Mathletics

Quebec Program of Studies

Skill Quests

Grades 7 – 8

May, 2022

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Grade 7

1 Arithmetic

1.1 Understanding real numbers

Outcome	Quests	Content
1. Natural numbers less than 1 000 000 a. Reads and writes any natural number	Read & write numbers of any size	Reading & writing numbers of any size
1. Natural numbers less than 1 000 000 c. Composes and decomposes a natural number in a variety of ways and identifies equivalent expressions	Compose & decompose numbers	Using place value to partition numbers of any size
1. Natural numbers less than 1 000 000 d. Approximates a natural number	Round numbers	Rounding numbers
1. Natural numbers less than 1 000 000 e. Compares natural numbers or arranges natural numbers in increasing or decreasing order	Compare & order numbers	Comparing & ordering numbers
2. Fractions b. Identifies the different meanings of fractions: part of a whole, division, ratio, operator, measurement	Meanings of fractions	Fractions as operators Fractions as division
2. Fractions c. Verifies whether two fractions are equivalent	Equivalent fractions	Finding equivalent fractions
3. Decimals up to thousandths a. Represents decimals in a variety of ways (using objects or drawings) and identifies equivalent representations	Represent decimals	Locating decimals on a number line
3. Decimals up to thousandths e. Compares numbers written in decimal notation or arranges them in increasing or decreasing order	Order terminating & repeating decimals	Ordering terminating & repeating decimals
4. Integers a. Represents integers in a variety of ways (using objects or drawings)	Represent integers	Locating integers on a number line

4. Integers b. Reads and writes integers	Read & write integers	Reading & writing integers
4. Integers c. Compares integers or arranges integers in increasing or decreasing order	Compare & order integers	Comparing & ordering integers
10. Defines the concept absolute value in context	Absolute value	Understanding absolute value
11. Represents and writes b. squares and square roots	Squares & square roots	Squares & square roots
11. Represents and writes c. numbers in exponential notation (integral exponent)	Write numbers in exponential notation	Writing numbers in exponential notation
15. Compares and arranges in order a. numbers written in fractional or decimal notation	Compare & order fractions & decimals	Comparing & ordering fractions & decimals
15. Compares and arranges in order b. numbers expressed in different ways (fractional, decimal, exponential [integral exponent], percentage, square root)	Compare/order numbers in different forms	Compare & order fractions, decimals & percentages

1.2 Understanding operations involving real numbers

Outcome	Quests	Content
1. Natural numbers less than 1 000 000 b. Uses objects, diagrams or equations to represent a situation and, conversely, describes a situation represented by objects, diagrams or equations (use of different meanings of the four operations)	Write equations to represent a situation	Writing equations to represent a situation
1. Natural numbers less than 1 000 000 c. Establishes equality relations between numerical expressions (e.g. 3 + 2 = 6 – 1)	Equality relations	Understanding equality
1. Natural numbers less than 1 000 000 d. Determines numerical equivalencies using relationships between operations, the commutative and associative properties of addition and	Addition & multiplication properties	The commutative & associative properties
		The distributive property

multiplication, the distributive property of multiplication over addition or subtraction		

1.3 Operations involving real numbers

2. Fractions (using objects or diagrams) b. Reduces a fraction to its simplest form	Simplify fractions	Simplifying fractions
2. Fractions (using objects or diagrams) c. Adds and subtracts fractions when the denominator of one fraction is a multiple of the other fraction	Add & subtract fractions	Adding & subtracting fractions
2. Fractions (using objects or diagrams) d. Multiplies a natural number by a fraction and a fraction by a natural number	Multiply fractions & natural numbers	Multiplying fractions & natural numbers
4. Properties of divisibility a. Determines the divisibility of a number by 2, 3, 4, 5, 6, 8, 9 and 10	Divisibility	Divisibility
6. Mentally computes the four operations, especially with numbers written in decimal notation, using equivalent ways of writing numbers and the properties of operations	Operations with decimals	Adding & subtracting decimals, mental strategies
		Multiplying & dividing decimals, mental strategies
7. Computes, in writing, the four operations with numbers that are easy to work with (including large numbers), using equivalent ways of writing numbers and the properties of operations a. numbers written in decimal notation, using rules of signs	Computation with decimals	Adding & subtracting positive & negative decimals
		Multiplying & dividing decimals, algorithm
7. Computes, in writing, the four operations with numbers that are easy to work with (including large numbers), using equivalent ways of writing numbers and the properties of operations b. positive numbers written in fractional notation, with or without the use of objects or diagrams	Computation with fractions	Adding fractions & mixed numbers
		Subtracting fractions & mixed numbers
		Multiplying fractions & mixed numbers
		Dividing fractions & mixed numbers

8. Computes, in writing, sequences of operations (numbers written in decimal notation) in accordance with the order of operations, using equivalent ways of writing numbers and the properties of operations (with no more than two levels of parentheses)	Order of operations, decimals	Add & subtract +/- decimals, order of operations
10. Switches, as needed, from one way of writing numbers to another: from fractional to percentage notation, from decimal to fractional notation, from decimal to percentage notation, and vice versa	Convert between fractions & decimals	Converting between fractions & decimals
		Converting between decimals & percentages
		Converting between fractions & percentages
		Converting fractions, decimals & percentages
13. Decomposes a natural number into prime factors	Express numbers as prime factors	Expressing numbers as prime factors

1.4 Understanding and analyzing proportional situations

Outcome	Quests	Content
1. Calculates a. a certain percentage of a number	Calculate with percentages	Calculating with percentages
1. Calculates b. the value corresponding to 100 per cent	Solve problems involving finding 100%	Solving problems involving finding 100%
3. Interprets ratios and rates	Interpret ratios & rates	Interpreting ratios & rates
5. Compares b. ratios and rates quantitatively (equivalent rates and ratios, unit rate)	Compare ratios & rates	Comparing ratios & rates
6. Translates a situation using a ratio or rate	Translate situations, ratios & rates	Translating situations using ratios & rates
7. Recognizes a proportional situation using the context, a table of values or a graph	Identify proportional relationships	Identifying proportional relationships
8. Represents or interprets a proportional situation using a graph, a table of values or a proportion	Constant of proportionality, table	Constant of proportionality, table
9. Solves proportional situations (direct or inverse variation) by using different strategies (e.g. unit-rate method, factor of change, proportionality ratio, additive procedure, constant product [inverse variation])	Solve problems involving proportions	Solving problems involving proportions

2 Algebra

2.1 Understanding and manipulating algebraic expressions

Outcome	Quests	Content
A. Algebraic expressions 1. Describes, using his/her own words and mathematical language, numerical patterns	Describe patterns algebraically	Describing patterns algebraically
A. Algebraic expressions 2. Describes, using his/her own words and mathematical language, series of numbers and family of operations	Recognize geometric sequences	Recognizing geometric sequences
A. Algebraic expressions 3. Adds new terms to a series when the first three terms or more are given	Find the nth term of linear sequences	Finding the nth term of linear sequences
A. Algebraic expressions 4. Describes the role of components of algebraic expressions: a. unknown b. variable, constant c. parameter d. coefficient, degree, term, constant term, like terms	Components of algebraic expressions	Identifying components of algebraic expressions
A. Algebraic expressions 5. Constructs an algebraic expression using a register (type) of representation	Write algebraic expressions	Writing algebraic expressions
A. Algebraic expressions 6. Interprets an algebraic expression in light of the context	Use & interpret algebraic notation	Using & interpreting algebraic notation
A. Algebraic expressions 7. Recognizes or constructs equivalent algebraic expressions	Equivalent algebraic expressions	Equivalent algebraic expressions
A. Algebraic expressions 8. Recognizes or constructs a. equalities and equations	Write equations	Writing equations
B. Manipulating algebraic expressions 1. Calculates the numeric value of an algebraic expression	Evaluate algebraic expressions	Evaluating algebraic expressions
B. Manipulating algebraic expressions 2. Performs the following operations on algebraic expressions, with or without objects	Simplify algebraic expressions	Simplifying algebraic expressions, 4 operations

or diagrams: addition and subtraction, multiplication and division by a constant, multiplication of first-degree monomials		
B. Manipulating algebraic expressions 3. Factors out the common factor in numerical expressions (distributive property of multiplication over addition or subtraction)	The distributive property	Using the distributive property
C. Analyzing situations using equations or inequalities 2. Recognizes or constructs a. relations or formulas	Understand formulas & equations	Understanding formulas & equations
C. Analyzing situations using equations or inequalities 3. Manipulates relations or formulas (e.g. isolates an element)	Manipulate formulas & equations	Manipulating formulas & equations
C. Analyzing situations using equations or inequalities 4. Represents a situation using a. a first-degree equation with one unknown	Write & solve equations	Writing & solving equations
C. Analyzing situations using equations or inequalities 6. Determines the missing term in an equation (relations between operations)	Solve 1-step equations	Solving 1-step equations
C. Analyzing situations using equations or inequalities 13. Validates a solution, with or without technological tools, by substitution	Validate solutions using substitution	Validating solutions using substitution
A. Relations, functions and inverses 3. Represents a situation generally using a graph	Graph discrete linear relationships	Graphing discrete linear relationships

3 Probability

3.1 Understanding data from random experiments

A. Processing data from random experiments 3. In activities involving chance a. recognizes variability in possible outcomes (uncertainty)	Describe variability in outcomes	Describing variability in outcomes
A. Processing data from random experiments 3. In activities involving chance b. recognizes equiprobability (e.g. quantity of objects, symmetry of an object such as a cube)	Recognize equiprobability	Recognizing equiprobability
A. Processing data from random experiments 3. In activities involving chance c. becomes aware of the independence of events (e.g. rolling dice, tossing a coin, drawing lots)	Independent events	Independent events
A. Processing data from random experiments 5. Compares the outcomes of a random experiment with known theoretical probabilities	Compare outcomes	Comparing outcomes with theoretical probability
A. Processing data from random experiments 7. Conducts or simulates random experiments involving one or more steps (with or without replacement, with or without order)	Create & conduct chance experiments	Creating & conducting chance experiments
A. Processing data from random experiments 10. Defines the sample space of a random experiment	Identify the sample space	Identifying the sample space
A. Processing data from random experiments 11. Recognizes certain, probable, impossible, simple, complementary, compatible, incompatible, dependent, independents events	Recognize events	Recognizing events
A. Processing data from random experiments 13. Uses fractions, decimals or percentages to quantify a probability	Quantify probability	Probability: decimals, fractions, percentages

B. Analyzing probability situations 3. Distinguishes between theoretical and experimental probability	Theoretical & experimental probability	Theoretical & experimental probability
B. Analyzing probability situations 4. Calculates the probability of an event	Calculate the probability of an event	Calculating the probability of an event

4 Statistics

4.1 Analyzing and making decisions about one- or two-variable distributions, using statistical tools

Outcome	Quests	Content
A. One-variable distributions 8. Understands and calculates the arithmetic mean	Calculate the mean	Calculating the mean
A. One-variable distributions 11. Determines and interprets b. measures of dispersion: i. range	Determine the range	Determining the range

5 Geometry

5.1 Spatial sense and analyzing situations involving geometric figures

A. Plane figures 1. Describes convex and nonconvex polygons	Convex & nonconvex polygons	Convex & nonconvex polygons
A. Plane figures 2. Describes and classifies quadrilaterals	Classify/identify special quadrilaterals	Classifying & identifying special quadrilaterals
A. Plane figures 3. Describes and classifies triangles	Classify triangles	Classifying triangles
A. Plane figures 4. Describes circles: radius, diameter, circumference, central angle	Describe circles	Describing circles
B. Solids 2. Determines the possible nets of a solid	Connect solids with their nets	Connecting solids with their nets
C. Geometric constructions and transformations in the Euclidian plane 3. Identifies congruence (translation, rotation and reflection) between two figures	Congruence	Congruence
C. Geometric constructions and transformations in the Euclidian plane 4. Constructs the image of a figure under a translation, rotation and reflection	Plot transformations, Cartesian plane	Plotting transformations, Cartesian plane
C. Geometric constructions and transformations in the Euclidian plane 6. Constructs the image of a figure under a dilatation with a positive scale factor	Dilations	Dilations
D. Congruent, similar or equivalent figures 1. Identifies congruent figures in frieze patterns and tessellations	Tessellations	Tessellations

5.2 Analyzing situations involving measurements

Outcome	Quests	Content
A. Mass 1. Chooses the appropriate unit of mass for the context	Choose appropriate units to measure mass	Choosing appropriate units to measure mass

A. Mass 3. Establishes relationships between units of mass	Convert related standard units of mass	Converting between related standard units of mass
B. Time 3. Establishes relationships between units of time: second, minute, hour, day, daily cycle, weekly cycle, yearly cycle	Convert related standard units of time	Converting between related standard units of time
C. Angles 2. Estimates and determines the degree measure of angles	Measure angles	Measuring angles
C. Angles 3. Describes the characteristics of different types of angles: complementary, supplementary, adjacent, vertically opposite, alternate interior, alternate exterior and corresponding	Define angles	Complementary, supplementary & adjacent angles
C. Angles 4. Determines measures of angles using the properties of the following angles: complementary, supplementary, vertically opposite, alternate interior, alternate exterior and corresponding	Measures of angles	Angle pairs on parallel lines Calculating complementary & supplementary angles
C. Angles 5. Finds unknown measurements using the properties of figures and relations a. measures of angles in a triangle	Angles of a triangle	Calculating angles of a triangle
C. Angles 5. Finds unknown measurements using the properties of figures and relations b. degree measures of central angles and arcs	Measures of central angles	Measures of central angles
D. Length 1. Chooses the appropriate unit of length for the context	Choose units to measure the length	Choosing appropriate units to measure the length
D. Length 5. Finds the following unknown measurements, using properties of figures and relations a. perimeter of plane figures	Find the perimeter of plane figures	Finding the perimeter of plane figures
D. Length 5. Finds the following unknown measurements, using properties of figures and relations b. a segment in a plane figure, circumference, radius, diameter, length of an arc, a segment	Find a segment in a plane figure	Finding the length of segment after transformation

resulting from an isometry or a similarity transformation		
E. Area 1. Chooses the appropriate unit of area for the context	Choose appropriate units to measure area	Choosing an appropriate unit to measure area
E. Area 3. Establishes relationships between SI units of area	Convert related standard units of area	Converting between related standard units of area
E. Area 6. Finds unknown measurements, using properties of figures and relations a. area of circles and sectors	Find the area of a circle	Finding the area of a circle
E. Area 6. Finds unknown measurements, using properties of figures and relations b. area of figures that can be split into circles (sectors), triangles or quadrilaterals	Find the area of composite shapes	Finding the area of composite shapes
F. Volume 1. Chooses the appropriate unit of volume for the context	Choose appropriate units for volume	Choosing appropriate units to measure volume
F. Volume 2. Estimates and measures volume or capacity using conventional units: cubic centimetre, cubic decimetre, cubic metre, millilitre, litre	Measure volume, cubic-centimetre blocks	Measuring volume with cubic-centimetre blocks
F. Volume 4. Establishes relationships between a. capacity units: millilitre, litre	Convert related units of capacity	Converting between related units of capacity
A. Locating 2. Locates points in a Cartesian plane, based on the types of numbers studied (x- and y-coordinates of a point)	Plot coordinates on the Cartesian plane	Plotting coordinates on the Cartesian plane

Grade 8

1 Arithmetic

1.1 Understanding real numbers

Outcome	Quests	Content
1. Represents and writes b. squares and square roots	Find square roots	Finding square roots

1.2 Operations involving real numbers

Outcome	Quests	Content
7. Computes, in writing, the four operations with numbers that are easy to work with (including large numbers), using equivalent ways of writing numbers and the properties of operations a. numbers written in decimal notation, using rules of signs	Multiply & divide decimals	Multiplying & dividing positive/negative decimals
7. Computes, in writing, the four operations with numbers that are easy to work with (including large numbers), using equivalent ways of writing numbers and the properties of operations b. positive numbers written in fractional notation, with or without the use of objects or diagrams	Fraction word problems	Multiplication & division fraction word problems

1.3 Understanding and analyzing proportional situations

Outcome	Quests	Content
8. Represents or interprets a proportional situation using a graph, a table of values or a proportion	Interpret a point, proportional graphs	Interpreting a point on a proportional graph
9. Solves proportional situations (direct or inverse variation) by using different strategies (e.g. unit-rate method, factor of change,	Solve proportional situations	Solving inverse variation problems
		Solving proportions problems

proportionality ratio, additive procedure, constant product [inverse variation])		

2. Algebra

2.1 Understanding and manipulating algebraic expressions

Outcome	Quests	Content
A. Algebraic expressions 1. Describes, using his/her own words and mathematical language, numerical patterns	Describe patterns	Describing patterns
A. Algebraic expressions 7. Recognizes or constructs equivalent algebraic expressions	Verify equivalent expressions	Verifying equivalent expressions
B. Manipulating algebraic expressions 1. Calculates the numeric value of an algebraic expression	Evaluate expressions	Evaluating expressions
A. Relations, functions and inverses 3. Represents a situation generally using a graph	Distance/time graphs	Constructing distance/time graphs

3 Probability

3.1 Understanding data from random experiments

Outcome	Quests	Content
A. Processing data from random experiments 10. Defines the sample space of a random experiment	Define the sample space	Defining the sample space
A. Processing data from random experiments 13. Uses fractions, decimals or percentages to quantify a probability	Calculate probability	Calculating probability
B. Analyzing probability situations 4. Calculates the probability of an event	Calculate probability of compound events	Calculating probabilities of compound events

4 Statistics

4.1 Analyzing and making decisions about one- or two-variable distributions, using statistical tools

Outcome	Quests	Content
A. One-variable distributions 1. Conducts a survey or a census a. Formulates questions for a survey	Construct appropriate survey questions	Constructing appropriate survey questions
A. One-variable distributions 1. Conducts a survey or a census c. Chooses a representative sample	Random sampling	Random sampling
A. One-variable distributions 2. Recognizes possible sources of bias	Recognize possible sources of bias	Recognizing possible sources of bias
A. One-variable distributions 3. Interprets data presented in a table or a bar graph, a pictograph, a broken-line graph or a circle graph	Interpret data presented in graphs	Interpreting data presented in graphs
A. One-variable distributions 4. Distinguishes different types of statistical variables: qualitative, discrete or continuous quantitative	Classify data: qualitative/quantitative	Classifying data as qualitative or quantitative
A. One-variable distributions 6. Organizes and presents data using a. a table, a bar graph, a pictograph and a broken-line graph	Construct broken-line graphs	Constructing broken-line graphs
A. One-variable distributions 6. Organizes and presents data using b. a table presenting variables or frequencies, or using a circular graph	Construct circle graphs	Constructing circle graphs
	Construct a frequency table	Constructing a frequency table

5 Geometry

5.1 Spatial sense and analyzing situations involving geometric figures

Outcome	Quests	Content
C. Geometric constructions and transformations in the Euclidian plane 3. Identifies congruence (translation, rotation and reflection) between two figures	Identify congruent figures	Identifying congruent figures
C. Geometric constructions and transformations in the Euclidian plane 4. Constructs the image of a figure under a translation, rotation and reflection	Translations, reflections & rotations	Translations, reflections & rotations
C. Geometric constructions and transformations in the Euclidian plane 6. Constructs the image of a figure under a dilatation with a positive scale factor	Dilations	Dilations
D. Congruent, similar or equivalent figures 1. Identifies congruent figures in frieze patterns and tessellations	Tessellations	Tessellations
D. Congruent, similar or equivalent figures 2. Recognizes congruent or similar figures	Similarity	Identifying similar triangles
D. Congruent, similar or equivalent figures 3. Recognizes the geometric transformation(s) linking a figure and its image	Transformations	Dilations, translations, rotations & reflections
D. Congruent, similar or equivalent figures 4. Determines the properties and invariants of congruent or similar figures	Properties & invariants of figures	Invariants of congruent figures
		Using scale to analyze similar triangles

5.2 Analyzing situations involving measurements

Outcome	Quests	Content
C. Angles 5. Finds unknown measurements using the properties of figures and relations a. measures of angles in a triangle	Calculate angles in isosceles triangles	Calculating angles in isosceles triangles
D. Length 5. Finds the following unknown measurements, using properties of figures and relations a. perimeter of plane figures	Find the perimeter, plane figures	Finding the perimeters of composite figures
		Finding the perimeters of quadrants & semicircles
D. Length 5. Finds the following unknown measurements, using properties of figures and relations b. a segment in a plane figure, circumference, radius, diameter, length of an arc, a segment resulting from an isometry or a similarity transformation	Circumference & arc lengths	Finding the circumference, radius/diameter length
		Finding arc lengths & the perimeters of sectors
E. Area 6. Finds unknown measurements, using properties of figures and relations c. lateral or total area of right prisms, right cylinders and right pyramids	Find the lateral area	Finding the lateral area of prisms
		Finding the lateral area of cylinders
		Finding the lateral area of pyramids

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