Mathletics

British Columbia Curriculum

Understanding Practice and Fluency (UPF)

Grades 7 – 8

July, 2021

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BC Curriculum

Understanding, Practice and Fluency (UPF)
June, 2021

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Part I

Grade 7

1 Number

Relationships between decimals, fractions, ratios, and percents			
Decimals, fractions, ratios, percents			
Learning Journey	Steps	Content	Details
Investigating terminating and repeating decimals	1	Investigating terminating and repeating decimals	• use the notation for repeating decimals, e.g., 0.33333... = $0.\overline{3}$, 0.345345345... = $0.\overline{345}$, 0.266666... = $0.2\overline{6}$
			• convert fractions to terminating or repeating decimals as appropriate
			• recognize that calculators may show approximations to repeating decimals, and explain why, e.g., 2/3 displayed as 0.666666667
Ordering fractions and decimals on a number line	1	Ordering fractions and decimals on a number line, including terminating and repeating decimals	• order fractions and decimals on a number line, including terminating and repeating decimals
Converting decimals to percents	1	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
Converting terminating decimals to fractions	1	Converting decimals to fraction up to 3 decimal places with models	• find an equivalent fraction with denominators of 10, 100 or 1000 to convert from decimals to fractions
	2	Converting terminating decimals less than 1 into fractions	• convert terminating decimals less than 1 into fractions
	3	Converting terminating decimals greater than 1 into fractions	• convert terminating decimals greater than 1 into improper fractions
			• convert terminating decimals greater than 1 into mixed numbers
Converting repeating decimals to fractions	1	Converting recurring decimals into fractions	• convert recurring decimals into fractions

Learning Journey	Steps	Content	Details
Converting fractions to terminating decimals	1	Converting fractions to decimals up to 3 decimal places	• find an equivalent fraction with denominators of 10, 100 or 1000 to convert from fractions to decimals
	2	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 numbers to terminating decimals by manipulating the denominator to be a power of 10
	3	Converting fractions to terminating decimals using division	• convert fractions to terminating decimals using division
			• convert improper fractions to terminating decimals using division
			• convert mixed numbers to terminating decimals using division
Converting fractions to repeating decimals	1	Converting fractions to repeating decimals using division	• convert fractions to repeating decimals using division
			• convert improper fractions to repeating decimals using division
			• convert mixed numbers to repeating decimals using division
Converting fractions to percents	1	Converting fractions to terminating percentages by manipulating the denominator to 100	• convert unit 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 numbers to terminating percentages by manipulating the denominator to be 100
	2	Converting fractions to terminating percentages using division	• convert fractions to terminating percentages using division
			• convert improper fractions to terminating percentages using division
			• convert mixed numbers to terminating percentages using division
Converting fractions to repeating percents	1	Converting fractions to repeating percentages using division	• convert fractions to repeating percentages using division
			• convert improper fractions to repeating percentages using division
			• convert mixed numbers to repeating percentages using division
Comparing/ordering: fractions, decimals, percents	1	Comparing and ordering fractions, decimals and percentages	• compare and order a mix of fractions, decimals and percentages

Learning Journey	Steps	Content	Details
Converting percents to fractions and mixed numbers	1	Converting percentages less than or equal to 100% into fractions	• convert percentages less than or equal to 100% into fractions
	2	Converting percentages greater than 100% to mixed numbers	• convert percentages greater than 100% to mixed numbers
	3	Converting percentages greater than 100% to improper fractions	• convert percentages greater than 100% to improper fractions
Converting percents to decimals	1	Converting terminating percentages less than 100% into a decimal	• convert terminating percentages less than 100% into a decimal
	2	Converting terminating percentages greater than or equal to 100% into a decimal	• convert terminating percentages greater than or equal to 100% into a decimal
Converting repeating percents to decimals	1	Converting repeating percentages less than 100% into a decimal	• convert repeating percentages less than 100% into a decimal
	2	Converting repeating percentages greater than or equal to 100% into a decimal	• convert repeating percentages greater than or equal to 100% into a decimal
Equivalence: decimals, fractions, ratios, percents	1	Understanding and demonstrating equivalence between decimals, fractions, ratios and percents	• understand and demonstrate equivalence between decimals, fractions, ratios and percents

2 Computational fluency

Multiplication and division facts to 100 (extending computational fluency)			
Multiplication and division facts to 100			
Learning Journey	Steps	Content	Details
Multiplying using known facts	1	Multiplying using known facts	• solve multiplication problems using known multiplication facts and relationships, eg the product of 81 and 9 is 3 times the size of the product of 81 and 3 so 81 x 9 = 729
Using factors to multiply	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
Using place value to divide	1	Dividing up to 4-digit numbers by 1-digit divisors using the distributive property	• solve division problems by splitting factors, e.g., 125 ÷ 5 as (100 ÷ 5) + (25 ÷ 5)
			• explain and justify the use of the strategy
Multiplying by 10 then halving	1	Multiplying 2-3-digit numbers by 5 using the strategy to x10 then halve	• use the strategy to multiply by 10 and then halve
Dividing using known facts	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

Operations with integers (addition, subtraction, multiplication, division, and order of operations)			
Operations with integers			
Learning Journey	Steps	Content	Details
Investigating integers	1	Investigating integers	• recognize 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 backward on a calculator
			• recognize that negative whole numbers can result from subtraction
	2	Interpreting integers in context	• use a model to interpret intervals across zero (in context)

Learning Journey	Steps	Content	Details
Comparing and ordering integers	1	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
	2	Ordering integers	• order integers of any size in ascending and descending order including negative numbers
Adding and subtracting integers	1	Adding and subtracting negative integers	• add and subtract negative integers
			• understand the way negative integers subtract from something actually adds positively
			• understand that 9–(–4) = 13 because –4 is 13 away from +9
	2	Solving problems in contexts involving addition and subtraction with integers	• solve problems in contexts involving addition and subtraction with integers
Adding integers, two-sided counters	1	Understanding addition and subtraction of integers pictorially	• understand addition and subtraction of integers pictorially
Adding and subtracting integers, number line	1	Representing addition and subtraction on a horizontal or vertical number line diagram	• represent addition and subtraction on a horizontal or vertical number line diagram
	2	Adding and subtracting a positive integer	• understand that adding a positive integer on a number line involves moving to the right and that subtracting a positive integer on a number line means moving to the left
			• add and subtract one or more positive integers to/from another integer using a given number line
			• add and subtract one or more positive integers to/from another integer without a given number line
Understanding opposites in context	1	Describing situations in which opposite quantities combine to make 0	• describe situations in which opposite quantities combine to make 0, eg a hydrogen atom has 0 charge because its 2 constituents are oppositely charged
Adding integers	1	Adding integers	• add integers
Subtracting integers	1	Subtracting integers	• subtract integers
Adding & subtracting integers, order of operations	1	Adding and subtracting integers with order of operations	• add and subtract integers with order of operations
Multiplying integers	1	Understanding the rules for multiplying signed numbers	• understand the rules for multiplying signed numbers
			• understand that if p and q are integers then -(p/q) = (-p)/q = p/(-q) where $q \neq 0$

Learning Journey	Steps	Content	Details
	2	Multiplying integers	• multiply integers
	3	Multiplying integers	• use patterns to develop rules for multiplying integers
			• find the product of 2 integers
			• find the product of more than 2 integers
Dividing integers	1	Understanding that integers can be divided, provided that the divisor is not 0	• understand that integers can be divided, provided that the divisor is not 0
Multiplying and dividing integers	1	Multiplying and dividing integers	• multiply and divide with more than 2 integers
Order of operations, integers	1	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
Using the 4 operations with integers	1	Using the 4 operations with integers	• use the 4 operations to solve problems involving integers

Operations with decimals (addition, subtraction, multiplication, division, and order of operations)			
Operations with decimals			
Learning Journey	Steps	Content	Details
Solving decimal word problems, 4 operations	1	Demonstrating an understanding of the addition, subtraction multiplication and division of decimals to solve problems	• demonstrate an understanding of the addition, subtraction multiplication and division of decimals to solve problems
Adding decimals	1	Adding decimals to 3 decimal places using a 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
Subtracting decimals	1	Subtracting decimals to 3 decimal places 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
Multiplying decimals	1	Multiplying decimals using written/mental methods	• multiply decimals using mental/written methods

Learning Journey	Steps	Content	Details
			• compare initial estimates with answers obtained by written methods and check by using a calculator
Multiplying decimals, place value	1	Multiplying decimals using splitting	• multiply decimals using splitting
Dividing decimals	1	Dividing decimals using written/mental methods	• divide decimals using written/mental methods
	2	Dividing decimals by decimals up to thousandths using a written method	• divide decimals by decimals up to thousandths using a written method
Order of operations, decimals	1	Applying the order of operations to evaluate expressions involving decimals with and without grouping symbols, 4 operations	• apply the order of operations to evaluate expressions involving decimals without grouping symbols, 4 operations
			• apply the order of operations to evaluate expressions involving decimals with grouping symbols, 4 operations

Two-step equations with whole-number coefficients, constants, and solutions			
Two-step equations			
Learning Journey	Steps	Content	Details
Preserving equality	1	Demonstrating an understanding of equivalence and the preservation of equality or 'balance'	• understand and use the '=' sign
			• model preservation of equality concretely
			• model preservation of equality pictorially
			• model preservation of equality symbolically
			• understand that applying the same operation to both sides of an equation preserves equality
Solving two-step equations	1	Solving linear equations using inverse operations involving 2 steps with mixed operations with whole-number coefficients, constants and solutions	• solve linear equations using inverse operations involving 2 steps with mixed operations with whole-number coefficients, constants and solutions
Model and solve two-step equations, algebra tiles	1	Modelling and solving, pictorially and symbolically, two-step linear equations in the form ax + b = c, where a and b and c are whole numbers	• model, pictorially and symbolically, two-step linear equations in the form ax + b = c, where a and b and c are whole numbers
			• solve two-step equations using algebra tile representation
Modelling real-life scenarios using equations	1	Modelling real-life scenarios using equations	• model real-life scenarios using equations

Learning Journey	Steps	Content	Details
Checking solutions of two-step equations	1	Checking solutions of two-step equations using substitution, whole numbers only	• check solutions of two-step equations using substitution, whole numbers only

3 Patterning

Discrete linear relations, using expressions, tables, and graphs			
Discrete linear relations			
Learning Journey	Steps	Content	Details
Graphing discrete linear relations	1	Graphing discrete linear relationships using a table	• graph discrete linear relationships using a table
	2	Graphing discrete linear relationships using an expression	• graph discrete linear relationships using an expression
Deriving the expression, discrete linear relations	1	Deriving an expression of a discrete linear relationship from a graph	• derive an expression of a discrete linear relationship from a graph
	2	Deriving an expression of a discrete linear relationship from a table	• derive an expression of a discrete linear relationship from a table

4 Geometry and measurement

Circumference and area of circles			
Circumference and area of circles			
Learning Journey	Steps	Content	Details
Finding the area of 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	Solving real-life problems involving calculating the area of circles	• solve real-life problems involving calculating the area of circles
Finding the circumference of circles	1	Finding the circumference of a circle using a formula	• find the circumference of a circle using a formula
	2	Finding circumferences	• develop and use the formulas to find the circumferences of circles in terms of the diameter d or radius r
			• use mental strategies to estimate the circumferences of circles
			• determine approximate formulas for the circumference of circles using models and connect these models to the actual formulas
	3	Finding the diameter and/or radius of a circle given its circumference	• find the diameter and/or radius of a circle given its circumference
Introducing the parts of a circle	1	Introducing parts of a circle: centre, radius, diameter and circumference	• identify and name parts of circles
			• create a circle by finding points that are all the same distance from a fixed point
Introducing circumference	1	Introducing circumference	• investigate the relationship between radius/diameter of a circle with its circumference

Volume of rectangular prisms and cylinders			
Volume: rectangular prisms and cylinders			
Learning Journey	Steps	Content	Details
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
	2	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

Learning Journey	Steps	Content	Details
Finding the missing dimension, rectangular prisms	1	Finding the height or area of the rectangular prism uniform cross-section given the volume in the same units	• find the height or area of the rectangular prism uniform cross-section given the volume in the same units
Finding the volume of cylinders	1	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 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
Finding the missing dimension, cylinders	1	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
	2	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
Volume: cylinder, word problems	1	Solving a variety of practical problems involving the volume of cylinders	• solve a variety of practical problems involving the volume of cylinders

Cartesian coordinates and graphing			
Cartesian coordinates and graphing			
Learning Journey	Steps	Content	Details
Introducing Cartesian coordinates	1	Introducing the Cartesian coordinate system	• recognize that the Cartesian plane consists of a horizontal axis (x-axis) and a vertical axis (y-axis), creating 4 quadrants
			• recognize that the horizontal axis and the vertical axis meet at right angles
			• identify the point of intersection of the 2 axes as the origin, having coordinates (0, 0)

Learning Journey	Steps	Content	Details
	2	Locating points on the Cartesian coordinate 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
			• recognize that the order of coordinates is important when locating points on the number plane, eg (2, 3) is a location different from (3, 2)
	3	Solving real-world and mathematical problems by graphing points in all 4 quadrants of the coordinate plane	• solve real-world and mathematical problems by graphing points in all 4 quadrants of the coordinate plane
Drawing shapes on the coordinate plane	1	Drawing polygons in the coordinate plane given coordinates for the vertices	• draw polygons in the coordinate plane given coordinates for the vertices

Combinations of transformations			
Combinations of transformations			
Learning Journey	Steps	Content	Details
Successive translations on the coordinate plane	1	Performing successive translations	• perform up to 3 consecutive translations, recognizing which 1 translation would have the same result
Rotations on the coordinate plane	1	Plotting and stating the coordinates of the image of a given point on a coordinate plane resulting from rotation of multiples of 90° about the origin	• plot and state the coordinates of the image of a given point on a coordinate plane resulting from a rotation of 90° about the origin
			• plot and state the coordinates of the image of a given point on the coordinate plane resulting from a rotation of 180° about the origin
			• investigate and describe the relationship between the coordinates of P and P' following a rotation of 180° about the origin
			• plot and state the coordinates of the image of a given point on the coordinate plane resulting from a rotation of 270° about the origin
Reflections on the coordinate plane	1	Plotting and stating the coordinates of the image of a given point on a coordinate 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 coordinate plane resulting from reflection in either the x-axis or y-axis

Learning Journey	Steps	Content	Details
			• investigate and describe the relationship between the coordinates of P and P' following a reflection in the x- or y-axis
Combinations of transformations	1	Plotting the transformations of shapes on the Cartesian plane	• plot the position of the image of a given shape on the Cartesian plane resulting from a one-step translation, reflection in the x-axis or y-axis, or rotation about the origin by a multiple of 90°
			• plot the position of the image of a given shape on the Cartesian plane resulting from a combination of translations, reflections in the x-axis or y-axis, and rotations about the origin by a multiple of 90°
			• explore and describe different combinations of transformations that produce the same image of a given shape
	2	Exploring combinations of transformations on a point (including reflection in any line)	• explore and describe different combinations of transformations that produce the same image of a given point (including reflection in any line)
Investigating tessellations using transformations	1	Investigating tessellations (tiling) using transformations	• determine, through investigation using a variety of tools, polygons or combinations of polygons (refer to congruent shapes) that tile a plane and describe the transformation(s) required

5 Data and probability

Circle graphs			
Circle graphs			
Learning Journey	Steps	Content	Details
Interpreting and constructing circle graphs	1	Interpreting circle graphs	• interpret circle graphs using proportional reasoning and percentages
			• find the whole from the parts and vice versa
			• ask and answer comparison questions; make conclusions; identify data values
	2	Constructing circle graphs	• construct circle graphs using proportional reasoning and represent sectors as percentages
			• use knowledge of protractors and angles to construct circle graphs; include a suitable title, labels and key
			• ask and answer questions related to data in the circle graphs; draw conclusions
	3	Solving problems using circle graphs	• use proportional reasoning and the 4 operations to solve problems related to data in a circle graph
	4	Representing and reading data in a circle graph with simple percentages	• represent data in a circle graph segmented into tenths using given or collected data with 20 responses; include a key, suitable category labels and appropriate title
			• relate and represent data in a circle graph as percentages
			• interpret data in a circle graph; ask and answer questions related to the data in the display; draw conclusions

Experimental probability with two independent events			
Experimental probability			
Learning Journey	Steps	Content	Details
Understanding independent events	1	Understanding that independent events have a set probability that do not rely on previous events	• understand that independent events have a set probability that do not rely on previous events
			• explore examples of independent events, eg consecutive rolls of dice
	2	Assigning expected probabilities to outcomes in chance experiments with random generators, including digital simulators	• assign expected probabilities to outcomes in chance experiments with random generators, including digital simulators

6 Financial literacy

Financial literacy – financial percentage			
Financial percentage			
Learning Journey	Steps	Content	Details
Calculating percentage discounts	1	Spending money: Percentage discounts of any size	• calculate the discount on the sale price of items after a percentage discount of any size
			• calculate the sale price of an item after a percentage discount of any size
			• calculate the percentage discount given the original (pre-discount) price and discounted price
			• calculate the original (pre-discount) price of an item given its price after a percentage discount of any size
Calculating tips	1	Calculating tips	• estimate the expected gratuity for an individual worker based on it being a given percentage of the bill
			• use a calculator to calculate the expected gratuity for an individual worker based on it being a given percentage of the bill
			• calculate the amount of gratuity per worker when all gratuities are collected together and split equally between the total number of workers
			• calculate a bill given a worker's individual tips and the tips percentage of the overall bill
Calculating tax	1	Understanding taxation: Harmonized Sales Tax (HST)	• calculate the HST payable on items given the pre-HST price (and 12% HST)
			• calculate the HST-inclusive price of items given the pre-HST price (and 12% HST)
			• calculate the pre-HST price of items given the HST-inclusive price (and 12% HST)
			• calculate the HST component of the price of an item given the HST-inclusive price (and 12% HST)

Part II

Grade 7 – Big Ideas

7 Number

Big Idea - Number: Decimals, fractions, and percents are used to represent and describe parts and wholes of numbers.			
Decimals, fractions, ratios, percents			
Learning Journey	Steps	Content	Details
Investigating terminating and repeating decimals	1	Investigating terminating and repeating decimals	• use the notation for repeating decimals, e.g., 0.33333... = 0. 3 , 0.345345345... =0.345 , 0.266666...=0.26
			• convert fractions to terminating or repeating decimals as appropriate
			• recognize that calculators may show approximations to repeating decimals, and explain why, e.g., 2/3 displayed as 0.666666667
Ordering fractions and decimals on a number line	1	Ordering fractions and decimals on a number line, including terminating and repeating decimals	• order fractions and decimals on a number line, including terminating and repeating decimals
Converting decimals to percents	1	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
Converting terminating decimals to fractions	1	Converting decimals to fraction up to 3 decimal places with models	• find an equivalent fraction with denominators of 10, 100 or 1000 to convert from decimals to fractions
	2	Converting terminating decimals less than 1 into fractions	• convert terminating decimals less than 1 into fractions
	3	Converting terminating decimals greater than 1 into fractions	• convert terminating decimals greater than 1 into improper fractions
			• convert terminating decimals greater than 1 into mixed numbers

Learning Journey	Steps	Content	Details
Converting repeating decimals to fractions	1	Converting recurring decimals into fractions	• convert recurring decimals into fractions
Converting fractions to terminating decimals	1	Converting fractions to decimals up to 3 decimal places	• find an equivalent fraction with denominators of 10, 100 or 1000 to convert from fractions to decimals
	2	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 numbers to terminating decimals by manipulating the denominator to be a power of 10
	3	Converting fractions to terminating decimals using division	• convert fractions to terminating decimals using division
			• convert improper fractions to terminating decimals using division
			• convert mixed numbers to terminating decimals using division
Converting fractions to repeating decimals	1	Converting fractions to repeating decimals using division	• convert fractions to repeating decimals using division
			• convert improper fractions to repeating decimals using division
			• convert mixed numbers to repeating decimals using division
Converting fractions to percents	1	Converting fractions to terminating percentages by manipulating the denominator to 100	• convert unit 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 numbers to terminating percentages by manipulating the denominator to be 100
	2	Converting fractions to terminating percentages using division	• convert fractions to terminating percentages using division
			• convert improper fractions to terminating percentages using division
			• convert mixed numbers to terminating percentages using division
Converting fractions to repeating percents	1	Converting fractions to repeating percentages using division	• convert fractions to repeating percentages using division
			• convert improper fractions to repeating percentages using division
			• convert mixed numbers to repeating percentages using division

Learning Journey	Steps	Content	Details
Comparing/ordering: fractions, decimals, percents	1	Comparing and ordering fractions, decimals and percentages	• compare and order a mix of fractions, decimals and percentages
Converting percents to fractions and mixed numbers	1	Converting percentages less than or equal to 100% into fractions	• convert percentages less than or equal to 100% into fractions
	2	Converting percentages greater than 100% to mixed numbers	• convert percentages greater than 100% to mixed numbers
	3	Converting percentages greater than 100% to improper fractions	• convert percentages greater than 100% to improper fractions
Converting percents to decimals	1	Converting terminating percentages less than 100% into a decimal	• convert terminating percentages less than 100% into a decimal
	2	Converting terminating percentages greater than or equal to 100% into a decimal	• convert terminating percentages greater than or equal to 100% into a decimal
Converting repeating percents to decimals	1	Converting repeating percentages less than 100% into a decimal	• convert repeating percentages less than 100% into a decimal
	2	Converting repeating percentages greater than or equal to 100% into a decimal	• convert repeating percentages greater than or equal to 100% into a decimal
Equivalence: decimals, fractions, ratios, percents	1	Understanding and demonstrating equivalence between decimals, fractions, ratios and percents	• understand and demonstrate equivalence between decimals, fractions, ratios and percents

8 Computational fluency

Big Idea - Comp Fluency: Computational fluency and flexibility with numbers extend to operations with integers and decimals.			
Operations with integers			
Learning Journey	Steps	Content	Details
Investigating integers	1	Investigating integers	• recognize 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 backward on a calculator
			• recognize that negative whole numbers can result from subtraction
	2	Interpreting integers in context	• use a model to interpret intervals across zero (in context)
Comparing and ordering integers	1	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
	2	Ordering integers	• order integers of any size in ascending and descending order including negative numbers
Adding and subtracting integers	1	Adding and subtracting negative integers	• add and subtract negative integers
			• understand the way negative integers subtract from something actually adds positively
			• understand that 9–(–4) = 13 because –4 is 13 away from +9
	2	Solving problems in contexts involving addition and subtraction with integers	• solve problems in contexts involving addition and subtraction with integers
Adding integers, two-sided counters	1	Understanding addition and subtraction of integers pictorially	• understand addition and subtraction of integers pictorially
Adding and subtracting integers, number line	1	Representing addition and subtraction on a horizontal or vertical number line diagram	• represent addition and subtraction on a horizontal or vertical number line diagram
	2	Adding and subtracting a positive integer	• understand that adding a positive integer on a number line involves moving to the right and that subtracting a positive integer on a number line means moving to the left
			• add and subtract one or more positive integers to/from another integer using a given number line

Learning Journey	Steps	Content	Details
			• add and subtract one or more positive integers to/from another integer without a given number line
Understanding opposites in context	1	Describing situations in which opposite quantities combine to make 0	• describe situations in which opposite quantities combine to make 0, eg a hydrogen atom has 0 charge because its 2 constituents are oppositely charged
Adding integers	1	Adding integers	• add integers
Subtracting integers	1	Subtracting integers	• subtract integers
Adding & subtracting integers, order of operations	1	Adding and subtracting integers with order of operations	• add and subtract integers with order of operations
Multiplying integers	1	Understanding the rules for multiplying signed numbers	• understand the rules for multiplying signed numbers
			• understand that if p and q are integers then -(p/q) = (-p)/q = p/(-q) where q ≠ 0
	2	Multiplying integers	• multiply integers
	3	Multiplying integers	• use patterns to develop rules for multiplying integers
			• find the product of 2 integers
			• find the product of more than 2 integers
Dividing integers	1	Understanding that integers can be divided, provided that the divisor is not 0	• understand that integers can be divided, provided that the divisor is not 0
Multiplying and dividing integers	1	Multiplying and dividing integers	• multiply and divide with more than 2 integers
Order of operations, integers	1	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
Using the 4 operations with integers	1	Using the 4 operations with integers	• use the 4 operations to solve problems involving integers
Operations with decimals			
Solving decimal word problems, 4 operations	1	Demonstrating an understanding of the addition, subtraction multiplication and division of decimals to solve problems	• demonstrate an understanding of the addition, subtraction multiplication and division of decimals to solve problems
Adding decimals	1	Adding decimals to 3 decimal places using a 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

Learning Journey	Steps	Content	Details
			• use estimation and rounding to check the reasonableness of answers when adding decimals
Subtracting decimals	1	Subtracting decimals to 3 decimal places 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
Multiplying decimals	1	Multiplying decimals using written/mental methods	• multiply decimals using mental/written methods
			• compare initial estimates with answers obtained by written methods and check by using a calculator
Multiplying decimals, place value	1	Multiplying decimals using splitting	• multiply decimals using splitting
Dividing decimals	1	Dividing decimals using written/mental methods	• divide decimals using written/mental methods
	2	Dividing decimals by decimals up to thousandths using a written method	• divide decimals by decimals up to thousandths using a written method
Order of operations, decimals	1	Applying the order of operations to evaluate expressions involving decimals with and without grouping symbols, 4 operations	• apply the order of operations to evaluate expressions involving decimals without grouping symbols, 4 operations
			• apply the order of operations to evaluate expressions involving decimals with grouping symbols, 4 operations

9 Patterning

Big Idea - Patterning: Linear relations can be represented in many connected ways to identify regularities and make generalizations.			
Discrete linear relations			
Learning Journey	Steps	Content	Details
Graphing discrete linear relations	1	Graphing discrete linear relationships using a table	• graph discrete linear relationships using a table
	2	Graphing discrete linear relationships using an expression	• graph discrete linear relationships using an expression
Deriving the expression, discrete linear relations	1	Deriving an expression of a discrete linear relationship from a graph	• derive an expression of a discrete linear relationship from a graph
	2	Deriving an expression of a discrete linear relationship from a table	• derive an expression of a discrete linear relationship from a table

10 Geometry and measurement

Big Idea - Geo and Measurement: The constant ratio between the circumference and diameter of circles can be used to describe, measure, and compare spatial relationships.			
Circumference and area of circles			
Learning Journey	Steps	Content	Details
Finding the area of 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	Solving real-life problems involving calculating the area of circles	• solve real-life problems involving calculating the area of circles
Finding the circumference of circles	1	Finding the circumference of a circle using a formula	• find the circumference of a circle using a formula
	2	Finding circumferences	• develop and use the formulas to find the circumferences of circles in terms of the diameter d or radius r
			• use mental strategies to estimate the circumferences of circles
			• determine approximate formulas for the circumference of circles using models and connect these models to the actual formulas
	3	Finding the diameter and/or radius of a circle given its circumference	• find the diameter and/or radius of a circle given its circumference
Introducing the parts of a circle	1	Introducing parts of a circle: centre, radius, diameter and circumference	• identify and name parts of circles
			• create a circle by finding points that are all the same distance from a fixed point
Introducing circumference	1	Introducing circumference	• investigate the relationship between radius/diameter of a circle with its circumference
Volume: rectangular prisms and cylinders			
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
	2	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
Finding the missing dimension, rectangular prisms	1	Finding the height or area of the rectangular prism uniform cross-section given the volume in the same units	• find the height or area of the rectangular prism uniform cross-section given the volume in the same units

Learning Journey	Steps	Content	Details
Finding the volume of cylinders	1	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 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
Finding the missing dimension, cylinders	1	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
	2	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
Volume: cylinder, word problems	1	Solving a variety of practical problems involving the volume of cylinders	• solve a variety of practical problems involving the volume of cylinders

11 Data and probability

Big Idea - Data & Probability: Data from circle graphs can be used to illustrate proportion and to compare and interpret.			
Circle graphs			
Learning Journey	Steps	Content	Details
Interpreting and constructing circle graphs	1	Interpreting circle graphs	• interpret circle graphs using proportional reasoning and percentages
			• find the whole from the parts and vice versa
			• ask and answer comparison questions; make conclusions; identify data values
	2	Constructing circle graphs	• construct circle graphs using proportional reasoning and represent sectors as percentages
			• use knowledge of protractors and angles to construct circle graphs; include a suitable title, labels and key
			• ask and answer questions related to data in the circle graphs; draw conclusions
	3	Solving problems using circle graphs	• use proportional reasoning and the 4 operations to solve problems related to data in a circle graph
	4	Representing and reading data in a circle graph with simple percentages	• represent data in a circle graph segmented into tenths using given or collected data with 20 responses; include a key, suitable category labels and appropriate title
			• relate and represent data in a circle graph as percentages
			• interpret data in a circle graph; ask and answer questions related to the data in the display; draw conclusions

Part III

Grade 8

12 Number

Perfect squares and cubes			
Perfect squares and cubes			
Learning Journey	Steps	Content	Details
Perfect squares	1	Understanding and modelling perfect squares	• understand and model perfect squares
	2	Introducing square numbers	• establish and define the concept of square numbers, including the exponential notation
			• generate square numbers up to at least 100
			• know and recall square numbers up to and including 100
	3	Using prime factorization to identify perfect squares	• use prime factorization to identify perfect squares
Perfect cubes	1	Understanding and modelling perfect cubes	• understand and model perfect cubes
	2	Introducing cube numbers	• establish and define the concept of cube numbers, including the exponential notation
			• generate cube numbers up to at least 125
			• know and recall cube numbers up to and including 125
	3	Using prime factorization to identify perfect cubes	• use prime factorization to identify perfect cubes
Finding perfect squares and cubes	1	Finding squares and cubes	• generate square numbers up to 12^2
			• generate cube numbers up to 6^3

Square and cube roots			
Square and cube roots			
Learning Journey	Steps	Content	Details
Finding square roots	1	Recognizing the link between squares and square roots	• recognize the link between squares and square roots
	2	Knowing that when the $\sqrt{}$ symbol is used, that it is conventionally referring to the principal square root which is the positive square root	• know that when the $\sqrt{}$ symbol is used, that it is conventionally referring to the principal square root which is the positive square root

Learning Journey	Steps	Content	Details
Finding square roots, fractions	1	Finding square roots of fractions with perfect square numerators and denominators	• find the square roots of fractions with perfect square numerators and denominators
Finding cube roots	1	Recognizing the link between cubes and cube roots	• recognize the link between cubes and cube roots
	2	Finding cube roots of perfect cube whole numbers	• find the cube roots of perfect cube whole numbers up to 125
Finding cube roots, fractions	1	Finding cube roots of fractions with perfect cube numerators and denominators	• find cube roots of fractions with perfect cube numerators and denominators
Finding square and cube roots	1	Expressing a number as a product of its prime factors to determine whether its square root and/or cube root is an integer	• express a number as a product of its prime factors to determine whether its square root and/or cube root is an integer
	2	Investigating square roots and cube roots	• investigate and use square roots of square numbers
			• use the notations for square root ($\sqrt{}$) and cube root ($\sqrt[3]{}$)
Estimating square roots	1	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
	2	Finding square roots of non-perfect squares	• use a calculator to calculate approximations of square roots of positive integers and positive non-integers
			• mentally determine between which 2 whole numbers lies the square root of a non-perfect square number up to 100
			• estimate the square root of a non-perfect square number up to 100
			• understand why entering the square root of a negative number in a calculator returns an error message
Estimating cube roots	1	Finding cube roots of non-perfect cubes	• use a calculator to calculate approximations of cube roots of positive integers and positive non-integers
			• mentally determine between which 2 whole numbers lies 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
	2	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

Percents less than 1 and greater than 100 (decimal and fractional percents)			
Percents less than 1 & greater than 100			
Learning Journey	Steps	Content	Details
Percents greater than 100	1	Understanding percentages greater than 1 whole	• demonstrate an understanding of percentages greater than 100%
	2	Calculating percentages of quantities greater than 100%	• calculate percentage amounts of quantities greater than 100%
	3	Interpreting increases of quantities as percentage increases (over 100%)	• interpret and calculate percentages greater than 100%
Percents less than 1	1	Calculating percentages of quantities less than 1%	• calculate percentage amounts of quantities less than 1%

Numerical proportional reasoning (rates, ratio, proportions, and percent)			
Numerical proportional reasoning			
Learning Journey	Steps	Content	Details
Unit rate	1	Modelling rates	• model real-life relationships involving constant rates where the initial condition starts at 0
	2	Understanding that a rate, in simplest form, is the comparison of an amount per unit value of another	• understand that a rate, in simplest form, is the comparison of an amount per unit value of another
Simplifying and comparing rates	1	Converting given information into a simplified rate	• convert given information into a simplified rate
	2	Comparing rates	• compare 2 quantities of different rates
	3	Solving problems comparing 2 given rates by simplifying	• solve problems comparing 2 given rates by simplifying
Solving rate problems	1	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
Dividing a quantity in a given ratio	1	Dividing a quantity in a given ratio	• divide a quantity in a given ratio
			• solve a variety of real-life problems involving ratio
			• describe 'sharing' in a given ratio
	2	Dividing an interval into a given ratio on a number line	• divide an interval into a given ratio on a number line
	3	Dividing a quantity into a given ratio (ratio composed of 3 numbers)	• divide a quantity in a given ratio
Solving ratio problems	1	Applying the unitary method to ratio problems	• apply the unitary method to ratio problems
	2	Solving a variety of real-life problems involving ratio	• solve a variety of real-life problems involving ratio

Learning Journey	Steps	Content	Details
Proportions	1	Solving proportions using cross multiplication	• solve proportions using cross multiplication
	2	Solving problems involving proportional reasoning	• solve problems involving proportional reasoning
Percents	1	Using proportions to solve percent problems	• use proportions to solve percent problems
	2	Solving multi-step ratio and percent problems using proportional relationships	• solve multi-step ratio and percent problems using proportional relationships

13 Computational fluency

Operations with fractions (addition, subtraction, multiplication, division, and order of operations)			
Operations with fractions			
Learning Journey	Steps	Content	Details
Adding fractions, same denominator	1	Using models to add unit fractions with the same denominator (denominators 2, 3, 4, 5, 6, 8, 10)	• use models to add unit fractions with the same denominator (denominators 2, 3, 4, 5, 6, 8, 10)
			• recognize the connection between the numerator of a fraction and the repeated addition of the unit fraction with the same denominator (e.g. 2/5 is one fifth plus one fifth)
	2	Adding simple fractions with the same denominator using models to make fractions up to and including 1 whole	• use models to add 2 or more fractions with the same denominator (up to and including one whole)
			• solve problems involving adding fractions with the same denominator
	3	Adding proper fractions with the same denominator (denominators 2, 3, 4, 5, 6, 7, 8)	• add proper fractions with the same denominator
			• model and represent strategies, including using diagrams and written representations
	4	Adding proper fractions with common denominators	• add proper fractions with common denominators
Adding a whole number and a fraction	1	Adding a whole number and a proper fraction	• add a whole number and a proper fraction
			• model and represent strategies, including using diagrams and written representations
Adding improper fractions, same denominator	1	Adding improper fractions with common denominators	• add improper fractions with common denominators
			• add improper fractions with common denominators expressing answers as a mixed number
Adding with mixed numbers, same denominator	1	Adding fractions and mixed numbers with the same denominator	• use models to add 2 or more fractions and mixed numbers with the same denominator
			• add fractions and mixed numbers with the same denominator without models
			• solve problems involving adding fractions and mixed numbers with the same denominator
	2	Adding mixed numbers with the same denominator	• add mixed numbers with the same denominator
			• model and represent strategies, including using diagrams and written representations

Learning Journey	Steps	Content	Details
Adding fractions, unlike denominator	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 proper fractions with unlike denominators	• add proper fractions with unlike denominators
			• explain why there must be a common denominator in order to add fractions
Adding improper fractions, unlike denominator	1	Adding improper fractions with unlike denominators	• add improper fractions with unlike denominators
			• add improper fractions with unlike denominators expressing answers as a mixed number
Adding with mixed numbers, unlike denominator	1	Adding fractions, including mixed numbers, with related denominators	• add fractions, including mixed numbers, where the denominators are related
			• convert an answer that is an improper fraction to a mixed number
			• use knowledge of equivalence to simplify answers when adding fractions
			• recognize that improper fractions may sometimes make calculations involving mixed numbers easier
	2	Adding fractions and mixed numbers with unrelated denominators	• add fractions, including mixed numbers, where the denominators are unrelated by finding common denominators
			• model and represent strategies, including using diagrams and written representations
			• convert an answer that is an improper fraction to a mixed number
			• use knowledge of equivalence to simplify answers when adding fractions
			• recognize that improper fractions may sometimes make calculations involving mixed numbers easier
	3	Adding mixed numbers with unlike denominators	• add mixed numbers with unlike denominators
Subtracting fractions, same denominator	1	Subtracting unit fractions with the same denominator (2, 4, 8) including subtracting from 1 whole (with models)	• subtract unit fractions with the same denominator (2, 4, 8) up to 1 whole with the use of models

Learning Journey	Steps	Content	Details
			• solve problems involving subtracting unit fractions with the same denominator (2, 4, 8) from 1 whole
	2	Subtracting simple fractions with the same denominator using models, including subtracting from 1 whole	• use models to subtract 2 or more fractions with the same denominator (including subtracting from one whole)
			• solve problems involving adding fractions with the same denominator
	3	Subtracting proper fractions with the same denominator (denominators 2, 3, 4, 5, 6, 7, 8)	• subtract proper fractions with the same denominator
			• model and represent strategies, including using diagrams and written representations
	4	Subtracting proper fractions with common denominators	• subtract proper fractions with common denominators
Subtracting a fraction from a whole number	1	Subtracting a proper fraction from a whole number	• use diagrams, and mental and written strategies, to subtract a proper fraction from any whole number including 1
			• model and represent strategies, including using diagrams and written representations
Subtracting improper fractions, same denominator	1	Subtracting improper fractions with common denominators	• subtract improper fractions with common denominators
			• subtract improper fractions with common denominators, expressing answers as a mixed number
Subtracting with mixed numbers, same denominator	1	Subtracting fractions and mixed numbers with the same denominator	• use models to subtract 2 or more fractions and mixed numbers with the same denominator
			• subtract fractions and mixed numbers with the same denominator without models
			• solve problems involving subtracting fractions and mixed numbers with the same denominator
	2	Subtracting mixed numbers with the same denominator	• subtract mixed numbers with the same denominator
			• model and represent strategies, including using diagrams and written representation
Subtracting fractions, unlike denominator	1	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

Learning Journey	Steps	Content	Details
	2	Subtracting proper fractions with unlike denominators	• subtract proper fractions with unlike denominators
			• explain why there must be a common denominator in order to subtract fractions
Subtracting improper fractions, unlike denominator	1	Subtracting improper fractions with unlike denominators	• subtract improper fractions with unlike denominators
			• subtract improper fractions with unlike denominators expressing answers as a mixed number
Subtracting with mixed numbers, unlike denominator	1	Subtracting fractions, including mixed numbers, with related denominators	• subtract fractions, including mixed numbers, where the denominators are related
			• convert an answer that is an improper fraction to a mixed number
			• use knowledge of equivalence to simplify answers when subtracting fractions
			• recognize that improper fractions may sometimes make calculations involving mixed numbers easier
	2	Subtracting fractions and mixed numbers with unrelated denominators	• subtract fractions, including mixed numbers, where the denominators are unrelated by finding common denominators
			• model and represent strategies, including using diagrams and written representations
			• convert an answer that is an improper fraction to a mixed number
			• use knowledge of equivalence to simplify answers when subtracting fractions
			• recognize that improper fractions may sometimes make calculations involving mixed numbers easier
Adding/subtracting fractions, word problems	1	Solving word problems involving fractions and mixed numbers 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
	2	Solving word problems involving fractions and mixed numerals with the unrelated denominators	• solve word problems involving the addition and subtraction of fractions with unrelated denominators
Multiplying fractions by whole numbers	1	Multiplying unit fractions by whole numbers using models and diagrams	• apply and extend previous understandings of multiplication to multiply a unit fraction by a whole number
			• use repeated addition to represent and multiply unit fractions by whole numbers, eg $1/5 \times 3 = 1/5 + 1/5 + 1/5 = 3/5$

Learning Journey	Steps	Content	Details
			• develop a rule for multiplying unit fractions by whole numbers, eg multiply the numerator by the whole number
			• solve word problems involving multiplication of unit fractions by whole numbers, including area and length problems
	2	Multiplying proper fractions by whole numbers using models and diagrams	• apply and extend previous understandings of multiplication to multiply a fraction by a whole number supported by models and/or diagrams, eg 2/5 × 3 = 2/5 + 2/5 + 2/5 = 6/5 = 1 1/5
			• use repeated addition to multiply simple fractions by whole numbers, eg 2/5 × 3 = 2/5 + 2/5 + 2/5 = 6/5 = 1 1/5
			• develop a rule for multiplying simple fractions by whole numbers, eg 2/5 × 3 = 2 × 3 /5 = 6/5 = 1 1/5
			• solve word problems involving multiplication of fractions by whole numbers, including area and length problems
	3	Multiplying proper or improper fractions by whole numbers using models and diagrams	• apply and extend previous understandings of multiplication to multiply a fraction by a whole number supported by models and/or diagrams, eg 2/5 × 3 = 2/5 + 2/5 + 2/5 = 6/5 = 1 1/5
			• apply and extend previous understandings of multiplication to multiply an improper fraction by a whole number supported by models and/or diagrams, eg 6/5 × 3 = 6/5 + 6/5 + 6/5 = 18/5 = 3 3/5
			• develop a rule for multiplying fractions by whole numbers eg multiply the numerator by the whole number
			• solve word problems involving multiplication of fractions by whole numbers, including area and length problems
	4	Multiplying a unit fraction by a whole number greater than 1	• multiply a unit fraction by a whole number greater than 1
		Multiplying proper fractions by a whole number greater than 1	• multiply proper fractions by a whole number greater than 1
	5	Multiplying improper fractions by a whole number greater than 1	• multiply improper fractions by a whole number greater than 1

Learning Journey	Steps	Content	Details
Multiplying mixed numbers by whole numbers	1	Multiplying mixed numbers by whole numbers using models and diagrams	• convert the mixed numbers to an improper fraction and then multiply by a whole number supported by models and/or diagrams, eg 1 and 2/3 x 6 as 5/3 x 6 = 30/3 or 10
			• solve word problems involving multiplication of fractions by whole numbers, including area and length problems
	2	Multiplying mixed numbers by a whole number greater than 1	• multiply mixed numbers by a whole number greater than 1
Multiplying fractions	1	Multiplying proper fractions	• determine the effect of multiplying by a number with magnitude less than 1
			• multiply proper fractions using written methods
			• demonstrate multiplication of a fraction by another fraction using a diagram to illustrate the process
			• solve problems involving multiplying fractions in context
			• calculate fractions of quantities using mental or written strategies
			• choose the appropriate equivalent form for mental computation
Multiplying improper fractions	1	Multiplying 2 improper fractions	• multiply improper fractions using written methods
	2	Multiplying 2 improper fractions, expressing the answer as a mixed number	• multiply 2 improper fractions expressing the answer as a mixed number
Multiplying mixed numbers	1	Multiplying 2 mixed numbers	• multiply mixed numbers using written methods
Multiplying fractions and mixed numbers	1	Multiplying proper fractions, improper fractions, and mixed numbers using written methods	• multiply proper fractions, improper fractions, and mixed numbers using written methods
Dividing fractions and whole numbers	1	Dividing a proper fraction by a positive whole number	• divide unit fractions by whole numbers, eg 1/3 ÷ 2 = 1/6
			• divide a non unit fraction by a whole number (where the divisor is a factor of the numerator); use diagrams for support
			• divide a non unit fraction by any whole number
	2	Dividing a positive whole number by proper fraction	• determine the effect of dividing by a number with magnitude less than 1
			• divide a positive whole number by a unit fraction using diagrams to support

Learning Journey	Steps	Content	Details
			• divide a positive whole number by a proper fraction (where the answer is a whole number) using diagrams to support
			• divide a positive whole number by any proper fraction using diagrams to support
			• demonstrate that dividing by a fraction is equal to multiplying by its reciprocal
			• develop a rule for dividing by a fraction
Dividing fractions	1	Dividing a proper fraction by a proper fraction	• divide a proper fraction by a proper fraction
	2	Dividing improper fractions by proper fractions and vice versa	• divide improper fractions by proper fractions and vice versa
	3	Dividing an improper fraction by an improper fraction	• divide an improper fraction by an improper fraction
Dividing whole numbers and improper fractions	1	Dividing a positive integer by an improper fraction	• divide a positive integer by an improper fraction and mixed number
	2	Dividing an improper fraction by a positive integer	• divide an improper fraction by a positive integer
Dividing whole numbers and mixed numbers	1	Dividing a positive integer by a mixed fraction/number	• divide a positive integer by a mixed fraction/number
	2	Dividing a mixed number by a positive integer	• divide a mixed number by a positive integer
Dividing mixed numbers and fractions	1	Dividing mixed numbers by proper fractions and vice versa	• divide mixed numbers by proper fractions and vice versa
Dividing mixed numbers	1	Dividing a mixed number by a mixed fraction/number	• divide a mixed number by a mixed number
Dividing improper fractions and mixed numbers	1	Dividing an improper fraction by a mixed number and vice versa	• divide an improper fraction by a mixed number and vice versa
Dividing fractions, word problems	1	Solving word problems involving division of fractions by fractions	• solve word problems involving division of fractions by fractions
Order of operations with fractions	1	Applying the order of operations to evaluate expressions involving fractions with and without grouping symbols, 4 operations	• apply the order of operations to evaluate expressions involving fractions without grouping symbols, 4 operations

Learning Journey	Steps	Content	Details
			• apply the order of operations to evaluate expressions involving fractions with grouping symbols, 4 operations

Expressions – writing and evaluating using substitution			
Writing and evaluating expressions			
Learning Journey	Steps	Content	Details
Writing expressions	1	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
			• create scenarios in words that match given algebraic operations
	2	Writing expressions with numbers and variables	• write expressions with numbers and variables
Evaluating expressions using substitution	1	Substituting known values in for variables	• substitute known values in for variables to find the value of an expression, eg if x = 2 and y = 3, find the value of 2x + 3y
Writing and evaluating expressions	1	Creating algebraic expressions	• create algebraic expressions and evaluate them by substituting a given value for each variable

Two-step equations with integer coefficients, constants, and solutions			
Two-step equations			
Learning Journey	Steps	Content	Details
Two-step equations	1	Modelling concretely, pictorially and symbolically problems that can be represented by two-step linear equations of the form ax + b = c, where a and b and c are integers	• model concretely, pictorially and symbolically, problems that can be represented by 2-step linear equations of the form ax + b = c, where a and b and c are integers
	2	Solving and verifying 2-step linear equations in the form ax + b = c, where a and b and c are integers	• solve 2-step linear equations in the form ax + b = c, where a and b and c are integers
			• verify answers of 2-step linear equations using substitution
Equation word problems	1	Solving word problems leading to equations of the form ax + b = c, where a, b, and c are integers	• solve word problems leading to equations of the form ax + b = c, where a, b, and c are integers

14 Patterning

Discrete linear relations (extended to larger numbers, limited to integers)			
Discrete linear relations			
Learning Journey	Steps	Content	Details
Discrete linear relations	1	Graphing a discrete linear relationship on the Cartesian plane using a table of values	• graph a discrete linear relationship on the Cartesian plane using a table of values
	2	Graphing a discrete linear relationship on the Cartesian plane using an equation in the form y = mx + b	• graph a discrete linear relationship on the Cartesian plane using an equation in the form y = mx + b
Identifying the equation from a graph	1	Identifying the equation that describes a discrete linear graph in the form y = mx + b	• identify the equation that describes a discrete linear graph in the form y = mx + b

15 Geometry and measurement

Surface area and volume of regular solids, including triangular and other right prisms and cylinders			
Surface area and volume: regular solids			
Learning Journey	Steps	Content	Details
Finding the surface area of regular solids	1	Developing a general method of finding the surface area of any three-dimensional object	• calculate the area of each face of a polyhedron to determine the surface area of the object
Finding the surface area of rectangular prisms	1	Developing the method of calculating surface areas of rectangular prisms	• determine, through investigation using a variety of tools, the surface area of rectangular prisms
	2	Finding the surface area of rectangular prisms	• find the surface area of rectangular prisms given the side lengths
			• find the surface area of rectangular prisms in real-world situations
Finding the surface area of triangular prisms	1	Developing the method of calculating surface areas of triangular prisms	• determine, through investigation using a variety of tools, the surface area of triangular prisms
	2	Finding the surface area of triangular prisms	• calculate the surface area of a triangular prism given the area of the triangular cross section, the side lengths of the triangle and the height of the prism
			• calculate the surface area of a triangular prism given the height and base length of the triangle cross section and the height of the prism
			• solve real-life problems involving the surface area calculation of triangular prisms
Finding the surface area of cylinders	1	Developing a method of calculating the surface area of a cylinder	• determine, through investigation using concrete materials, the surface area of a cylinder
	2	Finding the surface area of a cylinder	• find the surface area of a cylinder given its height, and the area of the cross-section
			• find the surface area of a cylinder given its height, and the radius of the circular cross-section
			• solve real-life problems involving the surface area calculation of cylinders
Finding the surface area of pyramids	1	Developing a method of calculating the surface area of a pyramid	• determine, through investigation using concrete materials, the surface area of a pyramid
	2	Finding the surface area of a pyramid	• find the surface area of rectangular pyramids and triangular pyramids given all necessary dimensions
			• find the surface area of pyramids in real-world situations

Learning Journey	Steps	Content	Details
			• solve real-life problems involving the surface area calculation of square and rectangular pyramids
Solving surface area and volume problems, cylinder	1	Solving problems involving the surface area and volume of cylinders	• use a variety of strategies to solve problems involving the surface area and the volume of cylinders
Finding the volume of pyramids	1	Using the formula to find the volumes of pyramids	• solve a variety of practical problems involving the volume of pyramids
			• solve real-world and mathematical problems
Finding the volume of cubes and rectangular prisms	1	Developing the formula for the volume of a cube and a rectangular prism	• develop the formula for the volume of a cube and a rectangular prism
	2	Finding the volume of a cube using a formula	• find the volume of a cube and prism using a formula given its length, width, or height
			• find the length of a cube and prism given its volume
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
	2	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
Finding the volume of cylinders	1	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

Pythagorean theorem			
Pythagorean theorem			
Learning Journey	Steps	Content	Details
Identifying the sides of a right triangle	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

Learning Journey	Steps	Content	Details
	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
Proving right triangles, Pythagorean theorem	1	Explaining a proof of the Pythagorean Theorem and its converse	• explain a proof of the Pythagorean Theorem and its converse
Finding the length of the missing side, short side	1	Finding the length of an unknown side (shorter sides only) using the Pythagorean Theorem	• find the length of an unknown side (shorter sides only) using the Pythagorean Theorem
	2	Finding the length of an unknown side (shorter sides only) using the Pythagorean Theorem, rounding answers	• find the length of an unknown side (shorter sides only) using the Pythagorean Theorem, rounding answers
	3	Finding the length of an unknown side (shorter sides only) using the Pythagorean Theorem leaving answers in exact form	• find the length of an unknown side (shorter sides only) using the Pythagorean Theorem leaving answers in exact form
	4	Finding the length of an unknown side (shorter sides only) using the Pythagorean 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 the Pythagorean Theorem in a variety of practical problems within a given context with and without diagrams given
Finding the length of the missing side, hypotenuse	1	Finding the length of an unknown side (hypotenuse only) using the Pythagorean Theorem	• find the length of an unknown side (hypotenuse only) using the Pythagorean Theorem
	2	Finding the length of an unknown side (hypotenuse only) using the Pythagorean Theorem, rounding answers	• find the length of an unknown side (hypotenuse only) using the Pythagorean Theorem, rounding answers
	3	Finding the length of an unknown side (hypotenuse only) using the Pythagorean Theorem leaving answers in exact form	• find the length of an unknown side (hypotenuse only) using the Pythagorean Theorem leaving answers in exact form

Learning Journey	Steps	Content	Details
	4	Finding the length of an unknown side (hypotenuse only) using the Pythagorean 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 the Pythagorean Theorem in a variety of practical problems within a given context with and without diagrams given
Finding the length of the missing side	1	Finding the length of an unknown side (shorter side and hypotenuse) using the Pythagorean Theorem	• find the length of an unknown side (shorter side and hypotenuse) using the Pythagorean Theorem
	2	Finding the length of an unknown side (shorter side and hypotenuse) using the Pythagorean Theorem, rounding answers	• find the length of an unknown side (shorter side and hypotenuse) using the Pythagorean Theorem, rounding answers
	3	Finding the length of an unknown side (shorter side and hypotenuse) using the Pythagorean Theorem leaving answers in exact form	• find the length of an unknown side (shorter side and hypotenuse) using the Pythagorean Theorem leaving answers in exact form
	4	Finding the length of an unknown side (shorter side and hypotenuse) using the Pythagorean 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 the Pythagorean Theorem in a variety of practical problems within a given context with and without diagrams given
	5	Finding the length of an unknown side (shorter side and hypotenuse) using the Pythagorean Theorem in a variety of practical problems within a given context with and without diagrams given, with answers given in exact form	• find the length of an unknown side (shorter side and hypotenuse) using the Pythagorean Theorem in a variety of practical problems within a given context with and without diagrams given, with answers given in exact form
Matching right triangles to word problems	1	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
Pythagorean triples	1	Identifying a Pythagorean triple as a set of 3 numbers that satisfy the Pythagorean Theorem	• identify a Pythagorean triple as a set of 3 numbers that satisfy the Pythagorean Theorem
			• establish new Pythagorean triples by starting with another
			• identify that when each term of a Pythagorean triple is multiplied/divided by a constant, the resulted 3 figures also form a Pythagorean triple

Construction, views, and nets of 3D objects			
Construction, views, & nets: 3D objects			
Learning Journey	Steps	Content	Details
Top, front, and side views of 3D objects	1	Drawing different views of prisms and solids made from connecting cubes	• draw (in two dimensions) 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
	2	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
Connecting prisms with their nets	1	Exploring prisms and their nets	• examine a diagram to determine whether it is the net of a prism
			• explain why a given net will not form a prism
	2	Connecting prisms with their nets	• visualize and sketch nets for a given prism
			• identify whether a diagram is a net of a particular prism
			• visualize and name prisms given diagrams of their nets
			• construct prisms from given nets
Connecting prisms and pyramids with their nets	1	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
			• visualize and sketch nets for a given prism or pyramid
			• recognize whether a diagram is a net of a particular prism or pyramid
			• visualize 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
Connecting 3D objects with their nets	1	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
			• visualize and sketch nets for given three-dimensional objects

Learning Journey	Steps	Content	Details
			• recognize whether a diagram is a net of a particular three-dimensional object
			• visualize and name prisms and pyramids, given diagrams of their nets
			• select the correct diagram of a net for a given three-dimensional object (include other regular polyhedrons)

16 Data and probability

Central tendency			
Central tendency			
Learning Journey	Steps	Content	Details
Mean	1	Understanding the mean	• explore a set of values in data displays and in lists with the aim of summarizing all of the values with a single number
			• calculate the mean for a small set of data that would produce a whole number
			• use the mean to describe the shape of the data set across its range of values, using charts, tables, and graphs (eg, 'The data values fall mainly into two groups on both sides of the mean.'; 'The set of data is not spread out evenly around the mean.')
			• decide if the mean is the best representative number for the centre of the data set; justify and discuss
	2	Calculating the mean	• calculate the mean for a small set of data
Median	1	Understanding the median	• explore a set of values in data displays and in lists with the aim of summarizing all of the values with a single number
			• organize values in order and find the middle number (median)
			• decide if the median is the best representative number for the centre of data set; justify and discuss
	2	Calculating the median	• organize values in order and find the middle number (median)
	3	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
Mode	1	Understanding the mode	• explore a set of values in data displays and in lists with the aim of summarizing all of the values with a single number
			• organize values in order and find the value that is occurs the most

Learning Journey	Steps	Content	Details
			• decide if the mode is the best representative number for centre of the data set; justify and discuss
	2	Calculating the mode	• organize values in order and find the value that is occurs the most

Theoretical probability with two independent events			
Theoretical probability			
Learning Journey	Steps	Content	Details
Determining theoretical probability, tree diagrams	1	Determining the theoretical probability of a series of events using tree diagrams	• determine the theoretical probability of a series of a events using a tree diagram (diagram given)
			• determine the theoretical probability of a series of a events using a tree diagram (diagram not given, needs to be constructed)
Identifying the sample space	1	Interpreting tree diagrams	• use a tree diagram to describe all possible combinations or outcomes for two or more independent events
	2	Constructing tree diagrams	• construct a tree diagram to show all possible combinations or outcomes for 2 or more independent events
	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
Exploring fair games	1	Exploring the 'fairness' of simple games involving chance	• identify what can affect the fairness of games involving chance eg: bias, weighted, uneven outcomes etc
			• explore how to make an unfair game fair and vice versa

17 Financial literacy

Best buys			
Best buys			
Learning Journey	Steps	Content	Details
Best buys	1	Spending money: Best buys	• determine the 'best buy'/'best value for money' for different quantities of the same type of substance by comparing the price per unit
			• determine the 'best buy'/'best value for money' by comparing two or more special offers for the same item
			• describe practical considerations that may mean that the cheapest option for buying something is not necessarily the best value for money
	2	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
			• investigate 'unit pricing' used by retailers and use this to determine the best buy
	3	Calculating the percentage increase given the new increased value and the original value	• calculate the percentage increase given the new increased value and the original value as follows: percentage increase = [(new value - original value)/original value] • 100

Part IV

Grade 8 – Big Ideas

18 Number

Big Idea - Number: Number represents, describes, and compares the quantities of ratios, rates, and percents.			
Percents less than 1 & greater than 100			
Learning Journey	Steps	Content	Details
Percents greater than 100	1	Calculating percentages of quantities greater than 100%	• calculate percentage amounts of quantities greater than 100%
	2	Interpreting increases of quantities as percentage increases (over 100%)	• interpret and calculate percentages greater than 100%
	3	Calculating percentages of quantities less than 1%	• calculate percentage amounts of quantities less than 1%
Percents less than 1	1	Modelling rates	• model real-life relationships involving constant rates where the initial condition starts at 0
Numerical proportional reasoning			
Unit rate	1	Understanding that a rate, in simplest form, is the comparison of an amount per unit value of another	• understand that a rate, in simplest form, is the comparison of an amount per unit value of another
	2	Converting given information into a simplified rate	• convert given information into a simplified rate
Simplifying and comparing rates	1	Comparing rates	• compare 2 quantities of different rates
	2	Solving problems comparing 2 given rates by simplifying	• solve problems comparing 2 given rates by simplifying
	3	Determining an amount for a given time period given a rate	• determine an amount for a given time period given a unit rate
Solving rate problems	1	Determining an amount for a given time period given a rate	• determine an amount for a given time period given a rate
			• divide a quantity in a given ratio
Dividing a quantity in a given ratio	1	Dividing a quantity in a given ratio	• solve a variety of real-life problems involving ratio
			• describe 'sharing' in a given ratio
			• divide an interval into a given ratio on a number line
	2	Dividing a quantity into a given ratio (ratio composed of 3 numbers)	• divide a quantity in a given ratio
	3	Applying the unitary method to ratio problems	• apply the unitary method to ratio problems

Learning Journey	Steps	Content	Details
Solving ratio problems	1	Solving a variety of real-life problems involving ratio	• solve a variety of real-life problems involving ratio
	2	Solving proportions using cross multiplication	• solve proportions using cross multiplication
Solving proportions	1	Solving problems involving proportional reasoning	• solve problems involving proportional reasoning
	2	Using proportions to solve percent problems	• use proportions to solve percent problems
Using percents	1	Solving multi-step ratio and percent problems using proportional relationships	• solve multi-step ratio and percent problems using proportional relationships
	2	Using models to add unit fractions with the same denominator (denominators 2, 3, 4, 5, 6, 8, 10)	• use models to add unit fractions with the same denominator (denominators 2, 3, 4, 5, 6, 8, 10)

19 Computational fluency

Big Idea - Comp Fluency: Computational fluency and flexibility extend to operations with fractions.			
Operations with fractions			
Learning Journey	Steps	Content	Details
Adding fractions, same denominator	1	Using models to add unit fractions with the same denominator (denominators 2, 3, 4, 5, 6, 8, 10)	• recognize the connection between the numerator of a fraction and the repeated addition of the unit fraction with the same denominator (e.g. 2/5 is one fifth plus one fifth)
			• use models to add 2 or more fractions with the same denominator (up to and including one whole)
	2	Adding simple fractions with the same denominator using models to make fractions up to and including 1 whole	• solve problems involving adding fractions with the same denominator
			• add proper fractions with the same denominator
	3	Adding proper fractions with the same denominator (denominators 2, 3, 4, 5, 6, 7, 8)	• model and represent strategies, including using diagrams and written representations
			• add proper fractions with common denominators
	4	Adding a whole number and a proper fraction	• add a whole number and a proper fraction
Adding a whole number and a fraction	1	Adding a whole number and a proper fraction	• model and represent strategies, including using diagrams and written representations
			• add improper fractions with common denominators
Adding improper fractions, same denominator	1	Adding improper fractions with common denominators	• add improper fractions with common denominators expressing answers as a mixed number
			• use models to add 2 or more fractions and mixed numbers with the same denominator
Adding with mixed numbers, same denominator	1	Adding fractions and mixed numbers with the same denominator	• add fractions and mixed numbers with the same denominator without models
			• solve problems involving adding fractions and mixed numbers with the same denominator
			• add mixed numbers with the same denominator
	2	Adding mixed numbers with the same denominator	• model and represent strategies, including using diagrams and written representations
			• add proper fractions where the denominators are related

Learning Journey	Steps	Content	Details
Adding fractions, unlike denominator	1	Adding proper fractions with related denominators and answers less than 1 whole	• model and represent strategies, including using diagrams and written representations
			• use knowledge of equivalence to simplify answers when adding fractions
			• add proper fractions with unlike denominators
	2	Adding proper fractions with unlike denominators	• explain why there must be a common denominator in order to add fractions
			• add improper fractions with unlike denominators
Adding improper fractions, unlike denominator	1	Adding improper fractions with unlike denominators	• add improper fractions with unlike denominators expressing answers as a mixed number
			• add fractions, including mixed numbers, where the denominators are related
Adding with mixed numbers, unlike denominator	1	Adding fractions, including mixed numbers, with related denominators	• convert an answer that is an improper fraction to a mixed number
			• use knowledge of equivalence to simplify answers when adding fractions
			• recognize that improper fractions may sometimes make calculations involving mixed numbers easier
			• add fractions, including mixed numbers, where the denominators are unrelated by finding common denominators
	2	Adding fractions and mixed numbers with unrelated denominators	• model and represent strategies, including using diagrams and written representations
			• convert an answer that is an improper fraction to a mixed number
			• use knowledge of equivalence to simplify answers when adding fractions
			• recognize that improper fractions may sometimes make calculations involving mixed numbers easier
			• add mixed numbers with unlike denominators
	3	Subtracting unit fractions with the same denominator (2, 4, 8) including subtracting from 1 whole (with models)	• subtract unit fractions with the same denominator (2, 4, 8) up to 1 whole with the use of models

Learning Journey	Steps	Content	Details
Subtracting fractions, same denominator	1	Subtracting unit fractions with the same denominator (2, 4, 8) including subtracting from 1 whole (with models)	• solve problems involving subtracting unit fractions with the same denominator (2, 4, 8) from 1 whole
			• use models to subtract 2 or more fractions with the same denominator (including subtracting from one whole)
	2	Subtracting simple fractions with the same denominator using models, including subtracting from 1 whole	• solve problems involving adding fractions with the same denominator
			• subtract proper fractions with the same denominator
	3	Subtracting proper fractions with the same denominator (denominators 2, 3, 4, 5, 6, 7, 8)	• model and represent strategies, including using diagrams and written representations
			• subtract proper fractions with common denominators
	4	Subtracting a proper fraction from a whole number	• use diagrams, and mental and written strategies, to subtract a proper fraction from any whole number including 1
Subtracting a fraction from a whole number	1	Subtracting a proper fraction from a whole number	• model and represent strategies, including using diagrams and written representations
			• subtract improper fractions with common denominators
Subtracting improper fractions, same denominator	1	Subtracting improper fractions with common denominators	• subtract improper fractions with common denominators, expressing answers as a mixed number
			• use models to subtract 2 or more fractions and mixed numbers with the same denominator
Subtracting with mixed numbers, same denominator	1	Subtracting fractions and mixed numbers with the same denominator	• subtract fractions and mixed numbers with the same denominator without models
			• solve problems involving subtracting fractions and mixed numbers with the same denominator
			• subtract mixed numbers with the same denominator
	2	Subtracting mixed numbers with the same denominator	• model and represent strategies, including using diagrams and written representation
			• subtract proper fractions where the denominators are related
Subtracting fractions, unlike denominator	1	Subtracting proper fractions with related denominators and answers less than 1 whole	• model and represent strategies, including using diagrams and written representations
			• use knowledge of equivalence to simplify answers when subtracting fractions

Learning Journey	Steps	Content	Details
			• subtract proper fractions with unlike denominators
	2	Subtracting proper fractions with unlike denominators	• explain why there must be a common denominator in order to subtract fractions
			• subtract improper fractions with unlike denominators
Subtracting improper fractions, unlike denominator	1	Subtracting improper fractions with unlike denominators	• subtract improper fractions with unlike denominators expressing answers as a mixed number
			• subtract fractions, including mixed numbers, where the denominators are related
Subtracting with mixed numbers, unlike denominator	1	Subtracting fractions, including mixed numbers, with related denominators	• convert an answer that is an improper fraction to a mixed number
			• use knowledge of equivalence to simplify answers when subtracting fractions
			• recognize that improper fractions may sometimes make calculations involving mixed numbers easier
			• subtract fractions, including mixed numbers, where the denominators are unrelated by finding common denominators
	2	Subtracting fractions and mixed numbers with unrelated denominators	• model and represent strategies, including using diagrams and written representations
			• convert an answer that is an improper fraction to a mixed number
			• use knowledge of equivalence to simplify answers when subtracting fractions
			• recognize that improper fractions may sometimes make calculations involving mixed numbers easier
			• solve word problems involving the addition and subtraction of fractions where 1 denominator is the same as, or a multiple of, the other
Adding/subtracting fractions, word problems	1	Solving word problems involving fractions and mixed numerals with the unrelated denominators	• solve word problems involving the addition and subtraction of fractions with unrelated denominators
	2	Multiplying unit fractions by whole numbers using models and diagrams	• apply and extend previous understandings of multiplication to multiply a unit fraction by a whole number
Multiplying fractions by whole numbers	1	Multiplying unit fractions by whole numbers using models and diagrams	• use repeated addition to represent and multiply unit fractions by whole numbers, eg $1/5 \times 3 = 1/5 + 1/5 + 1/5 = 3/5$

Learning Journey	Steps	Content	Details
			• develop a rule for multiplying unit fractions by whole numbers, eg multiply the numerator by the whole number
			• solve word problems involving multiplication of unit fractions by whole numbers, including area and length problems
			• apply and extend previous understandings of multiplication to multiply a fraction by a whole number supported by models and/or diagrams, eg 2/5 × 3 = 2/5 + 2/5 + 2/5 = 6/5 = 1 1/5
	2	Multiplying proper fractions by whole numbers using models and diagrams	• use repeated addition to multiply simple fractions by whole numbers, eg 2/5 × 3 = 2/5 + 2/5 + 2/5 = 6/5 = 1 1/5
			• develop a rule for multiplying simple fractions by whole numbers, eg 2/5 × 3 = 2 × 3 /5 = 6/5 = 1 1/5
			• solve word problems involving multiplication of fractions by whole numbers, including area and length problems
			• apply and extend previous understandings of multiplication to multiply a fraction by a whole number supported by models and/or diagrams, eg 2/5 × 3 = 2/5 + 2/5 + 2/5 = 6/5 = 1 1/5
	3	Multiplying proper or improper fractions by whole numbers using models and diagrams	• apply and extend previous understandings of multiplication to multiply an improper fraction by a whole number supported by models and/or diagrams, eg 6/5 × 3 = 6/5 + 6/5 + 6/5 = 18/5 = 3 3/5
			• develop a rule for multiplying fractions by whole numbers eg multiply the numerator by the whole number
			• solve word problems involving multiplication of fractions by whole numbers, including area and length problems
			• multiply a unit fraction by a whole number greater than 1
	4	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

Learning Journey	Steps	Content	Details
	5	Multiplying mixed numbers by whole numbers using models and diagrams	• convert the mixed numbers to an improper fraction and then multiply by a whole number supported by models and/or diagrams, eg 1 and 2/3 x 6 as 5/3 x 6 = 30/3 or 10
Multiplying mixed numbers by whole numbers	1	Multiplying mixed numbers by whole numbers using models and diagrams	• solve word problems involving multiplication of fractions by whole numbers, including area and length problems
			• multiply mixed numbers by a whole number greater than 1
	2	Multiplying proper fractions	• determine the effect of multiplying by a number with magnitude less than 1
Multiplying fractions	1	Multiplying proper fractions	• multiply proper fractions using written methods
			• demonstrate multiplication of a fraction by another fraction using a diagram to illustrate the process
			• solve problems involving multiplying fractions in context
			• calculate fractions of quantities using mental or written strategies
			• choose the appropriate equivalent form for mental computation
			• multiply improper fractions using written methods
Multiplying improper fractions	1	Multiplying 2 improper fractions, expressing the answer as a mixed number	• multiply 2 improper fractions expressing the answer as a mixed number
	2	Multiplying 2 mixed numbers	• multiply mixed numbers using written methods
Multiplying mixed numbers	1	Multiplying proper fractions, improper fractions, and mixed numbers using written methods	• multiply proper fractions, improper fractions, and mixed numbers using written methods
Multiplying fractions and mixed numbers	1	Dividing a proper fraction by a positive whole number	• divide unit fractions by whole numbers, eg 1/3 ÷ 2 = 1/6
Dividing fractions and whole numbers	1	Dividing a proper fraction by a positive whole number	• divide a non unit fraction by a whole number (where the divisor is a factor of the numerator); use diagrams for support
			• divide a non unit fraction by any whole number
			• determine the effect of dividing by a number with magnitude less than 1
	2	Dividing a positive whole number by proper fraction	• divide a positive whole number by a unit fraction using diagrams to support

Learning Journey	Steps	Content	Details
			• divide a positive whole number by a proper fraction (where the answer is a whole number) using diagrams to support
			• divide a positive whole number by any proper fraction using diagrams to support
			• demonstrate that dividing by a fraction is equal to multiplying by its reciprocal
			• develop a rule for dividing by a fraction
			• divide a proper fraction by a proper fraction
Dividing fractions	1	Dividing improper fractions by proper fractions and vice versa	• divide improper fractions by proper fractions and vice versa
	2	Dividing an improper fraction by an improper fraction	• divide an improper fraction by an improper fraction
	3	Dividing a positive integer by an improper fraction	• divide a positive integer by an improper fraction and mixed number
Dividing whole numbers and improper fractions	1	Dividing an improper fraction by a positive integer	• divide an improper fraction by a positive integer
	2	Dividing a positive integer by a mixed fraction/number	• divide a positive integer by a mixed fraction/number
Dividing whole numbers and mixed numbers	1	Dividing a mixed number by a positive integer	• divide a mixed number by a positive integer
	2	Dividing mixed numbers by proper fractions and vice versa	• divide mixed numbers by proper fractions and vice versa
Dividing mixed numbers and fractions	1	Dividing a mixed number by a mixed fraction/number	• divide a mixed number by a mixed number
Dividing mixed numbers	1	Dividing an improper fraction by a mixed number and vice versa	• divide an improper fraction by a mixed number and vice versa
Dividing improper fractions and mixed numbers	1	Solving word problems involving division of fractions by fractions	• solve word problems involving division of fractions by fractions
Dividing fractions, word problems	1	Applying the order of operations to evaluate expressions involving fractions with and without grouping symbols, 4 operations	• apply the order of operations to evaluate expressions involving fractions without grouping symbols, 4 operations

Learning Journey	Steps	Content	Details
Order of operations with fractions	1	Applying the order of operations to evaluate expressions involving fractions with and without grouping symbols, 4 operations	• apply the order of operations to evaluate expressions involving fractions with grouping symbols, 4 operations
			• graph a discrete linear relationship on the Cartesian plane using a table of values

20 Patterning

Big Idea - Patterning: Discrete linear relationships can be represented in many connected ways and used to identify and make generalizations.			
Discrete linear relations			
Learning Journey	Steps	Content	Details
Discrete linear relations	1	Graphing a discrete linear relationship on the Cartesian plane using an equation in the form y = mx + b	• graph a discrete linear relationship on the Cartesian plane using an equation in the form y = mx + b
	2	Identifying the equation that describes a discrete linear graph in the form y = mx + b	• identify the equation that describes a discrete linear graph in the form y = mx + b
Identifying the equation from a graph	1	Investigating the nets of cubes and rectangular prisms in order to deduce formulae for calculating their surface areas	• investigate the nets of cubes and rectangular prisms in order to deduce formulae for calculating their surface areas

21 Geometry and measurement

Big Idea - Geo and Measurement: The relationship between surface area and volume of 3D objects can be used to describe, measure, and compare spatial relationships.			
Surface area and volume: regular solids			
Learning Journey	Steps	Content	Details
Finding the surface area of regular solids	1	Developing the method of calculating surface areas of rectangular prisms	• develop the method of calculating the surface area of rectangular prisms
Finding the surface area of rectangular prisms	1	Finding the surface area of rectangular prisms	• find the surface area of rectangular prisms given the side lengths
	2	Finding the surface area of rectangular prisms	• find the surface area of rectangular prisms in real-world situations
			• develop the method of calculating the surface area of triangular prisms
Finding the surface area of triangular prisms	1	Finding the surface area of triangular prisms	• calculate the surface area of a triangular prism given the area of the triangular cross section, the side lengths of the triangle and the height of the prism
	2	Finding the surface area of triangular prisms	• calculate the surface area of a triangular prism given the height and base length of the triangle cross section and the height of the prism
			• solve real-life problems involving the surface area calculation of triangular prisms
			• develop a method of calculating the surface area of a cylinder
Finding the surface area of cylinders	1	Finding the surface area of a cylinder	• find the surface area of a cylinder given its height, and the area of the cross-section
	2	Finding the surface area of a cylinder	• find the surface area of a cylinder given its height, and the radius of the circular cross-section
			• solve real-life problems involving the surface area calculation of cylinders
			• develop a method of calculating the surface area for rectangular pyramids and triangular pyramids
Finding the surface area of pyramids	1	Finding the surface area of a pyramid	• find the surface area of rectangular pyramids and triangular pyramids given all necessary dimensions
	2	Finding the surface area of a pyramid	• find the surface area of pyramids in real-world situations
			• solve real-life problems involving the surface area calculation of square and rectangular pyramids
			• use a variety of strategies to solve problems involving the surface area and the volume of cylinders

Learning Journey	Steps	Content	Details
Solving surface area and volume problems, cylinder	1	Using the formula to find the volumes of pyramids	• develop and use the formula to find the volumes of pyramids
Finding the volume of pyramids	1	Using the formula to find the volumes of pyramids	• solve real-world and mathematical problems
			• develop the formula for the volume of rectangular and triangular prisms and of prisms in general by considering the number and volume of 'layers' of identical shape (volume of prism = base area × height, leading to V=Ah)
Finding the volume of cubes and rectangular prisms	1	Finding the volume of a cube using a formula	• find the volume of a cube and prism using a formula given its length, width, or height
	2	Finding the volume of a cube using a formula	• find the length of a cube and prism given its volume
			• develop the formula for the volume of triangular prisms by recognizing the area of the 'base' of a prism as being identical to the area of its uniform cross-section and using the formula V=Bh
Finding the volume of triangular prisms	1	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	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
Finding the volume of cylinders	1	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 different units
			• draw (in two dimensions) prisms from different views, including top, side, front and back views
Construction, views, & nets: 3D objects			
Top, front, and side views of 3D objects	1	Drawing different views of prisms and solids made from connecting cubes	• draw (in two dimensions) solids formed from combinations of prisms, from different views, 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	Creating models of three-dimensional objects from nets	• use nets to create models of geometric solids, including cubes, prisms, pyramids and cylinders

Learning Journey	Steps	Content	Details
Connecting prisms with their nets	1	Exploring prisms and their nets	• explain why a given net will not form a prism
			• visualize and sketch nets for a given prism
	2	Connecting prisms with their nets	• identify whether a diagram is a net of a particular prism
			• visualize and name prisms given diagrams of their nets
			• construct prisms from given nets
			• examine a diagram to determine whether it is or is not the net of a prism or pyramid
Connecting prisms and pyramids with their nets	1	Connecting prisms and pyramids with their nets	• explain why a given net will not form a prism or pyramid
			• visualize and sketch nets for a given prism or pyramid
			• recognize whether a diagram is a net of a particular prism or pyramid
			• visualize 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
			• examine a diagram to determine whether it is or is not the net of a closed three-dimensional object
Connecting 3D objects with their nets	1	Connecting three-dimensional objects with their nets	• explain why a given net will not form a closed three-dimensional object
			• visualize and sketch nets for given three-dimensional objects
			• recognize whether a diagram is a net of a particular three-dimensional object
			• visualize and name prisms and pyramids, given diagrams of their nets
			• select the correct diagram of a net for a given three-dimensional object (include other regular polyhedrons)
			• explore a set of values in data displays and in lists with the aim of summarizing all of the values with a single number

22 Data and probability

Big Idea - Data & Probability: Analyzing data by determining averages is one way to make sense of large data sets and enables us to compare and interpret.			
Central tendency			
Learning Journey	Steps	Content	Details
Understanding mean	1	Understanding the mean	• calculate the mean for a small set of data that would produce a whole number
			• use the mean to describe the shape of the data set across its range of values, using charts, tables, and graphs (eg, 'The data values fall mainly into two groups on both sides of the mean.'; 'The set of data is not spread out evenly around the mean.')
			• decide if the mean is the best representative number for the centre of the data set; justify and discuss
			• calculate the mean for a small set of data
	2	Understanding the median	• explore a set of values in data displays and in lists with the aim of summarizing all of the values with a single number
Understanding median	1	Understanding the median	• organize values in order and find the middle number (median)
			• decide if the median is the best representative number for the centre of data set; justify and discuss
			• organize values in order and find the middle number (median)
	2	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
	3	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 even number of scores
			• explore a set of values in data displays and in lists with the aim of summarizing all of the values with a single number
Understanding mode	1	Understanding the mode	• organize values in order and find the value that is occurs the most
			• decide if the mode is the best representative number for centre of the data set; justify and discuss
			• organize values in order and find the value that is occurs the most

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