coefficient • apply rationalising the denominator of a surd which has a coefficient to examples
3	Exploring why it in necessary to rationalise the denominator where a surd lies in the denominator	• explore why it in necessary to rationalise the denominator where a surd lies in the denominator
	Rationalising more complex denominators using conjugate surds	• establish what a conjugate surd is • explain how to rationalise a denominator using conjugate surds • apply rationalising a denominator using conjugate surds to examples
Learning Journey Convert recurring decimals into rational numbers		
1	Converting a decimal expansion that repeats into a rational number	• convert a decimal expansion that repeats into a rational number
Learning Journey Solving problems involving surds		
1	Applying surds to problems within context: trigonometry	• calculate the exact value of a trigonometric ratio in a right-angled triangle, given the lengths of 2 sides
2	Solving problems using surds	• solve problems involving surds, with and without a calculator
ACMNA265 Use the definition of a logarithm to establish and apply the laws of logarithms		
Quest: Logarithms and their laws		
Learning Journey Introducing logarithms		
1	Introducing and defining logarithms	• define the logarithm of a number to any positive base as the index when the number is expressed as a power of the base ie $a^x = y$ same as $\log_a y = x$ where $a>0$, $y>0$ • translate general statements (those with pronumerals) from index notation into equivalent statements using the Logarithmic form • translate general statements (those with pronumerals) from logarithmic form into equivalent statements using index notation
2	Evaluating logarithms involving whole numbers	• evaluate logarithms involving whole numbers, eg $\log_2 16$
3	Evaluating fractional logarithms with rational answers not involving surds	• evaluate fractional logarithms with rational answers, eg evaluate $\log_7(1/49)$
4	Evaluating logarithms with rational answers involving surds	• evaluate logarithms with rational answers involving surds, eg evaluate $\log_2\sqrt{64}$

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10A)

Real numbers

ACMNA265 Use the definition of a logarithm to establish and apply the laws of logarithms		
Quest: Logarithms and their laws		
Learning Journey Multiplication Log law		
Steps	**Content**	**Detail**
1	Deducing the rule: $\log_a x + \log_a y = \log_a(xy)$	• deduce the rule from the knowledge of indices: $\log_a x + \log_a y = \log_a(xy)$ • know the rule: $\log_a x + \log_a y = \log_a(xy)$
2	Expanding using the rule (using numbers only): $\log_a x + \log_a y = \log_a(xy)$	• expand expressions using the rule (using numbers only): $\log_a x + \log_a y = \log_a(xy)$
3	Simplifying using the rule (using numbers only): $\log_a x + \log_a y = \log_a(xy)$	• simplify expressions using the rule (using numbers only): $\log_a x + \log_a y = \log_a(xy)$
4	Expanding using the rule (using numbers and variables): $\log_a x + \log_a y = \log_a(xy)$	• expand expressions using the rule (using numbers and variables): $\log_a x + \log_a y = \log_a(xy)$
5	Simplifying using the rule (using numbers and variables): $\log_a x + \log_a y = \log_a(xy)$	• simplify expressions using the rule (using numbers and variables): $\log_a x + \log_a y = \log_a(xy)$
Learning Journey Division Log law 1		
1	Deducing the rule: $\log_a x - \log_a y = \log_a(x/y)$	• deduce the rule from the knowledge of indices: $\log_a x - \log_a y = \log_a(x/y)$ • know the rule: $\log_a x - \log_a y = \log_a(x/y)$
2	Expanding using the rule (using numbers only): $\log_a x - \log_a y = \log_a(x/y)$	• expand expressions using the rule (using numbers only): $\log_a x - \log_a y = \log_a(x/y)$
3	Simplifying using the rule (using numbers only): $\log_a x - \log_a y = \log_a(x/y)$	• simplify expressions using the rule (using numbers only): $\log_a x - \log_a y = \log_a(x/y)$
4	Expanding using the rule (using numbers and variables): $\log_a x - \log_a y = \log_a(x/y)$	• expand expressions using the rule (using numbers and variables): $\log_a x - \log_a y = \log_a(x/y)$
5	Simplifying using the rule (using numbers and variables): $\log_a x - \log_a y = \log_a(x/y)$	• simplify expressions using the rule (using numbers and variables): $\log_a x - \log_a y = \log_a(x/y)$
Learning Journey Division Log law 2		
1	Deducing the rule: $\log_a x^n = n\log_a x$	• deduce the rule from the knowledge of Indices: $\log_a x^n = n\log_a x$ • know the rule: $\log_a x^n = n\log_a x$
2	Expanding using the rule (using numbers only): $\log_a x^n = n\log_a x$	• expand expressions using the rule (using numbers only): $\log_a x^n = n\log_a x$
3	Simplifying using the rule (using numbers only): $\log_a x^n = n\log_a x$	• simplify expressions using the rule (using numbers only): $\log_a x^n = n\log_a x$
4	Expanding using the rule (using numbers and variables): $\log_a x^n = n\log_a x$	• expand expressions using the rule (using numbers and variables): $\log_a x^n = n\log_a x$
5	Simplifying using the rule (using numbers and variables): $\log_a x^n = n\log_a x$	• simplify expressions using the rule (using numbers and variables): $\log_a x^n = n\log_a x$

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10A)

Real numbers

ACMNA265 Use the definition of a logarithm to establish and apply the laws of logarithms		
Quest: Logarithms and their laws		
Learning Journey Log results		
Steps	**Content**	**Detail**
1	Establishing the result: $\log_a a^x = x$	• establish the result from log rules: $\log_a a^x = x$ • know the rule: $\log_a a^x = x$
	Establishing the result: $\log_a a = 1$	• establish the result from log rules: $\log_a a = 1$ • know the rule: $\log_a a = 1$
2	Establishing the result: $\log_a 1 = 0$	• establish the result from log rules: $\log_a 1 = 0$ • know the rule: $\log_a 1 = 0$
3	Establishing the result: $\log a(1/x) = -\log_a x$	• establish the result from log rules: $\log a(1/x) = -\log_a x$ • know the rule: $\log_a(1/x) = -\log_a x$
4	Applying the result: $\log_a(1/x) = -\log_a x$	• expand expressions using the result: $\log_a(1/x) = -\log_a x$ • simplify expressions using the result: $\log_a(1/x) = -\log_a x$ • solve equations using the result: $\log_a(1/x) = -\log_a x$
Learning Journey Log graphs and relationship with exponentials		
1	Understanding the inverse relationship between exponents and logarithms	• understand that there is an inverse relationship between exponents and logarithms • compare and contrast exponential and logarithmic graphs drawn on the same axes, eg $y = ax$ and $y = \log_a x$
2	Constructing graphs of logarithms (no natural log)	• graph logarithmic functions, showing intercepts and end behaviour without the use of graphing software (no natural log) • graph logarithmic functions, showing intercepts and end behaviour with the use of graphing software (no natural log) • analyse and describe features of graphs of logarithms (no natural log)
	Comparing graphs of logarithms (no natural logs)	• compare features of graphs of logarithms (no natural log)
3	Using logarithm rules and results to solve real world problems without change of base rule	• use logarithm rules and results to solve real world problems without change of base rule • relate logarithms to practical scales, eg Richter, decibel and pH scales without change of base rule • analyse graphs of logarithms in relation the their practical context without change of base rule
4	Using logarithm rules and results to solve real world problems using graphs	• relate logarithms to practical scales, eg Richter, decibel and pH scales • analyse graphs of logarithms in relation the their practical context
Learning Journey Solving equations with Logarithms		
1	Solving equations using the rule (using numbers and variables): $\log_a x + \log_a y = \log_a(xy)$	• solve equations using the rule (using numbers and variables): $\log_a x + \log_a y = \log_a(xy)$
2	Solving equations using the rule (using numbers and variables): $\log_a x - \log_a y = \log_a(x/y)$	• solve equations using the rule (using numbers and variables): $\log_a x - \log_a y = \log_a(x/y)$
3	Solving equations using the rule (using numbers and variables): $\log_a x^n = n\log_a x$	• solve equations using the rule (using numbers and variables): $\log_a x^n = n\log_a x$
4	Solving basic equations involving logarithms with surds	• solve basic equations involving logarithms with surds

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10A)

Patterns and algebra

ACMNA266 Investigate the concept of a polynomial and apply the factor and remainder theorems to solve problems		
Quest: Polynomials		
Learning Journey Polynomials introduction		
Steps	**Content**	**Detail**
1	Understanding the definition of a polynomial to be an expression in the form $a_nx_n + a_{n-1}x_{n-1} + ...a_1x_1 + a_0x_0$	• understand the definition of a polynomial to be an expression in the form $a_nx_n + a_{n-1}x_{n-1} + ...a_1x_1 + a_0x_0$ • recognise a polynomial
	Understanding the definitions involved with polynomials	• understand the terms 'degree', 'leading term', 'leading coefficient', 'constant term' and 'monic polynomial' • use the terms 'degree', 'leading term', 'leading coefficient', 'constant term' and 'monic polynomial' appropriately
	Using the notation P(x) for polynomials and P(c) to indicate the value of P(x) for x = c	• use the notation P(x) for polynomials and P(c) to indicate the value of P(x) for x = c
2	Stating the number of zeros that a polynomial of degree n can have	• state the number of zeros that a polynomial of degree n can have
3	Performing operations with polynomials	• add and subtract polynomials • multiply polynomials by linear expressions
Learning Journey Remainder and factor theorems		
1	Using the remainder theorem to find the remainder when a polynomial is divided by the expression (x-a)	• use the remainder theorem to find the remainder when a polynomial is divided by the expression (x-a) • verify the remainder theorem
2	Using the remainder and factor theorems to determine whether (x-a) is a factor of a given polynomial	• use the remainder and factor theorems to determine whether (x-a) is a factor of a given polynomial
3	Solving problems involving the factor and/or remainder theorems where an unknown variable must be found	• solve problems involving the factor and/or remainder theorems where an unknown variable must be found
4	Dividing polynomials by linear expressions to find the quotient and remainder, expressing the polynomial as the product of the linear expression and another polynomial plus a remainder, ie P(x) = (x−a)Q(x) + c	• divide polynomials by linear expressions to find the quotient and remainder, expressing the polynomial as the product of the linear expression and another polynomial plus a remainder, ie P(x) = (x−a)Q(x) + c
5	Using the factor theorem to factorise particular polynomials completely	• use the factor theorem to factorise particular polynomials completely
	Using the factor theorem and long division to find all zeros of a simple polynomial P(x) and then solve P(x) = 0	• use the factor theorem and long division to find all zeros of a simple polynomial P(x) and then solve P(x) = 0 (degree ≤ 4) • understand the relationship between zeros and factors of polynomials

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10A)

Linear and non-linear relationships

ACMNA267 Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations		
Quest: Functions and their transformations		
Learning Journey Exploring parabolas		
Steps	**Content**	**Detail**
1	Understanding the language and important features of parabolas	• understand the language of parabolas, turning point (vertex), concavity, roots, x-intercept, y-intercept, axis of symmetry • understand the important features to be marked on a parabola; y-intercept, x-intercept(s)/roots, turning point(vertex)
	Understanding that a parabola is the locus of a point that stays equidistant from a point and a line	• understand that a parabola is the locus of a point that stays equidistant from a point and a line
	Understanding that $y = ax^2 + bx + c$ is the general equation of a parabola and manipulate equations to be in this form	• understand that $y = ax^2 + bx + c$ is the general equation of a parabola • manipulate equations to be in the form $y = ax^2 + bx + c$
2	Investigating how the parabola with the equation $y = ax^2$ changes as the value of a is changed using digital technology	• investigate how the parabola with the equation $y = ax^2$ changes as the value of a is changed using digital technology • describe the features of the graph and how they change as the value of 'a' changes for both positive and negative values of 'a' • understand that the sign of the coefficient of x^2 (a) is what makes a parabola concave up or down. If $a > 0$ the parabola is concave up, If $a < 0$ the parabola is concave down
	Investigating how the parabola with the equation $y = ax^2 + k$ changes as the value of k is changed using digital technology	• investigate how the parabola with the equation $y = ax^2 + k$ changes as the value of k is changed using digital technology • describe the features of the graph and how they change as the value of k changes for both positive and negative values of k • describe the repositioning of $y = ax^2 + c$ as vertical shift from $y = ax_2$ according to the value of c
3	Graphing parabolas in the form $y = ax^2 + k$ with different values of a and k	• graph parabolas in the form $y = ax^2 + k$ with different values of a and k
4	Investigating how the parabola with the equation $y = (x + a)^2$ changes as the value of a is changed using digital technology	• investigate how the parabola with the equation $y = (x + a)^2$ changes as the value of a is changed using digital technology • describe the repositioning of $y = a(x + b)^2$ as horizontal shift from $y = ax_2$ according to the value of b • describe the features of the graph and how they change as the value of a changes for both positive and negative values of a
5	Investigating how the parabola with the equation $y= (x + a)^2 + k$ changes as the value of k is changed using digital technology	• investigate how the parabola with the equation $y = (x + a)^2 + k$ changes as the value of k is changed using digital technology • describe the features of the graph and how they change as the value of k changes for both positive and negative values of k
Learning Journey Parabolas: Vertex and axis of symmetry		
1	Determining the equation of the axis of symmetry of a parabola using the midpoint of the interval joining the points at which the parabola cuts the x-axis	• determine the equation of the axis of symmetry of a parabola using the midpoint of the interval joining the points at which the parabola cuts the x-axis
2	Determining the equation of the axis of symmetry of a parabola using the formula $x = -b/2a$	• determine the equation of the axis of symmetry of a parabola using the formula $x = -b/2a$
3	Finding the coordinates of the vertex of a parabola by using the midpoint of the interval joining the points at which the parabola cuts the x-axis and substituting to obtain the y-coordinate of the vertex	• find the coordinates of the vertex of a parabola by using the midpoint of the interval joining the points at which the parabola cuts the x-axis and substituting to obtain the y-coordinate of the vertex
4	Finding the coordinates of the vertex of a parabola by using the formula for the axis of symmetry to obtain the x-coordinate and substituting into the equation to obtain the y-coordinate of the vertex	• find the coordinates of the vertex of a parabola by using the formula for the axis of symmetry to obtain the x-coordinate and substituting to obtain the y-coordinate of the vertex

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10A)

Linear and non-linear relationships

ACMNA267 Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations		
Quest: Functions and their transformations		
Learning Journey Graphing parabolas		
Steps	**Content**	**Detail**
1	Graphing a variety of parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c using a table of values	• graph a variety of parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c using a table of values
	Finding y-intercept for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $x = 0$	• find y-intercept for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $x = 0$ • explain why c will always be the y-intercept
2	Finding x-intercepts (roots or zeros) of a parabola, where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and factorising	• find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and factorising for monic equations • find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and factorising for non-monic equations
	Graphing parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using factorising), the y-intercept and the turning point (vertex)	• graph parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using factorising), the y-intercept and the turning point (vertex) • identify and use features of parabolas and their equations to assist in sketching quadratic relationships, eg identify and use the x- and y-intercepts, vertex, axis of symmetry and concavity
3	Finding x-intercepts (roots or zeros) of a parabola, where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and completing the square	• find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and completing the square for monic equations • find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and completing the square for non-monic equations
	Graphing parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using completing the square), the y-intercept and the turning point (vertex)	• graph parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using completing the square), the y-intercept and the turning point (vertex) • identify and use features of parabolas and their equations to assist in sketching quadratic relationships, eg identify and use the x- and y-intercepts, vertex, axis of symmetry and concavity
4	Finding x-intercepts (roots or zeros) of a parabola, where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and using the quadratic formula	• find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and using the quadratic formula for monic equations • find x-intercepts (roots or zeros), where relevant, for the graph of $y = ax^2 + bx + c$, given a, b and c by substituting in $y = 0$ and using the quadratic formula for non-monic equations
	Graphing parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using the quadratic formula), the y-intercept and the turning point (vertex)	• graph parabolas where the equation is given in the form $y = ax^2 + bx + c$, for various values of a, b and c by finding x-intercept(s) (using the quadratic formula), the y-intercept and the turning point (vertex) • identify and use features of parabolas and their equations to assist in sketching quadratic relationships, eg identify and use the x- and y-intercepts, vertex, axis of symmetry and concavity

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Number and Algebra (AC10A)

Linear and non-linear relationships

ACMNA267 Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations		
Quest: Functions and their transformations		
Learning Journey Parabolas and their transformations		
Steps	**Content**	**Detail**
1	Describing, interpreting and sketching parabolas and their translations	• Describe, interpret and sketch parabolas and their translations
2	Describing, interpreting and sketching parabolas and their reflections	• Describe, interpret and sketch parabolas and their reflections
3	Describing, interpreting and sketching parabolas and their rotations	• Describe, interpret and sketch parabolas and their rotations
4	Describing, interpreting and sketching parabolas and their dilations	• Describe, interpret and sketch parabolas and their dilations
Learning Journey Graphing hyperbolas		
1	Graphing hyperbolic relationships of the form $y = k/x$ for integer values of k	• describe the effect on the graph of $y = 1/x$ of multiplying $1/x$ by different constants • explain what happens to the y-values of the points on the hyperbola $y = k/x$ as the x-values become very large or closer to zero • explain why it may be useful to choose both small and large numbers when constructing a table of values for a hyperbola
2	Investigating how the hyperbola with the equation $y = k/x + c$ changes as the value of k and c change using digital technology	• investigate how the hyperbola with the equation $y = k/x + c$ change as the value of k and c change using digital technology • describe the effect on the graph changing k and c have for both small and large negative and positive values
3	Understanding and finding asymptotes relating to hyperbolas	• understand the definition of an asymptote • explain why asymptotes exist using the equation of a hyperbola • determine the equations of the asymptotes of a hyperbola in the form $y = k/x + c$ or $y = k/(x - a)$
4	Graphing a variety of hyperbolic curves, including where the equation is given in the form $y = k/x + c$ or $y = k/x-a$ for integer values of k, a and c	• identify features of hyperbolas from their equations to assist in sketching their graphs, eg identify asymptotes, orientation, x- and/or y-intercepts where they exist • describe hyperbolas in terms of what happens to the y-values of the points on the hyperbola as x becomes very large or very small, whether there is a y-value for every x-value, and what occurs near or at $x = 0$
Learning Journey Hyperbolas and their transformations		
1	Describing, interpreting and sketching hyperbolas and their translations	• Describe, interpret and sketch hyperbolas and their translations
2	Describing, interpreting and sketching hyperbolas and their reflections	• Describe, interpret and sketch hyperbolas and their reflections
3	Describing, interpreting and sketching hyperbolas and their rotations	• Describe, interpret and sketch hyperbolas and their rotations
4	Describing, interpreting and sketching hyperbolas and their dilations	• Describe, interpret and sketch hyperbolas and their dilations

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10A)

Linear and non-linear relationships

ACMNA267 Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations		
Quest: Functions and their transformations		
Learning Journey Graphing circles		
Steps	**Content**	**Detail**
1	Establishing the equation of the circle with centre (a,b) and radius r, and graph equations of the form $(x - a)^2+(y - b)^2 = r^2$	• establish the equation of the circle with centre (a,b) and radius r, and graph equations of the form $(x - a)^2 + (y - b)^2 = r^2$
	Graphing circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ for various values of a,b,r	• graph circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ for various values of a,b,r • explain why a circle with the equation $x^2 + y^2 = r^2$ is a circle centred on the origin with radius r
2	Investigating how circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ change as the values of a,b,r change using digital technology	• investigate and describe how circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ change as the value of a changes using digital technology • investigate and describe how circles with equations in the form $(x - a)^2 + (y - b)^2 = r2$ change as the value of b changes using digital technology • investigate and describe how circles with equations in the form $(x - a)^2 + (y - b)^2 = r^2$ change as the value of r changes using digital technology • explain why r cannot be a negative number
3	Determining whether a particular point is inside, on, or outside a given circle	• determine whether a particular point is inside, on, or outside a given circle
4	Finding the centre and radius of a circle whose equation is in the form $x^2 + y^2 + ax + by + c = 0$ by completing the square	• find the centre and radius of a circle whose equation is in the form $x^2 + y^2 + ax + by + c = 0$ by completing the square
Learning Journey Circles and their transformations		
1	Describing, interpreting and sketching circles and their translations	• Describe, interpret and sketch circles and their translations
2	Describing, interpreting and sketching circles and their reflections	• Describe, interpret and sketch circles and their reflections
3	Describing, interpreting and sketching circles and their rotations	• Describe, interpret and sketch circles and their rotations
4	Describing, interpreting and sketching circles and their dilations	• Describe, interpret and sketch circles and their dilations
Learning Journey Exponential functions and their transformations		
1	Describing, interpreting and sketching exponential functions and their translations	• Describe, interpret and sketch exponential functions and their translations
2	Describing, interpreting and sketching exponential functions and their reflections	• Describe, interpret and sketch exponential functions and their reflections
3	Describing, interpreting and sketching exponential functions and their rotations	• Describe, interpret and sketch exponential functions and their rotations
4	Describing, interpreting and sketching exponential functions and their dilations	• Describe, interpret and sketch exponential functions and their dilations

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10A)

Linear and non-linear relationships

ACMNA267 Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations		
Quest: Functions and their transformations		
Learning Journey General non-linear relationships		
Steps	**Content**	**Detail**
1	Identifying and naming different types of graphs from their equations	• identify and name different types of graphs from their equations
2	Sketching any particular curve by using a table of values	• sketch any particular curve by using a table of values • refine appropriate x-values for the table of values once the shape becomes clear
3	Sketching any particular curve by determining its features from its equation	• sketch any particular curve by determining its features from its equation including x and y-intercepts, turning points (if applicable), asymptotes (if applicable)
4	Identifying equations whose graph is symmetrical about the y-axis	• identify equations whose graph is symmetrical about the y-axis
5	Determining a possible equation from a given graph and check using digital technologies	• determine a possible equation from a given graph and check using digital technologies
	Comparing and contrasting different types of graphs and determining possible equations from the key features	• compare and contrast different types of graphs and determine possible equations from the key features
ACMNA270 Solve simple exponential equations		
Quest: Solve exponential equations		
Learning Journey Solve exponential equations		
1	Identifying that if $a^x = a^y$, then x = y	• identify that if $a^x = a^y$, then x = y
2	Solving exponential equations containing equal bases	• solve exponential equations containing equal bases (linear exponents only) eg: $53x = 57x - 2$ • solve exponential equations containing equal bases (non-linear exponents) eg: $2^{x\wedge 2} = 2^{3x-4}$ • solve exponential equations containing equal bases where one side requires reciprocation prior to solving (linear exponents only) eg: $4^{4-3x} = 1/4^{x-2}$
3	Solving exponential equations containing different bases	• solve exponential equations containing different bases (one base a power of the other, linear exponents only) eg: $3^{2x} = 9^{3x+12}$ • solve exponential equations containing different bases (one base a power of the other, non-linear exponents) eg: $4^{x\wedge 2} = 2^{3x+1}$

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10A)

Linear and non-linear relationships

ACMNA268 Apply understanding of polynomials to sketch a range of curves and describe the features of these curves from their equation		
Quest: Sketching polynomials		
Learning Journey Sketching polynomials		
Steps	**Content**	**Detail**
1	Recognising linear, quadratic and cubic expressions as examples of polynomials and relating the sketching of these curves to factorising polynomials and finding the zeros	• recognise linear, quadratic and cubic expressions as examples of polynomials and relate the sketching of these curves to factorising polynomials and finding the zeros
	Using digital technologies to graph polynomials of odd and even degree and investigating the relationship between the number of zeros and the degree of the polynomial	• use digital technologies to graph polynomials of odd and even degree and investigate the relationship between the number of zeros and the degree of the polynomial • explain the relationship between the number of zeros and the degree of the polynomial
	Connecting the roots of the equation P(x) = 0 to the x-intercepts, and the constant term to the y-intercept, of the graph of y = P(x)	• connect the roots of the equation P(x) = 0 to the x-intercepts, and the constant term to the y-intercept, of the graph of y = P(x)
	Determining the importance of the sign of the leading term of a polynomial on the behaviour of the curve as $x \to \pm\infty$	• determine the importance of the sign of the leading term of a polynomial on the behaviour of the curve as $x \to \pm\infty$ • explain the importance of the sign of the leading term of a polynomial on the behaviour of the curve as $x \to \pm\infty$
	Determining the effect of single, double and triple roots of a polynomial equation P(x) = 0 on the shape of the graph of y = P(x)	• determine the effect of single, double and triple roots of a polynomial equation P(x) = 0 on the shape of the graph of y = P(x)
2	Using the leading term, the roots of the equation P(x) = 0, and the x- and y-intercepts to sketch the graph of y= P(x)	• use the leading term, the roots of the equation P(x) = 0, and the x- and y-intercepts to sketch the graph of y = P(x) • describe the key features of a polynomial
3	Sketching the graph of a polynomial, given its key features including zeros	• sketch the graph of a polynomial, given its key features including zeros
4	Sketching a polynomial curve given the polynomial of any degree in factored form	• sketch a polynomial curve given the polynomial of any degree in factored form
5	Finding the polynomial in factored form given a sketch of its graph	• find the polynomial in factored form given a sketch of its graph
	Using the graph of y= P(x) to sketch y = −P(x), y = P(−x), y = P(x) + c, y = kP(x)	• use the graph of y = P(x) to sketch y = −P(x), y = P(−x), y = P(x) + c, y = kP(x)
	Explaining the similarities and differences between the graphs of 2 similar polynomials	• explain the similarities and differences between the graphs of 2 similar polynomials, such as $y = x_3 + x_2 + x$ and $y = x_3 + x_2 + x + 1$
ACMNA269 Factorise monic and non-monic quadratic expressions and solve a wide range of quadratic equations derived from a variety of contexts		
Quest: Factorising and solving quadratics		
Learning Journey Factorising using difference of 2 squares		
1	Factorising monic quadratic expressions involving the difference of 2 squares	• factorise monic quadratic expressions involving the difference of 2 squares
2	Factorising non-monic quadratic expressions involving the difference of 2 squares	• factorise non-monic quadratic expressions involving the difference of 2 squares
3	Factorising non-monic quadratic expressions involving the difference of 2 squares where a HCF needs to be taken out first	• factorise non-monic quadratic expressions involving the difference of 2 squares where a HCF needs to be taken out first

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10A)

Linear and non-linear relationships

ACMNA269 Factorise monic and non-monic quadratic expressions and solve a wide range of quadratic equations derived from a variety of contexts		
Quest: Factorising and solving quadratics		
Learning Journey Factorising using grouping		
Steps	**Content**	**Detail**
1	Factorising monic quadratic expressions involving grouping in pairs with four-term expressions	• factorise monic quadratic expressions involving grouping in pairs with four-term expressions
2	Factorising non-monic quadratic expressions involving grouping in pairs with four-term expressions	• factorise non-monic quadratic expressions involving grouping in pairs with four-term expressions
3	Factorising non-monic quadratic expressions involving grouping in pairs with four-term expressions where a HCF needs to be taken out first	• factorise non-monic quadratic expressions involving grouping in pairs with four-term expressions where a HCF needs to be taken out first
Learning Journey Factorising using perfect squares		
1	Factorising monic quadratic expressions involving perfect squares	• factorise monic quadratic expressions involving perfect squares
2	Factorising non-monic quadratic expressions involving perfect squares	• factorise non-monic quadratic expressions involving perfect squares
3	Factorising non-monic quadratic expressions involving perfect squares where a HCF needs to be taken out first	• factorise non-monic quadratic expressions involving perfect squares where a HCF needs to be taken out first
Learning Journey Factorising quadratic trinomials		
1	Factorising monic quadratic expressions involving quadratic trinomials	• factorise monic quadratic expressions involving quadratic trinomials
2	Factorising non-monic quadratic expressions involving quadratic trinomials	• factorise non-monic quadratic expressions involving quadratic trinomials
3	Factorising non-monic quadratic expressions involving quadratic trinomials where a HCF needs to be taken out first	• factorise non-monic quadratic expressions involving quadratic trinomials where a HCF needs to be taken out first
Learning Journey Factorising complex fractions		
1	Factorising and simplifying expressions where at least one entire quadratic expression sits in the numerator or denominator position of a fraction	• factorise and simplify expressions where at least one entire quadratic expression sits in the numerator or denominator and must be factorised first
2	Factorising and simplifying expressions where at least one entire quadratic expression sits in the numerator or denominator position of a fraction where a HCF needs to be taken out first	• factorise and simplify expressions where at least one entire quadratic expression sits in the numerator or denominator and must be factorised first where a HCF needs to be taken out first
Learning Journey Solving quadratic equations by factorisation		
1	Solving monic quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation	• solve monic quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation
2	Solving non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation	• solve non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by factorisation
Learning Journey Solving quadratic equations: Completing the square		
1	Solving monic quadratic equations of the form $ax^2 + bx + c = 0$ by completing the square	• solve monic quadratic equations of the form $ax^2 + bx + c = 0$ by completing the square
2	Solving non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by completing the square	• solve non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by completing the square

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Number and Algebra (AC10A)

Linear and non-linear relationships

ACMNA269 Factorise monic and non-monic quadratic expressions and solve a wide range of quadratic equations derived from a variety of contexts		
Quest: Factorising and solving quadratics		
Learning Journey Solving quadratic equations using the quadratic formula		
Steps	**Content**	**Detail**
1	Solving monic quadratic equations of the form $ax^2 + bx + c = 0$ by using the quadratic formula	• solve monic quadratic equations of the form
2	Solving non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by using the quadratic formula	• solve non-monic quadratic equations of the form $ax^2 + bx + c = 0$ by using the quadratic formula
Learning Journey Solving a variety of quadratic equations		
1	Solving a variety of monic quadratic equations	• solve a variety of monic quadratic equations • choose the most appropriate method to solve particular quadratic equations
2	Solving a variety of non-monic quadratic equations	• solve a variety of non-monic quadratic equations • choose the most appropriate method to solve particular quadratic equations
3	Checking solutions of a quadratic equation by substituting	• check solutions of a quadratic equation by substituting
Learning Journey The discriminant		
1	Understanding that $b^2 - 4ac$ refers to the 'discriminant' of a quadratic equation	• understand that $b^2 - 4ac$ refers to the 'discriminant' of a quadratic equation
	Connecting the value of $b^2 - 4ac$ (the discriminant) to the number of distinct solutions of $ax^2 + bx + c = 0$ and explaining the significance of this connection	• connect the value of $b^2 - 4ac$ (the discriminant) to the number of distinct solutions of $ax^2 + bx + c = 0$ • explain the significance of this connection between $b^2 - 4ac$ (the discriminant) to the number of distinct solutions of $ax^2 + bx + c = 0$
	Using the discriminant to identify whether a given quadratic equation has real solutions and whether those solutions are unique or equal	• identify whether a given quadratic equation has real solutions, and if there are real solutions, whether they are or are not equal
Learning Journey Quadratic equations in context		
1	Solving quadratic equations resulting from substitution into formulas	• solve quadratic equations resulting from substitution into formulas
2	Solving real-life problems involving quadratic equations within a given context	• solve real-life problems involving quadratic equations within a given context
3	Creating quadratic equations to solve a variety of problems and check solutions	• create quadratic equations to solve a variety of problems and check solutions
4	Explaining why one of the solutions to a quadratic equation generated from a word problem may not be a possible solution to the problem	• explain why one of the solutions to a quadratic equation generated from a word problem may not be a possible solution to the problem

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Measurement and Geometry (AC10)

Using units of measurement

ACMMG242 Solve problems involving surface area and volume for a range of prisms, cylinders and composite solids		
Quest: Area of volume of composite solids		
Learning Journey Surface area of composite solids		
Steps	**Content**	**Detail**
1	Finding the surface area: composite solids involving prisms	• find the surface area of composite three-dimensional objects involving prisms • find the surface area of composite three-dimensional objects involving prisms within the context of a problem
2	Finding the surface area: composite solids involving cylinders	• find the surface area of composite three-dimensional objects involving cylinders • find the surface area of composite three-dimensional objects involving cylinders within the context of a problem
3	Solving a variety of practical problems related to surface areas of prisms, cylinders and related composite solids	• solve a variety of practical problems related to surface areas of prisms, cylinders and related composite solids
Learning Journey Volume of composite solids		
1	Finding the volumes of solids that have uniform cross-sections that are sectors, including semicircles and quadrants	• find the volumes of solids that have uniform cross-sections that are sectors, including semicircles and quadrants
2	Finding the volumes of composite solids involving prisms and cylinders, eg a cylinder on top of a rectangular prism	• find the volumes of composite solids involving prisms and cylinders, eg a cylinder on top of a rectangular prism • dissect composite solids into two or more simpler solids to find their volumes
3	Solving a variety of practical problems related to the volumes and capacities of prisms, cylinders and related composite solids	• solve a variety of practical problems related to the volumes and capacities of prisms, cylinders and related composite solids

Geometric reasoning

ACMMG244 Apply logical reasoning, including the use of congruence and similarity, to proofs and numerical exercises involving plane shapes		
Quest: Solve problems using geometric reasoning		
Learning Journey Solving problems using geometric reasoning		
Steps	**Content**	**Detail**
1	Proving and applying theorems to triangles	• prove and apply that the exterior angle of a triangle is equal to the sum of the 2 interior opposite angles
2	Solving problems involving similarity ratios and areas and volumes	• solve problems involving similarity ratios and areas and volumes
3	Applying theorems and properties related to triangles and quadrilaterals in order to solve problems, giving reasons for each step	• apply theorems and properties related to triangles and quadrilaterals in order to solve problems, giving reasons for each step. Find both missing angles and/or missing sides.
4	Applying tests for quadrilaterals	• apply tests for quadrilaterals

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry (AC10)

Pythagoras and trigonometry

ACMMG245 Solve right-angled triangle problems including those involving direction and angles of elevation and depression		
Quest: Angles of elevation/depression & bearings		
Learning Journey Angles of elevation and depression		
Steps	**Content**	**Detail**
1	Introducing angles of elevation and depression	• introduce and define angles of elevation and depression • identify angles of elevation and depression on diagrams • interpret, construct and label diagrams involving angles of depression and elevation
2	Solving problems involving angles of elevation and depression	• connect the alternate angles formed when parallel lines are cut by a transversal with angles of elevation and depression • solve problems involving angles of elevation and depression with and without diagrams provided
Learning Journey Compass bearings		
1	Introducing compass bearings	• introduce compass bearings including using degrees, eg N25°W • convert a direction on a compass to a compass bearing and vice versa
2	Constructing diagrams of given information (compass bearings)	• construct accurate scale diagrams of given information (compass bearings) • represent problems involving compass bearings in diagrammatic form in order to assist solving problems
3	Solving problems involving compass bearings using Pythagoras' theorem	• solve problems involving compass bearings using Pythagoras' theorem with and without diagrams • solve a variety of practical problems involving compass bearings using Pythagoras' theorem within a given context
4	Solving problems involving compass bearings using trigonometric ratios	• solve problems involving compass bearings using trigonometric ratios with and without diagrams • solve a variety of practical problems involving compass bearings using trigonometric ratios within a given context
5	Solving problems involving compass bearings	• solve problems involving compass bearings with and without diagrams • solve a variety of practical problems involving compass bearings within a given context
Learning Journey True bearings		
1	Introducing true bearings	• introduce true bearings including using degrees, eg 045° • convert between true bearings and compass bearings
2	Constructing diagrams of given information (true bearings)	• construct accurate scale diagrams of given information (true bearings) • represent problems involving true bearings in diagrammatic form in order to assist solving problems
3	Solving problems involving true bearings using Pythagoras' theorem	• solve problems involving true bearings using Pythagoras' theorem with and without diagrams • solve a variety of practical problems involving true bearings using Pythagoras' theorem within a given context
4	Solving problems involving true bearings using trigonometric ratios	• solve problems involving true bearings using trigonometric ratios with and without diagrams • solve a variety of practical problems involving true bearings using trigonometric ratios within a given context
5	Solving problems involving true bearings	• solve problems involving true bearings with and without diagrams • solve a variety of practical problems involving true bearings within a given context

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry (AC10A)

Using units of measurement

ACMMG271 Solve problems involving surface area and volume of right pyramids, right cones, spheres and related composite solids		
Quest: Surface area & volume: composite solids		
Learning Journey Surface area of pyramids and cones		
Steps	**Content**	**Detail**
1	Finding the surface area: pyramids (without Pythagoras' theorem)	• find the surface area of pyramids (without Pythagoras' theorem) • find the surface area of pyramids (without Pythagoras' theorem) within the context of a problem
2	Finding the surface area: pyramids (with and without Pythagoras' theorem)	• find the surface area of pyramids (with and without Pythagoras' theorem) • find the surface area of pyramids (with and without Pythagoras' theorem) within the context of a problem
3	Finding the surface area: cones (without Pythagoras' theorem)	• find the surface area of cones (without Pythagoras' theorem)
4	Finding the surface area: cones (with and without Pythagoras' theorem)	• find the surface area of cones (with and without Pythagoras' theorem) • find the surface area of cones (with and without Pythagoras' theorem) within the context of a problem
Learning Journey Surface area of spheres		
1	Finding the surface area: spheres	• find the surface area of spheres • find the surface area of spheres within the context of a problem
2	Finding the surface area: parts of spheres	• find the surface area of parts of spheres • find the surface area of parts of spheres within the context of a problem
Learning Journey Find dimensions of objects given the surface area		
1	Finding possible dimensions of three-dimensional objects given the surface area	• find possible dimensions of three-dimensional objects given the surface area • find possible dimensions of three-dimensional objects given the surface area within the context of a problem
2	Finding the missing dimension, given the other necessary dimensions and the surface area	• find the missing dimension, given the other necessary dimensions and the surface area • find the missing dimension, given the other necessary dimensions and the surface area within the context of a problem
Learning Journey Surface area of composite solids		
1	Finding the surface area: composite solids involving pyramids	• find the surface area of composite three-dimensional objects involving pyramids • find the surface area of composite three-dimensional objects involving pyramids within the context of a problem
2	Finding the surface area: composite solids involving cones	• find the surface area of composite three-dimensional objects involving cones • find the surface area of composite three-dimensional objects involving cones within the context of a problem
3	Finding the surface area: composite solids involving spheres and parts of spheres	• find the surface area of composite three-dimensional objects involving spheres and parts of spheres • find the surface area of composite three-dimensional objects involving spheres within the context of a problem
4	Finding the surface area: composite solids involving the addition of any three-dimensional objects	• find the surface area of composite three-dimensional objects involving the addition any three-dimensional shapes • find the surface area of composite three-dimensional objects involving the addition of shapes within the context of a problem
	Finding the surface area: composite solids involving the subtraction of any three-dimensional objects	• find the surface area of composite 3D objects involving the subtraction of any 3D shapes • find the surface area of composite 3D objects involving the subtraction of shapes within the context of a problem

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry (AC10A)

Using units of measurement

ACMMG271 Solve problems involving surface area and volume of right pyramids, right cones, spheres and related composite solids		
Quest: Surface area & volume: composite solids		
Learning Journey Volume of cones		
Steps	**Content**	**Detail**
1	Developing the formula for the volume of cones	• develop and use the formula to find the volumes of cones
2	Solving a variety of practical problems involving the volumes of cones	• solve a variety of practical problems involving the volumes of cones
3	Developing a formula to find the volume of pyramids	• develop and use the formula to find the volumes of pyramids
4	Solving a variety of practical problems involving the volume of pyramids	• solve a variety of practical problems involving the volume of pyramids
Learning Journey Volume of spheres		
1	Developing the formula for the volume of a sphere	• develop and use the formula to find the volumes of spheres
2	Solving a variety of practical problems involving the volume of spheres	• solve a variety of practical problems involving the volume of spheres including related problems such as half of spheres
3	Finding dimensions of a sphere given its volume (metric units)	• find the dimensions of a sphere, given its volume, by substitution into a formula • find the dimensions of a sphere, given its volume, by substitution into a formula within the context of a problem
4	Finding dimensions of part of a sphere given its volume (metric units)	• find the dimensions of a part of a sphere, given its volume, by substitution into a formula • find the dimensions of a part of a sphere, given its volume, by substitution into a formula within the context of a problem
Learning Journey Volume of composite solids		
1	Calculating the volume of composite solids without spheres and cones (metric units)	• dissect composite solids into 2 or more simpler solids, without spheres or cones • find the volumes of composite solids without spheres or cones • solve a variety of practical problems in context without spheres or cones
2	Calculating the volume of composite solids with spheres and cones included (metric units)	• dissect composite solids into 2 or more simpler solids with spheres or cones • find the volumes of composite solids with spheres or cones • solve a variety of practical problems in context with spheres or cones
3	Calculating the volume of composite solids (metric units) (Pythagoras' theorem necessary)	• dissect composite solids into 2 or more simpler solids (Pythagoras' theorem necessary) • find the volumes of composite solids (Pythagoras' theorem necessary) • solve a variety of practical problems in context (Pythagoras' theorem necessary)
4	Solving real-life problems involving the calculations of composite solids	• solve real-life problems involving the calculations of composite solids

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry (AC10A)

Using units of measurement

ACMMG272 Prove and apply angle and chord properties of circles		
Quest: Properties of circles		
Learning Journey Circle terminology		
Steps	**Content**	**Detail**
1	Identifying and naming the primary parts of the circle	• identify and name parts of a circle (centre, radius, diameter, circumference, sector, arc, tangents, semicircle)
	Understanding the use of the terms 'major' and 'minor' within the context of circles	• understand the terms 'major sector' and 'minor sector' • understand the terms 'major arc' and 'minor arc' • understand the terms 'major segment' and 'minor segment'
2	Identifying and naming further parts of the circle	• identify and name parts of a circle (chord, secant, segment)
	Using terminology associated with angles in circles	• use terminology associated with angles in circles
	Identifying the arc on which an angle at the centre or circumference stands	• identify the arc on which an angle at the centre or circumference stands
Learning Journey Circle properties: Tangents		
1	Understanding and demonstrating that at any point on a circle there is a unique tangent to the circle	• understand and demonstrate that at any point on a circle there is a unique tangent to the circle
2	Understanding and demonstrating that a tangent is perpendicular to the radius at the point of contact	• understand and demonstrate that a tangent is perpendicular to the radius at the point of contact
Learning Journey Circle properties: Equal radii		
1	Applying the property that all radii on a circle are equal in length	• apply the property that all radii on a circle are equal in length including the implication that any triangle formed with 2 radii will be isosceles to solve problems
2	Using the property that all radii on a circle are equal in length to find the length of a chord given the angle at the centre (angle in degrees)	• use the property that all radii on a circle are equal in length to find the length of a chord given the angle at the centre (angle in degrees)
3	Using the property that all radii on a circle are equal in length to find the area of the isosceles triangle given the angle at the centre (angle in degrees)	• use the property that all radii on a circle are equal in length to find the area of the isosceles triangle given the angle at the centre (angle in degrees)
4	Using the property that all radii on a circle are equal in length to find the area of the minor segment given the angle at the centre (angle in degrees)	• use the property that all radii on a circle are equal in length to derive the formula for the area of the minor segment given the angle at the centre • use the property that all radii on a circle are equal in length to find the area of the minor segment given the angle at the centre
	Using the area of the minor segment, find the area of the major segment	• use the area of the minor segment find the area of the major segment
Learning Journey Circle properties: Chord properties		
1	Proving and applying the property that chords of equal length in a circle subtend equal angles at the centre and are equidistant from the centre	• apply the property that chords of equal length in a circle are equidistant from the centre to solve problems
2	Proving and applying the property that a perpendicular from the centre of a circle to a chord bisects the chord and that conversely, the line from the centre of a circle to the midpoint of a chord is perpendicular to the chord	• apply the property that a perpendicular from the centre of a circle to a chord bisects the chord and that conversely, the line from the centre of a circle to the midpoint of a chord is perpendicular to the chord to solve problems • apply the property that the perpendicular bisector of a chord of a circle passes through the centre to solve problems
3	Proving and applying the property that given any 3 non-collinear points, the point of intersection of the perpendicular bisectors of any 2 sides of the triangle, formed by the 3 points, is the centre of the circle through all 3 points	• prove the property that given any 3 non-collinear points, the point of intersection of the perpendicular bisectors of any 2 sides of the triangle, formed by the 3 points, is the centre of the circle through all 3 points to solve problems • apply the property that given any 3 non-collinear points, the point of intersection of the perpendicular bisectors of any 2 sides of the triangle, formed by the 3 points, is the centre of the circle through all 3 points to solve problems

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry (AC10A)

Using units of measurement

ACMMG272 Prove and apply angle and chord properties of circles		
Quest: Properties of circles		
Learning Journey Circle properties: Chord properties		
Steps	**Content**	**Detail**
4	Proving and applying the property that when 2 circles intersect, the line joining their centres bisects their common chord at right angles	• apply the property that when 2 circles intersect, the line joining their centres bisects their common chord at right angles to solve problems • apply the property that when 2 circles intersect, the line joining their centres bisects their common chord at right angles to solve problems
Learning Journey Circle properties: Angle in a semicircle property		
1	Applying the property that the angle in a semicircle is a right angle involving Pythagoras' theorem	• apply the property that the angle in a semicircle is a right angle to solve problems involving the value of unknown angles • apply the property that the angle in a semicircle is a right angle involving Pythagoras' theorem to find an unknown diameter length (Pythagoras' theorem finding the hypotenuse) • apply the property that the angle in a semicircle is a right angle involving Pythagoras' theorem to find an unknown chord length (Pythagoras' theorem finding a shorter side)
2	Applying the property that the angle in a semicircle is a right angle involving trigonometric ratios	• apply the property that the angle in a semicircle is a right angle involving trigonometric ratios to find an unknown diameter length • apply the property that the angle in a semicircle is a right angle involving trigonometric ratios to find an unknown chord length • apply the property that the angle in a semicircle is a right angle involving trigonometric ratios to find an unknown angle
3	Applying the property that the angle in a semicircle is a right angle to find the area of a triangle	• apply the property that the angle in a semicircle is a right angle to find the area of a triangle
4	Applying the property that the angle in a semicircle is a right angle to find the area of a triangle in order to find the area of the segment	• apply the property that the angle in a semicircle is a right angle to find the area of a triangle in order to find the area of the minor segment • apply the property that the angle in a semicircle is a right angle to find the area of a triangle in order to find the area of the minor segment in order to find the major segment
Learning Journey Circle properties: Angle properties		
1	Proving and applying the property that the angle at the centre of a circle is twice the angle at the circumference standing on the same arc	• apply the property that the angle at the centre of a circle is twice the angle at the circumference standing on the same arc to solve problems
2	Proving and applying the property that angles at the circumference, standing on the same arc, are equal	• apply the property that angles at the circumference, standing on the same arc, are equal to solve problems
3	Proving and applying the property that the opposite angles of cyclic quadrilaterals are supplementary	• apply the property that the opposite angles of cyclic quadrilaterals are supplementary to solve problems
4	Proving and applying the property that an exterior angle at a vertex of a cyclic quadrilateral is equal to the interior opposite angle	• apply the property that an exterior angle at a vertex of a cyclic quadrilateral is equal to the interior opposite angle to solve problems

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Measurement and Geometry (AC10A)

Using units of measurement

ACMMG272 Prove and apply angle and chord properties of circles		
Quest: Properties of circles		
Learning Journey Circle properties: solve problems using properties		
Steps	**Content**	**Detail**
Learning Journey Circle properties: solve problems using properties		
1	Applying chord properties of circles to find unknown angles, lengths and areas in diagrams	• apply chord properties of circles to find unknown angles, lengths and areas in diagrams
2	Applying angle properties of circles to find unknown angles, lengths and areas in diagrams	• apply angle properties of circles to find unknown angles, lengths and areas in diagrams

Pythagoras and trigonometry

ACMMG273 Establish the sine, cosine and area rules for any triangle and solve related problems		
Quest: Trigonometry: non right-angled triangles		
Learning Journey Sine rule		
Steps	**Content**	**Detail**
1	Applying the sine rule	• identify relevant information on a triangle for input into the sine rule
2	Finding an unknown side using the sine rule	• apply the sine rule as a formula isolating the lower case pronumeral (side length) • find the missing side on a triangle using the sine rule given its corresponding angle and another side and angle that are corresponding
3	Finding an unknown angle using the sine rule	• apply the sine rule as a formula isolating the upper case pronumeral (angle) • find the missing angle on a triangle using the sine rule given its corresponding side and another side and angle that are corresponding. Include the ambiguous case
4	Solving problems using the sine rule	• solve problems in context using the sine rule
Learning Journey Cosine rule		
1	Applying the cosine rule	• apply the cosine rule as a formula isolating the lower case pronumeral (side length) • apply the cosine rule as a formula isolating the upper case pronumeral (angle) • rearrange cosine rule to make different pronumerals the subject
2	Using the cosine rule to find a missing side	• find the missing side on a triangle using the cosine rule given its corresponding angle and the other 2 sides
3	Using the cosine rule to find a missing angle	• find the missing angle on a triangle using the cosine rule given the 3 sides of the triangle
4	Solving problems using the cosine rule	• solve problems in context using the cosine rule in order to extend the knowledge of the cosine rule

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry (AC10A)

Pythagoras and trigonometry

ACMMG273 Establish the sine, cosine and area rules for any triangle and solve related problems		
Quest: Trigonometry: non right-angled triangles		
Learning Journey Area rule		
Steps	**Content**	**Detail**
1	Applying the area of a triangle rule	• apply the area of a triangle rule as a formula isolating the lower case pronumeral (side length) • apply the area of a triangle rule as a formula isolating the upper case pronumeral (angle) • rearrange the area of a triangle rule to make different pronumerals the subject
2	Using the area of a triangle rule to find the area of a triangle	• find the area of a triangle using the area of a triangle rule given 2 sides and the included angle
3	Using the area of a triangle rule to find a missing side	• find the missing side on a triangle using the area of a triangle rule given the other 3 variables
4	Using the area of a triangle rule to find a missing angle	• find the missing angle in a triangle using the area of a triangle rule given the other 3 variables
5	Using the area of a triangle rule to solve problems	• solve problems in context using the area of a triangle rule in order to extend the knowledge of the area of a triangle rule
Learning Journey Solving problems in non-right angled triangles		
1	Solving a variety of two-dimensional problems involving the sine, cosine and area of a triangle rules of different orientation	• solve a variety of two-dimensional problems involving the sine, cosine and area of a triangle rules of different orientation
2	Solving a variety of three-dimensional problems involving the sine, cosine and area of a triangle rules of different orientation	• solve a variety of three-dimensional problems involving the sine, cosine and area of a triangle rules of different orientation
ACMMG274 Use the unit circle to define trigonometric functions, and graph them with and without the use of digital technologies		
Quest: Trigonometry: identities, ratios, angles		
Learning Journey Using trigonometric identities		
1	Deriving and using the trigonometric identitiy $\tan\theta = \sin\theta/\cos\theta$ using the unit circle (using θ)	• use the trigonometric identity that the tangent ratio is expressed as $\tan\theta = \sin\theta/\cos\theta$ using the unit circle
2	Deriving and using the Pythagorean identity $\sin2\theta+\cos2\theta = 1$ (using θ)	• use the Pythagorean identity $\sin^2\theta+\cos^2\theta = 1$
Learning Journey Investigating trigonometric ratios		
1	Investigating the sine, cosine, tangent ratios for (at least) $0°\leq \theta \leq 360°$ using the unit circle and dynamic mathematical software (using θ)	• communicate how the value of each trigonometric ratio changes as θ travels from 0° to 360° • find the value of each trigonometric ratio for angles of any magnitude using the calculator and confirming with the aid of the unit circle
2	Comparing the features of trigonometric curves, including periodicity and symmetry	• compare the features of trigonometric curves, including periodicity and symmetry
	Comparing the features of trigonometric curves, including periodicity and symmetry	• compare the features of trigonometric curves, including periodicity and symmetry
3	Sketching the sine, cosine, tangent ratios for (at least) $0°\leq \theta \leq 360°$	• sketch the sine, cosine, tangent ratios for (at least) $0°\leq \theta \leq 360°$

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Measurement and Geometry (AC10A)

Pythagoras and trigonometry

ACMMG274 Use the unit circle to define trigonometric functions, and graph them with and without the use of digital technologies		
Quest: Trigonometry: identities, ratios, angles		
Learning Journey Angles of any magnitude		
Steps	**Content**	**Detail**
1	Investigating graphs of the sine, cosine and tangent functions for angles of any magnitude, including negative angles	• investigate graphs of the sine, cosine and tangent functions for angles of any magnitude, including negative angles
2	Using the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\sin A = \sin(180° - A)$	• use the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\sin A = \sin(180° - A)$
	Using the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\sin A = \sin(180° - A)$	• use the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\sin A = \sin(180° - A)$
3	Using the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\cos A = -\cos(180° - A)$	• use the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\cos A = -\cos(180° - A)$
4	Using the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\tan A = -\tan(180° - A)$	• use the unit circle or graphs of trigonometric functions to establish and use the following relationships for obtuse angles, where $0° \leq A \leq 90°$: $\tan A = -\tan(180° - A)$
5	Solving problems using the angles of any magnitude identities	• solve problems using the angles of any magnitude identities
ACMMG275 Solve simple trigonometric equations		
Quest: Solving simple trigonometric equations		
Learning Journey Solving simple trigonometric equations		
1	Finding the exact values of trigonometric ratios	• construct triangles in order to obtain exact trigonometric ratios for 0°, 30°, 45°, 60° • find the exact value for sine ratio for angles 0°, 30°, 45°, 60° • find the exact value for cosine ratio for angles 0°, 30°, 45°, 60° • find the exact value for tangent ratio for angles 0°, 30°, 45°, 60°
2	Solving problems using the exact trigonometric ratios	• solve problems using the of trigonometric ratios leaving in exact form where necessary
3		• use complementary angle relationships to solve problems
4	Solving trigonometric equations involving exact ratios and complementary angles giving all possible solutions	• solve trigonometric equations involving exact ratios and complementary angles giving all possible solutions

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Measurement and Geometry (AC10A)

Pythagoras and trigonometry

ACMMG276 Apply Pythagoras' Theorem and trigonometry to solving three-dimensional problems in right-angled triangles		
Quest: Solving problems in three dimensions		
Learning Journey Solving problems in three dimensions		
Steps	**Content**	**Detail**
1	Solving problems involving the lengths of the edges and diagonals of rectangular prisms and other three-dimensional objects using Pythagoras's Theorem and/or trigonometry	• solve problems involving the lengths of the edges and diagonals of rectangular prisms and other three-dimensional objects using Pythagoras's Theorem and/or trigonometry
2	Using a given diagram to solve problems involving right-angled triangles in three dimensions using Pythagoras's Theorem and/or trigonometry	• use a given diagram to solve problems involving right-angled triangles in three dimensions using Pythagoras's Theorem and/or trigonometry
3	Drawing diagrams and use them to solve word problems involving right-angled triangles in three dimensions, including using bearings and angles of elevation or depression using Pythagoras's Theorem and/or trigonometry	• draw diagrams and use them to solve word problems involving right-angled triangles in three dimensions, including using bearings and angles of elevation or depression using Pythagoras's Theorem and/or trigonometry

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Statistics and Probability (AC10)

Chance

ACMSP246 Describe the results of two- and three-step chance experiments, both with and without replacements, assign probabilities to outcomes and determine probabilities of events. Investigate the concept of independence		
Quest: Two/three-step experiments, independence		
Learning Journey Three-step chance experiments with replacement		
Steps	**Content**	**Detail**
1	Listing all outcomes for 3-step chance experiments, with replacement and assign probabilities to outcomes	• list all outcomes for 3-step chance experiments, with replacement and assign probabilities to outcomes
2	Determining probabilities for events for 3-step chance experiments with replacement	• determine probabilities for events for 3-step chance experiments with replacement
3	Calculating probabilities of simple and compound events in 3-step chance experiments, with replacement	• calculate probabilities of simple and compound events in 3-step chance experiments, with replacement
Learning Journey Three-step chance experiments without replacement		
1	Listing all outcomes for 3-step chance experiments, without replacement and assign probabilities to outcomes	• list all outcomes for 3-step chance experiments, without replacement and assign probabilities to outcomes
2	Determining probabilities for events for 3-step chance experiments without replacement	• determine probabilities for events for 3-step chance experiments without replacement
3	Calculating probabilities of simple and compound events in 3-step chance experiments without replacement	• calculate probabilities of simple and compound events in 3-step chance experiments without replacement
Learning Journey Independent events		
1	Understanding that independent events have a set probability that do not rely on previous events	• explore examples of independent events, eg consecutive rolls of dice • explore examples of dependent events, eg drawing cards from a deck
2	Determining if 2 events, A and B, are independent by using the characteristic that if the probability of A and B occurring together is the product of their probabilities	• determine if 2 events, A and B, are independent by using the characteristic that if the probability of A and B occurring together is the product of their probabilities
3	Recognising and using the fact, that for independent events P(A and B) = P(A) × P(B)	• recognise and using the fact, that for independent events P(A and B) = P(A) × P(B)
ACMSP247 Use the language of 'if....then, 'given', 'of', 'knowing that' to investigate conditional statements and identify common mistakes in interpreting such language		
Quest: Conditional probability		
Learning Journey Conditional probability introduction		
1	Identifying mistakes in interpreting conditional probability statements	• identify mistakes in interpreting conditional probability statements
2	Determining the conditional probability of A given B as the fraction of B's outcomes that also belong to A	• determine the conditional probability of A given B as the fraction of B's outcomes that also belong to A • interpret the answer to questions modelled on conditional probability calculations
3	Applying the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpreting the answer in terms of the model	• apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B) • interpret the answer to questions modelled on the addition rule for probability
4	Applying the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpreting the answer in terms of the model	• apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B) • interpret the answer to questions modelled on the multiplication rule for probability

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Statistics and Probability (AC10)

Chance

ACMSP247 Use the language of 'if....then, 'given', 'of', 'knowing that' to investigate conditional statements and identify common mistakes in interpreting such language		
Quest: Conditional probability		
Learning Journey Conditional probability and two-way tables		
Steps	**Content**	**Detail**
1	Constructing and interpreting two-way frequency tables of data when 2 categories are associated with each object being classified	• construct and interpret two-way frequency tables of data when two categories are associated with each object being classified
2	Determining if events are independent using a two-way table as a sample space	• determine if events are independent using a two-way table as a sample space
3	Approximating conditional probabilities using two-way tables as a samples space	• approximate conditional probabilities using two-way tables as a samples space
4	Calculating and interpreting conditional probabilities through representation using expected frequencies with two-way tables	• calculate probabilities through representation using expected frequencies with two-way tables • interpret conditional probabilities through representation using expected frequencies with two-way tables
5	Calculating and interpreting probabilities of compound events using two-way tables	• calculate probabilities of compound events using two-way tables • interpret probabilities of compound events using two-way tables
Learning Journey Conditional probability and tree diagrams		
1	Calculating and interpreting conditional probabilities through representation using expected frequencies with tree diagrams	• calculate conditional probabilities through representation using expected frequencies with tree diagrams • interpret conditional probabilities through representation using expected frequencies with tree diagrams
2	Calculating and interpreting probabilities of compound events using tree diagrams	• calculate and interpret probabilities of compound events using tree diagrams • interpret probabilities of compound events using tree diagrams
Learning Journey Conditional probability and arrays		
1	Calculating and interpreting conditional probabilities through representation using expected frequencies with arrays	• calculate conditional probabilities through representation using expected frequencies with arrays • interpret conditional probabilities through representation using expected frequencies with arrays
2	Calculating and interpreting probabilities of compound events using arrays	• calculate probabilities of compound events using arrays • interpret probabilities of compound events using arrays
Learning Journey Conditional probability and Venn diagrams		
1	Calculating and interpreting conditional probabilities through representation using expected frequencies with Venn diagrams	• calculate conditional probabilities through representation using expected frequencies with Venn diagrams • interpret conditional probabilities through representation using expected frequencies with Venn diagrams
2	Calculating and interpreting probabilities of compound events using Venn diagrams	• calculate probabilities of compound events using Venn diagrams • interpret probabilities of compound events using Venn diagrams
Learning Journey Set theory and Venn diagrams		
2	Defining unions, intersections and complements of subsets using symbols	• define unions as the combination of subsets, ie if an element is in A U B then the element can be in either A or B • define intersections as the crossover between subsets, ie if an element is in A ∩ B then the element must be in A and B • define complements of an event as all outcomes that are not the event
3	Identifying different regions on a Venn diagram using set theory	• identify different regions on a Venn diagram using set theory

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Mathletics

Statistics and Probability (AC10)

Data representation and interpretation

ACMSP248 Determine quartiles and interquartile range		
Quest: Interquartile range		
Learning Journey Interquartile range		
Steps	**Content**	**Detail**
1	Defining quartiles and interquartile-range	• defining quartiles and interquartile-range
	Describing the proportion of data values contained between various quartiles	• describe the proportion of data values contained between various quartiles
2	Determining the upper and lower extremes, median, and upper and lower quartiles for sets of numerical-data	• determine the upper and lower extremes, median, and upper and lower quartiles for sets of numerical-data
3	Determining the interquartile range for sets of data	• determine the interquartile range for sets of data
ACMSP249 Construct and interpret box plots and use them to compare data sets		
Quest: Constructing and interpreting Box plots		
Learning Journey Constructing and interpreting Box plots		
1	Constructing a box-and-whisker plot using the median, the upper and lower quartiles, and the upper and lower extremes of a set of data	• construct a box-and-whisker plot using the median, the upper and lower quartiles, and the upper and lower extremes of a set of data
	Constructing a box-and-whisker plot using the median, the upper and lower quartiles, and the upper and lower extremes of a set of data	• construct a box-and-whisker plot using the median, the upper and lower quartiles, and the upper and lower extremes of a set of data
2	Comparing 2 or more sets of data using parallel box-and-whisker-plots drawn on the same scale	• compare 2 or more sets of data using parallel-box-and-whisker-plots drawn on the same scale
ACMSP250 Compare shapes of box plots to corresponding histograms and dot plots		
Quest: Comparing Box plots		
Learning Journey Comparing Box plots		
1	Determining quartiles from data displayed in histograms and dot plots, and using these to draw a box-and-whisker plot to represent the same set of data	• determine quartiles from data displayed in histograms and dot plots • draw a box-and-whisker plot to represent the same set of data displayed in a histogram
3	Identifying skewed and symmetrical sets of data displayed in histograms and dot plots, and describing the shape/features of the corresponding box-and-whisker plot for such sets of data	• identify skewed and symmetrical sets of data displayed in histograms and dot plots • describe the shape/features of the corresponding box-and-whisker plot for such sets of data

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Statistics and Probability (AC10)

Data representation and interpretation

ACMSP251 Use scatter plots to investigate and comment on relationships between two numerical variables		
Quest: Scatter plots		
Learning Journey Scatter plots		
Steps	**Content**	**Detail**
1	Describing, informally, the strength and direction of the relationship between 2 variables displayed in a scatter plot	• describe, informally, the strength and direction of the relationship between 2 variables displayed in a scatter plot
2	Making predictions from a given scatter plot or other graph	• make predictions from a given scatter plot or other graph
3	Drawing conclusions from a given scatter plot	• draw conclusions from a given scatter plot
ACMSP252 Investigate and describe bivariate numerical data where the independent variable is time		
Quest: Bivariate data		
Learning Journey Bivariate data		
1	Recognising the difference between an independent variable and its dependent variable	• recognise the difference between an independent variable and its dependent variable
	Distinguishing bivariate data from single variable (univariate) data	• distinguish bivariate data from single variable (univariate) data
3	Describing changes in the dependent variable over time	• describe changes in the dependent variable over time
4	Interpreting data displays representing 2 or more dependent numerical-variables against time	• interpret data displays representing 2 or more dependent numerical-variables against time
ACMSP253 Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data		
Quest: Evaluating statistical reports		
Learning Journey Evaluating statistical reports		
1	Analysing graphical displays to recognise features that may have been manipulated to cause a misleading interpretation and/or support a particular point of view	• analyse graphical displays to recognise features that may have been manipulated to cause a misleading interpretation and/or support a particular point of view

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Statistics and Probability (AC10A)

Chance

ACMSP277 Investigate reports of studies in digital media and elsewhere for information on their planning and implementation		
Quest: Critical analysis of data in the media		
Learning Journey Critical analysis of data in the media		
Steps	**Content**	**Detail**
1	Investigating the appropriateness of sampling methods and sample size used in reports where statements about a population are based on a sample	• investigate the appropriateness of sampling methods and sample size used in reports where statements about a population are based on a sample
	Determining whether a sample used enables inferences or conclusions to be drawn about the relevant population	• determine whether a sample used enables inferences or conclusions to be drawn about the relevant population
2	Evaluating whether graphs in a report could mislead, and whether graphs and numerical information support the claims	• evaluate whether graphs in a report could mislead, and whether graphs and numerical information support the claims

Data representation and interpretation

ACMSP278 Calculate and interpret the mean and standard deviation of data and use these to compare data sets		
Quest: Mean and standard deviation		
Learning Journey Using the mean and standard deviation of data sets		
Steps	**Content**	**Detail**
1	Defining standard deviation and the percentiles they represent	• define standard deviation and the percentiles they represent
2	Finding the standard deviation of a set of data using digital technologies	• find the standard deviation of a set of data using digital technologies
3	Investigating and describing the effect, if any, on the standard deviation of adding a data value to the set of data	• investigate and describe the effect, if any, on the standard deviation of adding a data value to the set of data
	Investigating and describing the effect, if any, on the standard deviation of altering all of the data values in the set of data by operations such as doubling all data values or adding a constant to all data values	• investigate and describe the effect, if any, on the standard deviation of altering all of the data values in the set of data by operations such as doubling all data values or adding a constant to all data values
	Estimating population percentages of a data set using its mean and standard deviation	• estimate population percentages of a data set using its mean and standard deviation (assuming the population fits a normal distribution)
4	Fitting a data set to a normal distribution using its mean and standard deviation	• fit a data set to a normal distribution using its mean and standard deviation
5	Estimating areas under the normal curve using calculators and tables	• estimate areas under the normal curve using calculators and tables
Learning Journey Comparing data using mean and standard deviation		
1	Comparing 2 sets of data by using the mean and standard deviation	• compare 2 sets of data by using the mean and standard deviation
2	Comparing and describing the spread of sets of data with the same mean but different standard deviations	• compare and describe the spread of sets of data with the same mean but different standard deviations
3	Comparing and describing the spread of sets of data with different means by referring to standard deviation	• compare and describe the spread of sets of data with different means by referring to standard deviation

Australian Curriculum Year 10

Understanding Practice and Fluency (UPF)

Statistics and Probability (AC10A)

Data representation and interpretation

ACMSP279 Use information technologies to investigate bivariate numerical data sets. Where appropriate use a straight line to describe the relationship allowing for variation		
Quest: Bivariate data and lines of best fit		
Learning Journey Bivariate data and lines of best fit		
Steps	**Content**	**Detail**
1	Constructing a line of best fit for bivariate numerical data using digital technologies, such as a spreadsheet	• construct a line of best fit for bivariate numerical data using digital technologies, such as a spreadsheet
2	Predicting what might happen between known data values and predicting what might happen beyond known data values using lines of best fit	• predict what might happen between known data values (interpolation) and predict what might happen beyond known data values using lines of best fit

Mathletics

For more information about Mathletics,
contact our friendly team.

www.mathletics.com/contact

A 3P Learning Product