

PROGRESSIONS OF LEARNING - CYCLE 1

Arithmetic

	Year 1 (7)	Year 2 (8)	Panoramath
Understanding Real Numbers			
Fractions			
<ul style="list-style-type: none"> Identifies the different meanings of fractions: part of a whole, division, ratio, operator, measurement 	→	☆	5/11
Represents, reads and writes numbers in fractional or decimal notation	☆		5/6
Approximates, in various contexts, the numbers under study (e.g. estimates, rounds-off, truncates)	☆		1
Defines the concept of absolute value in context (e.g. difference between two numbers, distance between two points) <i>Note : In Cycle One and Secondary III, the concept of absolute value is introduced informally, using examples.</i>	→	→	
Represents and writes:			
<ul style="list-style-type: none"> squares and square roots 	→	☆	2/10
<ul style="list-style-type: none"> numbers in exponential notation (integral notation) 	→	☆	3
Estimates the order of magnitude of a real number in different contexts	→	→	1
Compares and arranges (in order) numbers expressed in different ways (fractional, decimal, exponential, percentage, square root, scientific notation)	→	☆	5/6
Understanding Operations Involving Real Numbers			
Fractions			
<ul style="list-style-type: none"> Uses an operation to represent a situation (use of different meanings of operations) 	☆		5
Looks for equivalent expressions: decomposing (additive, multiplicative, etc.), equivalent fractions, simplifying and reducing, factoring, etc.	☆		2/6
Translates (mathematizes) a situation using a sequence of operations (no more than two levels of parentheses)	☆		2
Anticipates the results of operations	☆		1
Interprets the results of operations in light of the context	☆		1

Arithmetic

	Year 1 (7)	Year 2 (8)	Panoramath
Operations Involving Real Numbers			
Uses, in different contexts, the properties of divisibility: 2, 3, 4, 5 and 10	☆		2
Approximates the results of an operation or a sequence of operations	→	☆	1/2
Mentally computes the four operations, especially with numbers written in decimal notation, using equivalent ways of writing numbers and the properties of operations	→	☆	2/6
Computes, in writing, the four operations ¹ with numbers that are easy to work with, including large numbers, using equivalent ways of writing numbers and the properties of operations:			
• numbers written in decimal notation, using rules of signs	☆		6
• positive numbers written in fractional notation, with or without the use of objects or diagrams	→	☆	5
Computes, in writing, sequences of operations (with no more than two levels of parentheses) in accordance with order of operations, using equivalent ways of writing numbers (incl. decimal notation) and the properties of operations	☆		2/6
Computes, using a calculator, operations and sequences of operations in accordance with the order of operations	☆		2
Switches, as needed, from one way of writing numbers to another <i>Note : In Secondary Cycle One, the students should use positive numbers when switching from one type of notation to another.</i>	→	☆	6
Understanding and Analyzing Proportional Situations			
Calculates:			
• the percentage of a number	☆		5
• the value corresponding to 100%	→	☆	16
Recognizes ratios and rates	→	☆	11
Interprets ratios and rates	→	☆	11
Describes the effect of changing a term into a ratio or rate	→	☆	11
Compares			
• ratios and rates qualitatively (equivalent rates and ratios, unit rate)	→	☆	11
• ratios and rates quantitatively (equivalent rates and ratios, unit rate)	→	☆	11
Translates a situation using a ratio or rate	→	☆	11
Recognizes a proportional situation using the context, a table of values or a graph	→	☆	11
Represents or interprets a proportional situation using a graph, a table of values or a proportion	→	☆	11
Solves proportional situations (direct or inverse) by using different strategies (e.g. unit-rate method, factor of change, proportionality ratio, additive procedure, constant product [inverse variation])	→	☆	11

¹ Students use technological tools for operations in which the divisors and multipliers have more than two digits; however, for written computation, the understanding and mastery of the processes is more important than the ability to do complex calculations.

Algebra

	Year 1 (7)	Year 2 (8)	Panoramath
Algebra: Understanding and Manipulating Algebraic Expressions			
A. Algebraic expressions			
Describes the role of the components of algebraic expressions:			
<ul style="list-style-type: none"> Unknown <i>Note : This concept was introduced in elementary school (although not named as such) when students were asked to find a missing term.</i> 	→	☆	9
<ul style="list-style-type: none"> variable, constant 	→	☆	9
<ul style="list-style-type: none"> parameter <i>Note : The concept of parameter is introduced intuitively (although not named as such) in Secondary I, II and III.</i> 	→	→	9
<ul style="list-style-type: none"> coefficient, degree, term, constant term, like terms 	→	☆	9
Constructs an algebraic expression using a register (type of representation)	→	☆	7/13
Interprets an algebraic expression in light of the context	→	☆	7/13
Recognizes or constructs equivalent algebraic expressions	→	☆	7/13
Recognizes or constructs equalities and equations	→	☆	13
B. Manipulating algebraic expressions			
Calculates the numerical value of an algebraic expression	→	☆	7/13
Performs the following operations on algebraic expressions, with or without objects or diagrams: addition/subtraction, multiplication/division by a constant, multiplication of first degree monomials	→	☆	13
Factors out the common factor in numerical expressions (distributive property of multiplication over addition/subtraction).	→	☆	13
C. Analyzing situations using equations or inequalities			
Recognizes whether a situation can be translated into an equation	→	☆	7/13
Recognizes or constructs relations or formulas	→	☆	7/13
Manipulates relations or formulas (e.g. isolates an element)	→	☆	13
Represents a situation using a first-degree equation with one unknown	→	☆	13
Represents an equation using another register (mode of representation), if necessary	→	☆	7/13
Transforms arithmetic equalities and equations to maintain equivalence (properties and rules for transforming equalities) and justifies the steps followed, if necessary	→	☆	13
Uses different methods to solve first-degree equations with one unknown of the form $ax + b = cx + d$: trial and error, drawings, arithmetic methods (inverse or equivalent operations), algebraic methods (balancing equations or hidden terms)	→	☆	7/13
Validates a solution by substitution with or without the help of technological tools	→	☆	13
Interprets solutions or makes decisions, if necessary, depending on the context	→	☆	13
Understanding Dependency Relationships			
A. Relations, functions and inverses			
Analyzes situations using different registers (modes of representation)	→	☆	9
Represents a situation generally using a graph	→	☆	9

Probability

	Year 1 (7)	Year 2 (8)	Panoramath
Understanding Data from Random Experiments			
A. Processing data from random experiments			
Conducts or simulates random experiments involving one or more steps (with or without replacement, with or without order)	→	☆	5/15
Enumerates possible outcomes using networks, tables, diagrams, Venn diagrams <i>Note: In developing their probabilistic thinking skills, students are introduced to the language of sets, which is considered to be a comprehension and communication tool</i>	→	☆	5/15
Defines the sample space of a random experiment	→	☆	15
Recognizes certain, probable, impossible, simple, complementary, compatible, incompatible, dependent and independent events	→	☆	15
B. Analyzing probability situations			
Distinguishes between theoretical and experimental probability	→	☆	5/15
Calculates the probability of an event	→	☆	5/15
Interprets probabilities and makes appropriate decisions	→	☆	5/15

Statistics

	Year 1 (7)	Year 2 (8)	Panoramath
Analyzing and Making Decisions about One- and Two-variable Distributions using Statistical Tools			
A. One-variable distributions			
Conducts a survey or a census			
<ul style="list-style-type: none"> chooses a sampling method : simple random, systematic 	→	☆	16
<ul style="list-style-type: none"> chooses a representative sample 	→	☆	16
Recognizes possible sources of bias <i>Note: In CST Secondary IV, students learn to correct the sources of bias</i>	→	☆	16
Distinguishes different types of statistical variables : qualitative, discrete or continuous quantitative	→	☆	16
Organizes and presents data using a table presenting variables or frequencies or using a circle graph	→	☆	16
Compares one-variable distributions	→	☆	16
Describes the concept of arithmetic mean (levelling or balance point)	→	☆	2
Calculates and interprets arithmetic mean <i>Note: The arithmetic mean is calculated using positive or negative numbers written in decimal or fractional notation.</i>	→	☆	2
Determines and interprets:			
<ul style="list-style-type: none"> measures of dispersion: range 	→	☆	1
<ul style="list-style-type: none"> measures of position: minimum, maximum 	→	☆	9
Chooses the appropriate statistical measures for a given situation	→	☆	16

Geometry

	Year 1 (7)	Year 2 (8)	Panoramath
Spatial Sense and Analyzing Situations Involving Geometric Figures			
A. Plane figures			
Recognizes and names regular convex polygons	☆		8
Decomposes plane figures into circles (sectors), triangles and quadrilaterals	→	☆	8/14
Describes circles and sectors	→	☆	14
Recognizes and draws main segments and lines: diagonal, altitude, median, perpendicular bisector, bisector, apothem, radius, diameter, chord	→	☆	14
Identifies the properties of plane figures using geometric transformations and constructions <i>See the Secondary Cycle One Mathematics program p.219</i>	→	☆	4
Justifies statements using definitions of properties ² of plane figures	→	☆	8
B. Solids			
Determines the possible nets of a solid	→	☆	12
Names the solid corresponding to a net	→	☆	12
Describes the solid corresponding to a net altitude, apothem, lateral face	→	☆	12
Recognizes solids that can be split into right prisms, right cylinders, right pyramids	→	☆	12
C. Geometric constructions and transformations in the Euclidian plane³			
Identifies properties and invariants resulting from geometric constructions and transformations	→	☆	4
Identifies congruence (translation, rotation and reflection) between two figures	→	☆	4
Constructs the image of a figure under translation, rotation and reflection	→	☆	4
Recognizes dilatations with a positive scale factor	→	☆	11
Constructs the image of a figure under dilatation with a positive scale factor	→	☆	11
D. Congruent, similar or equivalent figures			
Recognizes congruent or similar figures	→	☆	4/11
Recognizes the geometric transformation(s) linking a figure and its image	→	☆	4
Determines the properties and invariants of congruent or similar figures	→	☆	11
Justifies statements using definitions or properties of congruent, similar or equivalent figures, depending on the cycle and year	→	☆	4/11

² In all statements involving justification, the properties used were identified through exploration or have been proven.

³ Geometric transformations in the Cartesian plane are not covered in Secondary Cycle One.

Geometry

Analyzing Situations Involving Measurement ⁴			
A. Time			
Distinguishes between duration and position in time <i>Note: This includes the concept of negative time, where the start time $t=0$ is arbitrarily chosen.</i>	→	☆	4
B. Angles			
Describes the characteristics of different types of angles: complementary, supplementary, adjacent, vertically opposite, alternate interior, alternate exterior and corresponding	→	☆	4
Determines measures of angles using the properties of the following angles: complementary, supplementary, adjacent, vertically opposite, alternate interior, alternate exterior and corresponding	→	☆	4
Finding unknown measurements using the properties of figures and relations			
• Measure of angles in a triangle	☆		4/8
• Degree measures of central angles and arcs	→	☆	14
Justifies statements using definitions of properties associated with angles and their measures	→	☆	4
C. Length			
Establishes the relationship between measures of length of the international system (SI)	☆		6
Constructs relations that can be used to calculate the perimeter or the circumference of figures	→	☆	8/14
Finds the following unknown measurements, using the properties and relations of figures			
• a segment in a plane figure, circumference, radius, diameter, length of an arc, a segment resulting from an isometry or a similarity transformation	→	☆	14
Justifies statements concerning measures of lengths	→	☆	10/12
D. Area			
Establishes relationships between SI units of area	→	☆	12
Constructs relations that can be used to calculate the area of plane figures: quadrilateral, triangle, circle (sector) <i>Note: Using relations established for the area of plane figures and the net of solids, students identify relationships to calculate the lateral or total area of a right prism, right cylinder or a right pyramid.</i>	→	☆	10 14
Finds unknown measurements, using the properties of figures and relations:			
• area of circles and sectors	→	☆	14
• area of figures that can be split into circles (sectors), triangles and quadrilaterals	→	☆	10
• lateral or total area of right prisms, right cylinders and right pyramids	→	☆	12
• lateral or total area of solids that can be split into right prisms, right cylinders and/or right pyramids	→	☆	12 14
• area of figures resulting from an isometry	→	☆	12
• area of figures resulting from a similarity transformation <i>Note: In similar plane figures, the ratio of the areas is equal to the square of the similarity ratio.</i>		→	12
Justifies statements concerning measures of area	→	☆	12

⁴ Depending on the context, measurement prefixes (e.g. nano, micro, milli, deca, kilo, mega, giga) are introduced.

Analytic Geometry

	Year 1 (7)	Year 2 (8)	Panoramath
Analyzing Situations Using Analytic Geometry			
A. Locating			
Locates objects/numbers on an axis, based on the types of numbers studied	→	☆	3
Locates points in a Cartesian plane, based on the types of numbers studied (x- and y-coordinates of a point)	→	☆	3