Mathletics

Nova Scotia Program of Studies

Understanding Practice and Fluency (UPF)

Grades 7 – 8

November, 2021

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Grade 7

1 Number

1.1 Students will be expected to develop number sense

Outcome	Quests	Content
1. Students will be expected to 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. Students will be expected to demonstrate an understanding of the addition, subtraction, multiplication, and division of decimals to solve problems (for more than one-digit divisors or more than two-digit multipliers, the use of technology is expected).	Operations with decimals	Solving decimal word problems, 4 operations
		Adding decimals
		Subtracting decimals
		Multiplying decimals
		Multiplying decimals using place value
		Dividing decimals
		Applying order of operations, decimals
3. Students will be expected to solve problems involving percents from 1% to 100% (limited to whole numbers).	Percents, fractions & decimals	Solving word problems involving percentages
		Converting percents into fractions & decimals
4. Students will be expected to demonstrate an understanding of the relationship between positive terminating decimals and positive fractions and between positive repeating decimals (with one or two	Decimals & fractions	Investigating terminating & repeating decimals
		Converting terminating decimals to fractions
		Converting repeating decimals to fractions

repeating digits) and positive fractions.		Converting fractions to terminating decimals
		Converting fractions to repeating decimals
5. Students will be expected to 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
	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. Students will be expected to 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. Students will be expected to compare, order, and position positive fractions, positive decimals (to thousandths), and whole numbers by using benchmarks, place value, and 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

2 Patterns and Relations

2.1 Students will be expected to use patterns to describe the world and to solve problems

Outcome	Quests	Content
1. Students will be expected to demonstrate an understanding of oral and written patterns and their equivalent linear relations.	Patterns & linear relations	Representing written patterns as linear relations
2. Students will be expected to create a table of values from a linear 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

2.2 Students will be expected to represent algebraic expressions in multiple ways

Outcome	Quests	Content
3. Students will be expected to 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. Students will be expected to explain the difference between an expression and an equation.	Expressions & equations	Distinguishing between expressions & equations
		Identifying parts of expressions & equations
5. Students will be expected to evaluate an expression given the value of the variable(s).	Evaluate an expression	Evaluating expressions using substitution
6. Students will be expected to model and solve, concretely, pictorially, and symbolically, problems that can be represented by one-step linear equations of the form $x + a = b$, where a and b are integers.	Linear equations, integers	Solving linear equations with integers
		Modeling & solving 1-step equations, algebra tiles
7. Students will be expected to model and solve, concretely, pictorially, and symbolically, where a, b and c are whole numbers, problems that can be represented	Linear equations, whole numbers	Solving 2-step equations
		Modeling & solving 2-step equations, algebra tiles
		Modeling real-life scenarios using equations

by linear equations of the form: $ax + b = c$; $ax = b$; $x/a = b$, $a \neq 0$		Solving 1-step equations
		Solving 1-step equations using algebra tiles
		Checking solutions of 2-step equations

3 Measurement

3.1 Students will be expected to use direct and indirect measurement to solve problems

Outcome	Quests	Content
1. Students will be expected to demonstrate an understanding of circles by: describing the relationships among radius, diameter, and circumference, relating circumference to pi, 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	Introducing the parts of a circle
		Introducing circumference
		Finding the circumference of circles
		Determining sum of the central angles of a circle
2. Students will be expected to develop and apply a formula for determining the area of triangles, parallelograms, and circles.	Determine the area	Determining the area of a triangle
		Determining the area of a parallelogram
		Determining the area of a circle

4 Geometry

4.1 Students will be expected to describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them

Outcome	Quests	Content
1. Students will be expected to perform geometric constructions, including: perpendicular line segments, parallel line segments, perpendicular bisectors, angle bisectors.	Identify lines & angles	Identifying parallel & perpendicular lines

4.2 Students will be expected to describe and analyze position and motion of objects and shapes

Outcome	Quests	Content
2. Students will be expected to identify and plot points in the four quadrants of a Cartesian plane, using integral ordered pairs.	The Cartesian plane	Introducing Cartesian coordinates
		Drawing shapes on the coordinate plane
3. Students will be expected to perform and describe transformations (translations, rotations, or reflections) of a 2-D shape in all four quadrants of a Cartesian plane (limited to integral number vertices).	Transformations on the Cartesian plane	Successive translations on the coordinate plane
		Plotting rotations on the coordinate plane
		Plotting reflections on the coordinate plane
		Plotting combinations of transformations

5 Statistics and Probability

5.1 Students will be expected to collect, display, and analyze data to solve problems

Outcome	Quests	Content
1. Students will be expected to 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	Mean
		Median
		Mode
		Range
		Choosing statistical measures for data
2. Students will be expected to determine the effect on the mean, median, and mode when an outlier is included in a data set.	Investigate outliers	Investigating the effect of outliers
3. Students will be expected to construct, label, and interpret circle graphs to solve problems.	Circle graphs	Interpreting & constructing circle graphs

5.2 Students will be expected to use experimental or theoretical probabilities to represent and solve problems involving uncertainty

Outcome	Quests	Content
4. Students will be expected to express probabilities as ratios, fractions, and percents.	Probability: decimal, fraction, percent	Probability: decimals, fractions & percents
5. Students will be expected to 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. Students will be expected to conduct a probability experiment to compare the theoretical probability (determined using a tree diagram, table, or other 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 Students will be expected to develop number sense

Outcome	Quests	Content
1. Students will be expected to 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. Students will be expected to determine the approximate square root of numbers that are not perfect squares (limited to whole numbers).	Estimate square roots	Estimating square roots
3. Students will be expected to demonstrate an understanding of and solve problems involving 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. Students will be expected to demonstrate an understanding of ratio and rate.	Understand ratio & rate	Unit rate
		Introduction to ratios
5. Students will be expected to 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. Students will be expected to 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. Students will be expected to 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

2 Patterns and Relations

2.1 Students will be expected to use patterns to describe the world and to solve problems

Outcome	Quests	Content
1. Students will be expected to graph and analyze two-variable linear relations.	Linear relations	Graphing discrete linear relations
		Identifying an equation from a discrete linear graph
2. Students will be expected to model and solve problems, concretely, pictorially, and symbolically, where a, b, and c are integers, using linear equations of the form: $ax = b$; $x/a = b$, $a \neq 0$; $ax + b = c$; $x/a + b = c$, $a \neq 0$; $a(x + b) = c$	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

3 Measurement

3.1 Students will be expected to use direct or indirect measurement to solve problems

Outcome	Quests	Content
1. Students will be expected to 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. Students will be expected to 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. Students will be expected to determine the surface area of right rectangular prisms, right triangular prisms, and 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. Students will be expected to develop and apply formulas for determining the volume of right rectangular prisms, right triangular 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

4 Geometry

4.1 Students will be expected to describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them

Outcome	Quests	Content
1. Students will be expected to 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

4.2 Students will be expected to describe and analyze position and motion of objects and shapes

Outcome	Quests	Content
2. Students will be expected to demonstrate an understanding of the congruence of polygons under a transformation.	Congruence of polygons	Identifying congruent figures, transformations
		Exploring translations, coordinates
		Describing reflections, coordinates
		Exploring rotations, coordinates

4.3 Students will be expected to collect, display, and analyze data to solve problems

Outcome	Quests	Content
1. Students will be expected to critique ways in which data is presented.	Critique data displays	Critiquing data displays

4.4 Students will be expected to use experimental or theoretical probabilities to represent and solve problems involving uncertainty

Outcome	Quests	Content
2. Students will be expected to solve problems involving the probability of independent events.	Probability of independent events	Finding the probability of 2 independent events

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