Mathletics

New Brunswick Program of Studies

Understanding Practice and Fluency (UPF)

Grades 7 – 8

November, 2021

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Grade 7

1 Number

1.1 Develop number sense

Outcome	Quests	Content
1. Determine and apply the divisibility rules for 2, 3, 4, 5, 6, 8, 9 or 10, and explain 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 (for more than 1-digit divisors or 2-digit multipliers, the use of technology is expected) to solve problems.	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. 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 positive repeating decimals and positive fractions, and positive terminating decimals and positive 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
	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 positive fractions, positive decimals (to thousandths) and whole numbers 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

2 Patterns & Relations

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 equivalent linear relations.	Patterns & linear relations	Representing written patterns as linear relations
2. 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 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
		Modelling & 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
		Modelling & solving 2-step equations, algebra tiles
		Modelling real-life scenarios using equations
		Solving 1-step equations
		Solving 1-step equations using algebra tiles

		Checking solutions of two-step equations

3 Shape & Space

3.1 Use direct and 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, 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
		Determining 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

3.2 Describe 3-D objects and 2-D shapes, and analyze the relationships

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

3.3 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 integral ordered pairs.	The Cartesian plane	Introducing Cartesian coordinates
		Drawing shapes on the coordinate plane
5. Perform and describe transformations (translations,	Transformations on the Cartesian plane	Successive translations on the coordinate plane

rotations or reflections) of a 2-D shape in all four quadrants of a Cartesian plane (limited to integral number vertices).		Plotting rotations on the coordinate plane
		Plotting reflections on the coordinate plane
		Plotting combinations of transformations

4 Statistics and Probability

4.1 Collect, display and analyze data to solve problems

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	Mean
		Median
		Mode
		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.	Investigate outliers	Investigating the effect of outliers
3. Construct, label and interpret circle graphs to solve problems.	Circle graphs	Interpreting & constructing circle graphs

4.2 Use experimental or theoretical probabilities to solve problems

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

2 Patterns & Relations

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 relationships
		Identifying equation from a discrete linear graph

2.2 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

3 Shape & Space

3.1 Use direct and 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

3.2 Describe 3-D objects and 2-D shapes, and analyze the relationships

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

3.3 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

3.4 Collect, display and analyze data to solve problems

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

3.5 Use experimental or theoretical probabilities to solve problems

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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