Mathletics

Manitoba Program of Studies

Understanding Practice and Fluency (UPF)

Grades 7 – 8

October, 2021

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Grade 7

1 Number

1.1 Develop number sense

Outcome	Quests	Content
1. Determine and explain why a number is divisible by 2, 3, 4, 5, 6, 8, 9, or 10, and why a number cannot be divided by 0	Divisibility rules	Introducing divisibility rules for dividing by 2
		Introducing divisibility rules for dividing by 3
		Introducing divisibility rules for dividing by 4
		Introducing divisibility rules for dividing by 5
		Introducing divisibility rules for dividing by 6
		Introducing divisibility rules for dividing by 8
		Introducing divisibility rules for dividing by 9
		Introducing divisibility rules for dividing by 10
		Divisibility rules: dividing by 2, 3, 4, 5, 6, 10
2. Demonstrate an understanding of the addition, subtraction, multiplication, and division of decimals to solve problems (for more than 1-digit divisors or 2-digit multipliers, technology could be used)	Operations with decimals	Solving decimal word problems, 4 operations
		Adding decimals
		Subtracting decimals
		Multiplying decimals
		Multiplying decimals using place value
		Dividing decimals
		Order of operations, decimals
3. Solve problems involving percents from 1% to 100%	Percents, fractions & decimals	Solving word problems involving percentages
		Converting percents into fractions & decimals
4. Demonstrate an understanding of the relationship between repeating decimals and fractions, and terminating decimals and fractions	Decimals & fractions	Investigating terminating & repeating decimals
		Converting terminating decimals to fractions
		Converting repeating decimals to fractions
		Converting fractions to terminating decimals

		Converting fractions to repeating decimals
5. Demonstrate an understanding of adding and subtracting positive fractions and mixed numbers, with like and unlike denominators, concretely, pictorially, and symbolically (limited to positive sums and differences)	Add fractions & mixed numbers	Adding fractions, like denominator
		Adding a whole number & a fraction
		Adding improper fractions, like denominator
		Adding mixed numbers, like denominator
		Adding fractions, unlike denominator
		Adding improper fractions, unlike denominator
		Adding mixed numbers, unlike denominator
5. Demonstrate an understanding of adding and subtracting positive fractions and mixed numbers, with like and unlike denominators, concretely, pictorially, and symbolically (limited to positive sums and differences)	Subtract fractions & mixed numbers	Subtracting fractions, like denominator
		Subtracting a fraction from a whole number
		Subtracting improper fractions, like denominator
		Subtracting with mixed numbers, like denominator
		Subtracting fractions, unlike denominator
		Subtracting improper fractions, unlike denominator
		Subtracting with mixed numbers, unlike denominator
	Add & subtract fractions, word problems	Adding & subtracting fractions, word problems
6. Demonstrate an understanding of addition and subtraction of integers, concretely, pictorially, and symbolically	Understand integers	Investigating integers
		Comparing & ordering integers
		Understanding opposites in context
	Add & subtract integers	Adding & subtracting negative integers
		Adding & subtracting integers, word problems
		Adding integers with two-coloured counters
		Adding & subtracting integers on a number line
		Adding integers
		Subtracting integers
		Adding & subtracting integers, order of operations

7. Compare and order fractions, decimals (to thousandths), and integers by using: benchmarks, place value, equivalent fractions and/or decimals	Compare & order fractions & decimals	Ordering fractions & decimals on a number line
		Identifying a number between 2 given numbers
		Comparing & ordering proper fractions
		Ordering terminating & repeating decimals
		Comparing & ordering integers

2 Patterns & Relations (Patterns)

2.1 Use patterns to describe the world and solve problems

Outcome	Quests	Content
1. Demonstrate an understanding of oral and written patterns and their corresponding relations	Patterns & linear relations	Representing written patterns as linear relations
2. Construct a table of values from a relation, graph the table of values, and analyze the graph to draw conclusions and solve problems	Discrete linear relations	Graphing discrete linear relations using a table
		Matching graphs & linear relations
		Creating tables of values for linear relations

3 Patterns & Relations (Variables & Equations)

3.1 Represent algebraic expressions in multiple ways

Outcome	Quests	Content
3. Demonstrate an understanding of preservation of equality by: modelling preservation of equality, concretely, pictorially, and symbolically, applying preservation of equality to solve equations	Preservation of equality	Understanding the preservation of equality
		Equivalent forms of equations
		Solving 1-step equations using a balance
4. Explain the difference between an expression and an equation	Expressions & equations	Distinguishing between expressions & equations
		Identifying parts of expressions & equations
5. Evaluate an expression given the value of the variable(s)	Evaluate an expression	Evaluating expressions using substitution
6. Model and solve problems that can be represented by one-step linear equations of the form $x + a = b$, concretely, pictorially, and symbolically, where a and b are integers	Linear equations, integers	Solving linear equations with integers
		Modeling & solving 1-step equations, algebra tiles
7. Model and solve problems that can be represented by linear equations of the form: $ax + b = c$, $ax = b$, $x/a = b$, $a \neq 0$ concretely, pictorially, and symbolically, where a, b, and c, are whole numbers	Linear equations, whole numbers	Solving 2-step equations
		Modeling & solving 2-step equations, algebra tiles
		Modeling real-life scenarios using equations
		Solving 1-step equations
		Solving 1-step equations using algebra tiles
		Checking solutions of two-step equations

4 Shape & Space (Measurement)

4.1 Use direct or indirect measurement to solve problems

Outcome	Quests	Content
1. Demonstrate an understanding of circles by: describing the relationships among radius, diameter, and circumference of circles, relating circumference to pi (π), determining the sum of the central angles, constructing circles with a given radius or diameter, solving problems involving the radii, diameters, and circumferences of circles	Circles	Finding the circumference of circles
		Introducing the parts of a circle
		Introducing circumference
		Sum of the central angles of a circle
2. Develop and apply a formula for determining the area of: triangles, parallelograms, circles	Determine the area	Determining the area of a triangle
		Determining the area of a parallelogram
		Determining the area of a circle

5 Shape & Space (3-D Objects & 2-D Shapes)

5.1 Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them

Outcome	Quests	Content
3. Perform geometric constructions, including: perpendicular line segments, parallel line segments, perpendicular bisectors, angle bisectors	Lines & angles	Identifying parallel & perpendicular lines

6 Shape & Space (Transformations)

6.1 Describe and analyze position and motion of objects and shapes

Outcome	Quests	Content
4. Identify and plot points in the four quadrants of a Cartesian plane using ordered pairs	The Cartesian plane	Introducing Cartesian coordinates
		Drawing shapes on the coordinate plane
5. Perform and describe transformations of a 2-D shape in all four quadrants of a Cartesian plane (limited to integral vertices)	Transformations on the Cartesian plane	Successive translations on the coordinate plane
		Rotations on the coordinate plane
		Reflections on the coordinate plane
		Combinations of transformations

7 Statistics & Probability (Data Analysis)

7.1 Describe and analyze position and motion of objects and shapes

Outcome	Quests	Content
1. Demonstrate an understanding of central tendency and range by: determining the measures of central tendency (mean, median, mode) and range, determining the most appropriate measures of central tendency to report findings	Measures of central tendency & range	Understanding mean
		Understanding median
		Understanding mode
		Understanding range
		Choosing statistical measures for data
2. Determine the effect on the mean, median, and mode when an outlier is included in a data set	Outliers	Investigating the effect of outliers
3. Construct, label, and interpret circle graphs to solve problems	Circle graphs	Interpreting & constructing circle graphs

8 Statistics & Probability (Chance & Uncertainty)

8.1 Use experimental or theoretical probabilities to represent and solve problems involving uncertainty

Outcome	Quests	Content
4. Express probabilities as ratios, fractions, and percents	Probability: decimal, fraction, percent	Probability: decimals, fractions & percents
5. Identify the sample space (where the combined sample space has 36 or fewer elements) for a probability experiment involving two independent events	Sample space	Identifying the sample space
6. Conduct a probability experiment to compare the theoretical probability (determined using a tree diagram, table, or another graphic organizer) and experimental probability of two independent events	Theoretical & experimental probability	Understanding independent events
		Determining theoretical probability, tree diagrams
		Exploring fair games

Grade 8

1 Number

1.1 Develop number sense

Outcome	Quests	Content
1. Demonstrate an understanding of perfect squares and square roots, concretely, pictorially, and symbolically (limited to whole numbers)	Squares & square roots	Perfect squares
		Finding square roots
2. Determine the approximate square root of numbers that are not perfect squares (limited to whole numbers)	Estimate square roots	Estimating square roots
3. Demonstrate an understanding of percents greater than or equal to 0%	Percents greater than or equal to 0%	Percents greater than 100%
		Converting percents to fractions & mixed numbers
		Converting percents to decimals
		Solving problems involving consecutive percents
		Increasing & decreasing amounts by percents
		Solving problems involving combined percents
4. Demonstrate an understanding of ratio and rate	Understand ratio & rate	Unit rate
		Introduction to ratios
5. Solve problems that involve rates, ratios, and proportional reasoning	Rates, ratios & proportional reasoning	Simplifying & comparing rates
		Solving rate problems
		Dividing a quantity in a given ratio
		Solving ratio problems
		Solving proportions problems
6. Demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially, and symbolically	Multiply fractions & mixed numbers	Multiplying unit fractions by whole numbers
		Multiplying proper fractions by whole numbers
		Multiplying mixed numbers by whole numbers
		Multiplying fractions
		Multiplying mixed numbers
	Divide fractions & mixed numbers	Dividing fractions & whole numbers
		Dividing fractions

		Dividing whole numbers & mixed numbers
		Dividing mixed numbers & fractions
		Dividing mixed numbers
		Dividing fractions, word problems
7. Demonstrate an understanding of multiplication and division of integers, concretely, pictorially, and symbolically	Multiply & divide integers	Multiplying integers
		Dividing integers
		Multiplying & dividing integers
		Multiplying integers using models
		Dividing integers using models
8. Solve problems involving positive rational numbers	Operations with decimals	Solving decimal word problems, 4 operations
		Using operations with decimals
	Add & subtract fractions & mixed numbers	Adding fractions & mixed numbers
		Subtracting fractions & mixed numbers
		Adding & subtracting fractions, word problems

2 Patterns & Relations (Patterns)

2.1 Use patterns to describe the world and solve problems

Outcome	Quests	Content
1. Graph and analyze two-variable linear relations	Linear relations	Graphing discrete linear relations
		Identifying equation from a discrete linear graph

3 Patterns & Relations (Variables & Equations)

3.1 Represent algebraic expressions in multiple ways

Outcome	Quests	Content
2. Model and solve problems using linear equations of the form: $ax = b$, $x/a = b$, $a \neq 0$, $ax + b = c$, $x/a + b = c$, $a \neq 0$, $a(x + b) = c$ concretely, pictorially, and symbolically, where a, b, and c, are integers	Linear equations, integers	Modelling & solving 2-step linear equations
		Solving linear equation word problems
		Solving 2-step linear equations, mixed operations
		Solving 1-step linear equations, add & subtract
		Solving 1-step linear equations, multiply & divide
		Solving 1-step linear equations, mixed operations
		Solving linear equations, distributive property
		Checking solutions using substitution

4 Shape & Space (Measurement)

4.1 Use direct or indirect measurement to solve problems

Outcome	Quests	Content
1. Develop and apply the Pythagorean theorem to solve problems	Pythagorean Theorem	Identifying the sides of a right triangle
		Converse of the Pythagorean Theorem
		Finding the length of the missing side, short side
		Finding the length of the missing side, hypotenuse
		Finding the length of the missing side
		Matching right triangles to word problems
		Identifying Pythagorean triples
2. Draw and construct nets for 3-D objects	Nets of 3-D objects	Connecting prisms with their nets
		Connecting 3-D objects with their nets
3. Determine the surface area of: right rectangular prisms, right triangular prisms, right cylinders to solve problems	Surface area	Finding the surface area of rectangular prisms
		Finding the surface area of triangular prisms
		Finding the surface area of cylinders
4. Develop and apply formulas for determining the volume of right prisms and right cylinders	Volume	Finding the volume of cubes & rectangular prisms
		Finding the volume of triangular prisms
		Finding the volume of cylinders
		Solving volume problems, right prisms & cylinders

5 Shape & Space (3-D Objects & 2-D Shapes)

5.1 Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them

Outcome	Quests	Content
5. Draw and interpret top, front, and side views of 3-D objects composed of right rectangular prisms	Top, front & side views of 3-D objects	Drawing top, front & side views of 3-D objects

6 Shape & Space (Transformations)

6.1 Describe and analyze position and motion of objects and shapes

Outcome	Quests	Content
6. Demonstrate an understanding of tessellation by: explaining the properties of shapes that make tessellating possible, creating tessellations, identifying tessellations in the environment	Tessellation	Investigating tessellations using transformations
		Recognizing tessellations

7 Statistics & Probability (Data Analysis)

7.1 Collect, display, and analyze data to solve problems

Outcome	Quests	Content
1. Critique ways in which data are presented	Critique data displays	Critiquing data displays

8 Statistics & Probability (Chance & Uncertainty)

8.1 Use experimental or theoretical probabilities to represent and solve problems involving uncertainty

Outcome	Quests	Content
2. Solve problems involving the probability of independent events	Probability of independent events	Finding the probability of 2 independent events

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