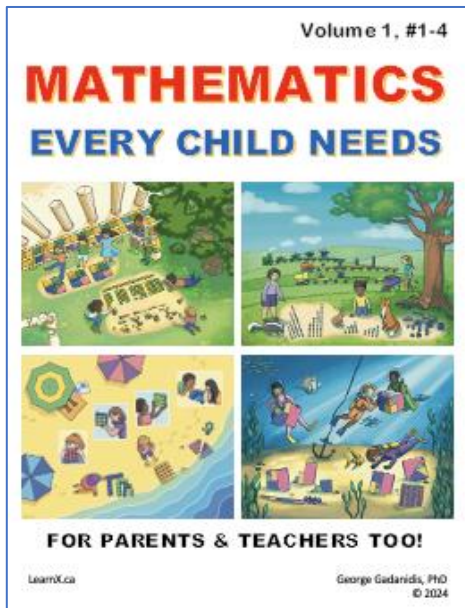


CURRICULUM CORRELATION

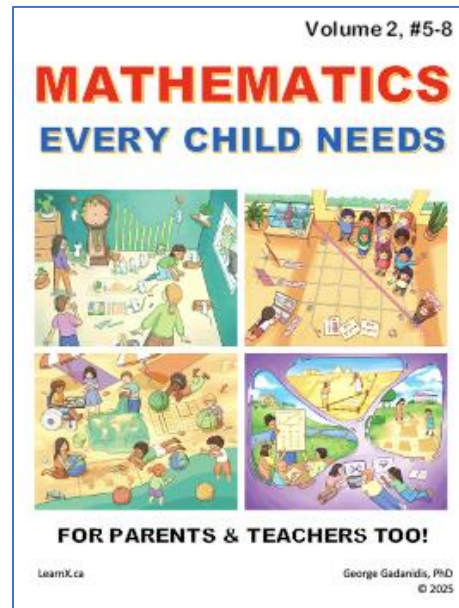
Ontario 1-9 Mathematics

MATHEMATICS EVERY CHILD NEEDS, Volumes 1-2



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Curriculum Correlation: Ontario 1-9 Mathematics

1. Repeating Patterns (K-6)

In **grades K-3**, children use link cubes or dabbers and strips of inch-grid chart paper to build colourful repeating patterns. They perform the patterns by singing the colour sequence, playing notes on a xylophone, and hopping or dancing them on colour mats.

They also build their patterns using link cubes or grids of different widths and notice what new patterns emerge.

In **grades 3-6**, students also build repeating patterns on a number grid with code.



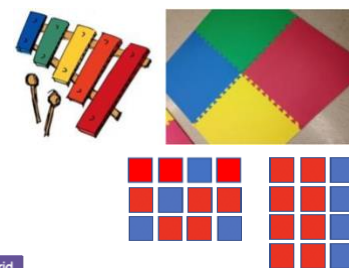
Grade 1- ALGEBRA

C1.1 identify and describe the regularities in a variety of patterns, including patterns found in real-life contexts

C1.2 create and translate patterns using movements, sounds, objects, shapes, letters, and numbers

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns

C3.2 read and alter existing code, including code that involves sequential events, and describe how changes to the code affect the outcomes



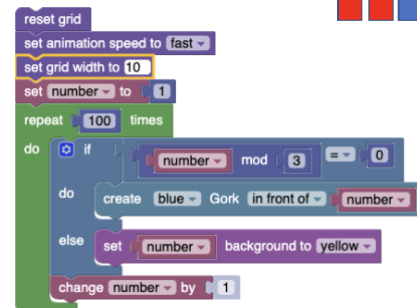
Grade 2- ALGEBRA

C1.1 identify and describe a variety of patterns involving geometric designs, including patterns found in real-life contexts

C1.2 create and translate patterns using various representations, including shapes and numbers

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements

C3.2 read and alter existing code, including code that involves sequential and concurrent events, and describe how changes to the code affect the outcomes in patterns represented with shapes and numbers



Grade 3- NUMBER

B2.2 recall and demonstrate multiplication facts for 1×1 to 10×10 , and related division facts

Grade 3- ALGEBRA

C1.1 identify and describe repeating elements and operations in a variety of patterns, including patterns found in real-life contexts

C1.2 create and translate patterns that have repeating elements, movements, or operations using various representations, including shapes, numbers, and tables of values

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns that have repeating elements, movements, or operations

C3.2 read and alter existing code, including code that involves sequential, concurrent, and repeating events, and describe how changes to the code affect the outcomes

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Grade 4- NUMBER

B2.2 recall and demonstrate multiplication facts for 1×1 to 10×10 , and related division facts

Grade 4- ALGEBRA

C1.1 identify and describe repeating and growing patterns, including patterns found in real-life contexts

C1.2 create and translate repeating and growing patterns using various representations, including tables of values and graphs

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating and growing patterns

C3.2 read and alter existing code, including code that involves sequential, concurrent, repeating, and nested events, and describe how changes to the code affect the outcomes

Grade 5- NUMBER

B2.2 recall and demonstrate multiplication facts from 0×0 to 12×12 , and related division facts

Grade 5- ALGEBRA

C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns

C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes

Grade 6- NUMBER

B2.2 understand the divisibility rules and use them to determine whether numbers are divisible by 2, 3, 4, 5, 6, 8, 9, and 10

Grade 6- ALGEBRA

C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and specify which growing patterns are linear

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns,

C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code

2. Growing Patterns (1-9)

Students in **grades 1-4** investigate growth patterns, where some parts change and some remain the same, and represent the patterns using link cubes, tables of values, and bar graphs. They describe how the patterns grow in relation to one another (such as faster or steeper). They predict values at stages 5, 10, and 100.

Students in **grades 5-8** also develop algebraic expressions (like $3N + 3$ for the pattern above). Students in **grades 8-9** also develop equations (like $y = 3x + 3$), and consider growth patterns that are not linear.

Grade 1 - NUMBER

B2.2 recall and demonstrate addition facts for numbers up to 10, and related subtraction facts

B2.3 use mental math strategies, including estimation, to add and subtract whole numbers that add up to no more than 20, and explain the strategies used

Grade 1 - ALGEBRA

C1.1 identify and describe the regularities in a variety of patterns, including patterns found in real-life contexts

C1.2 create and translate patterns using movements, sounds, objects, shapes, letters, and numbers

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns

C1.4 create and describe patterns to illustrate relationships among whole numbers up to 50

C2.1 identify quantities that can change and quantities that always remain the same in real-life contexts

C3.2 read and alter existing code, including code that involves sequential events, and describe how changes to the code affect the outcomes

Grade 2 - NUMBER

B2.2 recall and demonstrate addition facts for numbers up to 20, and related subtraction facts

B2.3 use mental math strategies, including estimation, to add and subtract whole numbers that add up to no more than 50, and explain the strategies used

Grade 2 - ALGEBRA

C1.1 identify and describe a variety of patterns involving geometric designs, including patterns found in real-life contexts

C1.2 create and translate patterns using various representations, including shapes and numbers

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements

C1.4 create and describe patterns to illustrate relationships among whole numbers up to 100

C2.1 identify when symbols are being used as variables, and describe how they are being used

C3.2 read and alter existing code, including code that involves sequential and concurrent events, and describe how changes to the code affect the outcomes in patterns represented with shapes and numbers



What do you see? Complete the table.

Stage #	# of blocks
1	3 blue + 3 red = 6
2	6 blue + 3 red = 9
3	9 blue + 3 red = 12
4	12 blue + 3 red = 15
5	15 blue + 3 red = 18
10	30 blue + 3 red = 33
100	300 blue + 3 red = 103

What is different? What is the same? How does the pattern grow? How many blocks in Stage #? Stage #? Stage #? What does the graph look like?

Stage #	# of blocks
1	3 blue + 3 red = 6
2	6 blue + 3 red = 9
3	9 blue + 3 red = 12
4	12 blue + 3 red = 15
5	15 blue + 3 red = 18
10	30 blue + 3 red = 33
100	300 blue + 3 red = 103

Computer Code for a Growing Pattern

VIEW: Code Flowchart Text OUTPUT: Table Graph Grid

```

repeat for stage = 1 to 5
  BLUE = stage x 3
  RED = 3
  plot BLUE, RED
  
```

when clicked

delete all of Pattern List

set term to 1

repeat 10

add 3 term + 3 to Pattern List

change term by 1

Pattern List

1	6
2	9
3	12
4	15
5	18
6	21
7	24
8	27
9	30
10	33

+ length 10

You will see the list of numbers shown on the right.

```

1 for x in range (1,11):
2   print(x, 3*x+3)
  
```

This code represents the pattern shown below.

1	6
2	9
3	12
4	15
5	18
6	21
7	24
8	27
9	30
10	33

Grade 3 - NUMBER

B2.2 recall and demonstrate multiplication facts of 2, 5, and 10, and related division facts

B2.3 use mental math strategies, including estimation, to add and subtract whole numbers that add up to no more than 1000, and explain the strategies used

Grade 3 - ALGEBRA

C1.1 identify and describe repeating elements and operations in a variety of patterns, including patterns found in real-life contexts

C1.2 create and translate patterns that have repeating elements, movements, or operations using various representations, including shapes, numbers, and tables of values

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns that have repeating elements, movements, or operations

C1.4 create and describe patterns to illustrate relationships among whole numbers up to 1000

C2.1 describe how variables are used, and use them in various contexts as appropriate

C3.2 read and alter existing code, including code that involves sequential, concurrent, and repeating events, and describe how changes to the code affect the outcomes

Grade 4 - NUMBER

B2.2 recall and demonstrate multiplication facts for 1×1 to 10×10 , and related division facts

B2.3 use mental math strategies to multiply whole numbers by 10, 100, and 1000, divide whole numbers by 10, and add and subtract decimal tenths, and explain the strategies used

Grade 4 - ALGEBRA

C1.1 identify and describe repeating and growing patterns, including patterns found in real-life contexts

C1.2 create and translate repeating and growing patterns using various representations, including tables of values and graphs

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating and growing patterns

C2.1 translate among words, algebraic expressions, and visual representations that describe equivalent relationships

C3.2 read and alter existing code, including code that involves sequential, concurrent, repeating, and nested events, and describe how changes to the code affect the outcomes

Grade 5 - ALGEBRA

C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns

C2.2 evaluate algebraic expressions that involve whole numbers

C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes

Grade 6 - ALGEBRA

C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and specify which growing patterns are linear

C1.2 create and translate repeating, growing, and shrinking patterns using various representations, including tables of values, graphs, and, for linear growing patterns, algebraic expressions and equations

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns,

C2.2 evaluate algebraic expressions that involve whole numbers and decimal tenths

C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code

Grade 7 - ALGEBRA

C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing patterns on the basis of their constant rates and initial values

C1.2 create and translate repeating, growing, and shrinking patterns involving whole numbers and decimal numbers using various representations, including algebraic expressions and equations for linear growing patterns

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns involving whole numbers and decimal numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns

C1.4 create and describe patterns to illustrate relationships among integers

C2.2 evaluate algebraic expressions that involve whole numbers and decimal numbers

C3.2 read and alter existing code, including code that involves events influenced by a defined count and/or sub-program and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code

Grade 8 - ALGEBRA

C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing and shrinking patterns on the basis of their constant rates and initial values

C1.2 create and translate repeating, growing, and shrinking patterns involving rational numbers using various representations, including algebraic expressions and equations for linear growing and shrinking patterns

C3.2 read and alter existing code involving the analysis of data in order to inform and communicate decisions, and describe how changes to the code affect the outcomes and the efficiency of the code

Grade 9 - ALGEBRA

C1.2 create algebraic expressions to generalize relationships expressed in words, numbers, and visual representations, in various contexts

C1.3 compare algebraic expressions using concrete, numerical, graphical, and algebraic methods to identify those that are equivalent, and justify their choices

C1.4 simplify algebraic expressions by applying properties of operations of numbers, using various representations and tools, in different contexts

C1.5 create and solve equations for various contexts, and verify their solutions

C2. apply coding skills to represent mathematical concepts and relationships dynamically, and to solve problems, in algebra and across the other strands

C4. demonstrate an understanding of the characteristics of various representations of linear and non-linear relations, using tools, including coding when appropriate

3. Where Numbers Hide (1-8)

Students in **grades 1-4** investigate growth patterns, describe rules for determining sums of odd and even numbers, and create math art to share their learning at home.

Students in **grades 6-8** develop algebraic expressions to represent odd, even, and natural numbers, and their sums.

The growth of odd, even, and natural numbers, compared to the growth of their sums, introduces students to linear and non-linear relationships.

Grade 1- NUMBER

B1.3 compare and order whole numbers up to and including 50, in various contexts

B1.5 count to 50 by 1s, 2s, 5s, and 10s, using a variety of tools and strategies

B2.2 recall and demonstrate addition facts for numbers up to 10, and related subtraction facts

B2.3 use mental math strategies, including estimation, to add and subtract whole numbers that add up to no more than 20, and explain the strategies used

Grade 1- ALGEBRA

C1.1 identify and describe the regularities in a variety of patterns, including patterns found in real-life contexts

C1.4 create and describe patterns to illustrate relationships among whole numbers up to 50

C2.3 identify and use equivalent relationships for whole numbers up to 50, in various contexts

C3.2 read and alter existing code, including code that involves sequential events, and describe how changes to the code affect the outcomes

Grade 2- NUMBER

B1.3 compare and order whole numbers up to and including 200, in various contexts

B1.4 count to 200, including by 20s, 25s, and 50s, using a variety of tools and strategies

B2.2 recall and demonstrate addition facts for numbers up to 20, and related subtraction facts

B2.3 use mental math strategies, including estimation, to add and subtract whole numbers that add up to no more than 50, and explain the strategies used

B2.5 represent multiplication as repeated equal groups, including groups of one half and one fourth, and solve related problems, using various tools and drawings

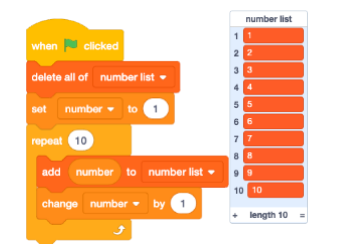
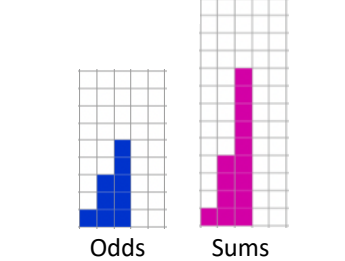
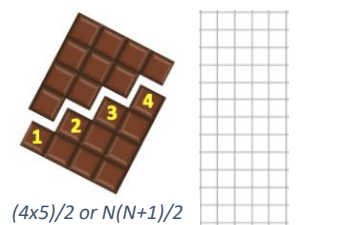
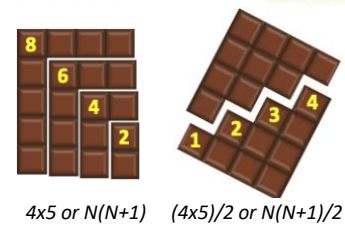
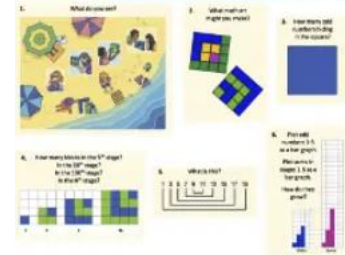
Grade 2- ALGEBRA

C1.1 identify and describe a variety of patterns involving geometric designs, including patterns found in real-life contexts

C1.4 create and describe patterns to illustrate relationships among whole numbers up to 100

C2.3 identify and use equivalent relationships for whole numbers up to 100, in various contexts

C3.2 read and alter existing code, including code that involves sequential and concurrent events, and describe how changes to the code affect the outcomes



```

1 for N in range (1,6):
2   print (2*N)
2
4
6
8
10

```

Grade 3- NUMBER

B1.3 compare and order whole numbers up to and including 1000, in various contexts

B1.4 count to 1000, including by 50s, 100s, and 200s, using a variety of tools and strategies

B2.2 recall and demonstrate multiplication facts of 2, 5, and 10, and related division facts

B2.4 demonstrate an understanding of algorithms for adding and subtracting whole numbers by making connections to and describing the way other tools and strategies are used to add and subtract

Grade 3- ALGEBRA

C1.1 identify and describe repeating elements and operations in a variety of patterns, including patterns found in real-life contexts

C1.4 create and describe patterns to illustrate relationships among whole numbers up to 1000

C2.3 identify and use equivalent relationships for whole numbers up to 1000, in various contexts

C3.2 read and alter existing code, including code that involves sequential, concurrent, and repeating events, and describe how changes to the code affect the outcomes

Grade 4- NUMBER

B1.2 compare and order whole numbers up to and including 10 000, in various contexts

B2.1 use the properties of operations, and the relationships between addition, subtraction, multiplication, and division, to solve problems involving whole numbers,

B2.2 recall and demonstrate multiplication facts for 1×1 to 10×10 , and related division facts

B2.4 represent and solve problems involving the addition and subtraction of whole numbers that add up to no more than 10 000 and of decimal tenths, using appropriate tools and strategies, including algorithms

B2.5 represent and solve problems involving the multiplication of two- or three-digit whole numbers by one-digit whole numbers and by 10, 100, and 1000, using appropriate tools, including arrays

Grade 4- ALGEBRA

C1.1 identify and describe repeating and growing patterns, including patterns found in real-life contexts

C1.2 create and translate repeating and growing patterns using various representations, including tables of values and graphs

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating and growing patterns

C2.1 identify and use symbols as variables in expressions and equations

C3.2 read and alter existing code, including code that involves sequential, concurrent, repeating, and nested events, and describe how changes to the code affect the outcomes

Grade 5- NUMBER

B1.2 compare and order whole numbers up to and including 100 000, in various contexts

B2.1 use the properties of operations, and the relationships between operations, to solve problems involving whole numbers

B2.2 recall and demonstrate multiplication facts from 0×0 to 12×12 , and related division facts

B2.3 use mental math strategies to multiply whole numbers by 10, 100, and 1000, divide whole numbers by 10,

B2.4 represent and solve problems involving the addition and subtraction of whole numbers that add up to no more than 100 000, and of decimal numbers up to hundredths, using appropriate tools, strategies, and algorithms

B2.6 represent and solve problems involving the multiplication of two-digit whole numbers by two-digit whole numbers using the area model and using algorithms, and make connections between the two methods

Grade 5- ALGEBRA

C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts

C1.2 create and translate growing and shrinking patterns using various representations, including tables of values and graphs

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns

C2.1 translate among words, algebraic expressions, and visual representations that describe equivalent relationships

C2.2 evaluate algebraic expressions that involve whole numbers

C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes

Grade 6- NUMBER

B1.3 compare and order whole numbers up to and including 50, in various contexts

B2.2 understand the divisibility rules and use them to determine whether numbers are divisible by 2, 3, 4, 5, 6, 8, 9, and 10

Grade 6- ALGEBRA

C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and specify which growing patterns are linear

C1.2 create and translate repeating, growing, and shrinking patterns using various representations, including tables of values, graphs, and, for linear growing patterns, algebraic expressions and equations

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns

C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code

Grade 7- NUMBER

B1.3 compare and order whole numbers up to and including 50, in various contexts

Grade 7- ALGEBRA

C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing patterns on the basis of their constant rates and initial values

C1.2 create and translate repeating, growing, and shrinking patterns involving whole numbers and decimal numbers using various representations, including algebraic expressions and equations for linear growing patterns

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns involving whole numbers and decimal numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns

C3.2 read and alter existing code, including code that involves events influenced by a defined count and/or sub-program and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code

Grade 8- NUMBER

B1.3 compare and order whole numbers up to and including 50, in various contexts

Grade 8- ALGEBRA

C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing and shrinking patterns on the basis of their constant rates and initial values

C1.2 create and translate repeating, growing, and shrinking patterns involving rational numbers using various representations, including algebraic expressions and equations for linear growing and shrinking patterns

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in growing and shrinking patterns involving rational numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing and shrinking patterns

C3.2 read and alter existing code involving the analysis of data in order to inform and communicate decisions, and describe how changes to the code affect the outcomes and the efficiency of the code

4. Infinity in your Hand (2-9)

Students in **grades 2-4** shade grids (or use link cubes) to build area (or volume) representations of unit fractions $1/2$, $1/4$, $1/8$, and so on, and notice that they all fit in a single square (or square grid of link cubes).

They compare this to walking to the door by repeatedly travelling half the remaining distance. They shade different representations of the fractions (as shown on the right) to create math art.

Students in **grades 5-9** also compare the two fraction patterns on the right and demonstrate that $1/4 + 1/16 + 1/64 + \dots = 1/3$ and $1/2 + 1/8 + 1/32 + \dots = 2/3$. They also develop an understanding of $0.999\dots = 1$.

Grade 2 - NUMBER

B1.6 use drawings to represent, solve, and compare the results of fair-share problems that involve sharing up to 10 items among 2, 3, 4, and 6 sharers, including problems that result in whole numbers, mixed numbers, and fractional amounts

B1.7 recognize that one third and two sixths of the same whole are equal, in fair-sharing contexts

Grade 2 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns represented with shapes and numbers

C3.2 read and alter existing code, including code that involves sequential and concurrent events, and describe how changes to the code affect the outcomes

Grade 3 - NUMBER

B1.6 use drawings to represent, solve, and compare the results of fair-share problems that involve sharing up to 20 items among 2, 3, 4, 5, 6, 8, and 10 sharers, including problems that result in whole numbers, mixed numbers, and fractional amounts

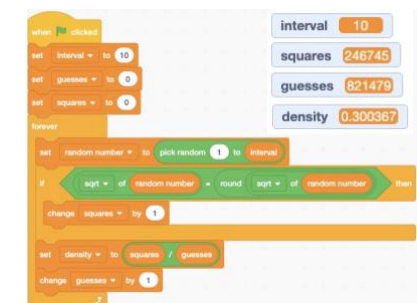
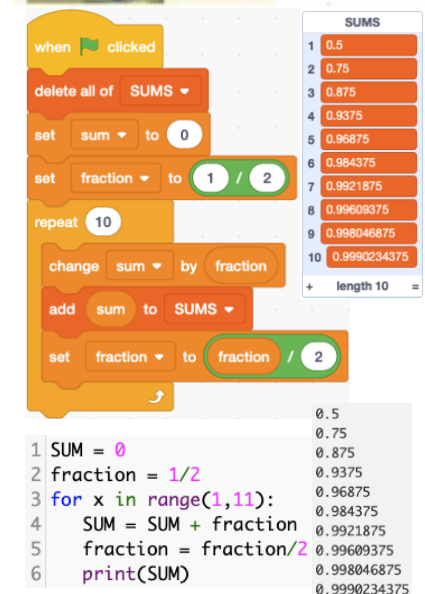
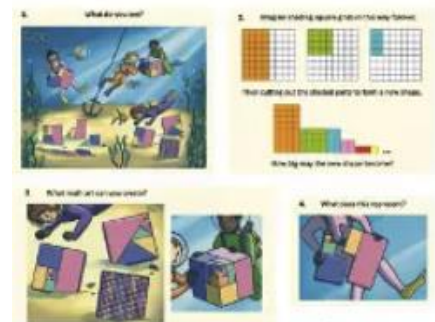
B1.7 represent and solve fair-share problems that focus on determining and using equivalent fractions, including problems that involve halves, fourths, and eighths; thirds and sixths; and fifths and tenths

B2.8 represent the connection between the numerator of a fraction and the repeated addition of the unit fraction with the same denominator using various tools and drawings, and standard fractional notation

Grade 3 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns that have repeating elements, movements, or operations

C3.2 read and alter existing code, including code that involves sequential, concurrent, and repeating events, and describe how changes to the code affect the outcomes



Grade 4 - NUMBER

B1.4 represent fractions from halves to tenths using drawings, tools, and standard fractional notation, and explain the meanings of the denominator and the numerator

B1.5 use drawings and models to represent, compare, and order fractions representing the individual portions that result from two different fair-share scenarios involving any combination of 2, 3, 4, 5, 6, 8, and 10 sharers

B1.6 count to 10 by halves, thirds, fourths, fifths, sixths, eighths, and tenths, with and without the use of tools

B2.7 represent the relationship between the repeated addition of a unit fraction and the multiplication of that unit fraction by a whole number, using tools, drawings, and standard fractional notation

Grade 4 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating and growing patterns

C3.2 read and alter existing code, including code that involves sequential, concurrent, repeating, and nested events, and describe how changes to the code affect the outcomes

Grade 5 - NUMBER

B1.3 represent equivalent fractions from halves to twelfths, including improper fractions and mixed numbers, using appropriate tools, in various contexts

B1.4 compare and order fractions from halves to twelfths

B1.7 describe relationships and show equivalences among fractions, decimal numbers up to hundredths, and whole number percents, using appropriate tools and drawings, in various contexts

B2.5 add and subtract fractions with like denominators, in various contexts

B2.8 multiply and divide one-digit whole numbers by unit fractions, using appropriate tools and drawings

Grade 5 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns

C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes

Grade 6 - NUMBER

B1.6 describe relationships and show equivalences among fractions and decimal numbers up to thousandths, using appropriate tools and drawings, in various contexts

B2.5 add and subtract fractions with like and unlike denominators, using appropriate tools, in various contexts

B2.9 multiply whole numbers by proper fractions, using appropriate tools and strategies

Grade 6 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns

C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code

Grade 7 - NUMBER

B1.4 use equivalent fractions to simplify fractions, when appropriate, in various contexts

B1.7 convert between fractions, decimal numbers,

B2.5 add and subtract fractions, including by creating equivalent fractions, in various contexts

B2.8 multiply and divide fractions by fractions, using tools in various contexts

Grade 7 - ALGEBRA

C3.2 read and alter existing code, including code that involves events influenced by a defined count and/or sub-program and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code

Grade 8 - NUMBER

B2.5 add and subtract fractions, using appropriate strategies, in various contexts

B2.6 multiply and divide fractions by fractions, as well as by whole numbers and mixed numbers, in various contexts

Grade 8 - ALGEBRA

C1.4 create and describe patterns to illustrate relationships among rational numbers

C3.2 read and alter existing code involving the analysis of data in order to inform and communicate decisions, and describe how changes to the code affect the outcomes and the efficiency of the code

Grade 9 - NUMBER

B1.1 research a number concept to tell a story about its development and use in a specific culture, and describe its relevance in a current context

B1.2 describe how various subsets of a number system are defined, and describe similarities and differences between these subsets

B1.3 use patterns and number relationships to explain density, infinity, and limit as they relate to number sets

B3.2 apply an understanding of unit fractions and their relationship to other fractional amounts, in various contexts, including the use of measuring tools

Grade 9 - ALGEBRA

C2. apply coding skills to represent mathematical concepts and relationships dynamically, and to solve problems, in algebra and across the other strands

C2.3 read code to predict its outcome, and alter code to adjust constraints, parameters, and outcomes to represent a similar or new mathematical situation

C3.1 compare the shapes of graphs of linear and non-linear relations to describe their rates of change, to make connections to growing and shrinking patterns, and to make predictions

C4.1 compare characteristics of graphs, tables of values, and equations of linear and non-linear relations

MATH EVERY CHILD NEEDS, vol. 2, #5-8

Curriculum Correlation: Ontario 1-9 Mathematics

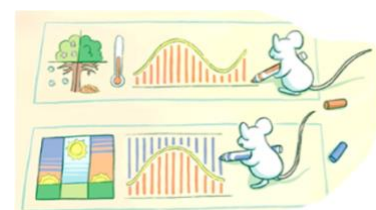
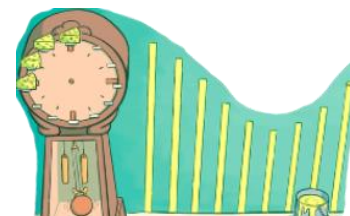
5. Math Waves (3-9)

In **grades 3-8**, students measure the height of hours on a clock and display their data as a bar graph.

They also collect and plot bar graphs of average monthly sunset times and temperatures, and notice similar patterns. What is the connection?

Students investigate cyclical patterns in nature, such as how the weights of bears vary over a year and variations in predator-prey numbers over time. They tape markers to various shaped cracker containers and roll them to see what paths they draw on vertical surfaces.

In **grades 9 and up**, students make connections to circular functions and trigonometry.



Grade 3 - ALGEBRA

C1.1 identify and describe repeating elements and operations in a variety of patterns, including patterns found in real-life contexts

C1.2 create and translate patterns that have repeating elements, movements, or operations using various representations

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns that have repeating elements, movements, or operations

C3.2 read and alter existing code, including code that involves sequential, concurrent, and repeating events, and describe how changes to the code affect the outcomes

Grade 3 - DATA

D1.2 collect data through observations, experiments

D1.3 display sets of data in bar graphs

D1.5 analyse different data sets presented in various ways, by asking and answering questions about the data and drawing conclusions, then make convincing arguments and informed decisions

Grade 3 - SPATIAL SENSE

E1.1 sort, construct, and identify cubes, prisms, pyramids, cylinders, and cones by comparing their faces, edges, vertices, and angles

E2.6 use analog and digital clocks and timers to tell time in hours, minutes, and seconds

Grade 4 - ALGEBRA

C1.1 identify and describe repeating and growing patterns, including patterns found in real-life contexts

C1.2 create and translate repeating and growing patterns using various representations, including tables of values and graphs

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating and growing patterns

C3.2 read and alter existing code, including code that involves sequential, concurrent, repeating, and nested events, and describe how changes to the code affect the outcomes

Grade 4 - DATA

D1.2 collect data from different primary and secondary sources

D1.3 display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs

D1.6 analyse different data sets presented in various ways, by asking and answering questions about the data and drawing conclusions, then make convincing arguments and informed decisions

Grade 4 - SPATIAL SENSE

E1.1 identify geometric properties of rectangles

E1.2 plot and read coordinates in the first quadrant of a Cartesian plane, and describe the translations that move a point from one coordinate to another

E2.6 use analog and digital clocks and timers to tell time in hours, minutes, and seconds

Grade 5 - ALGEBRA

C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts

C1.2 create and translate growing and shrinking patterns using various representations, including tables of values and graphs

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns

C3.1 solve problems and create computational representations of mathematical situations by writing and executing code,

Grade 5 - DATA

D1.3 select from among a variety of graphs the type of graph best suited to represent various data.

D1.6 analyse different data sets presented in various ways, by asking and answering questions about the data and drawing conclusions, then make convincing arguments and informed decisions

Grade 5 - SPATIAL SENSE

E1.1 identify geometric properties of triangles

E1.4 plot and read coordinates in the first quadrant of a Cartesian plane using various scales

Grade 6 - ALGEBRA

C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and specify which growing patterns are linear

C1.2 create and translate growing and shrinking patterns using various representations, including tables of values and graphs

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns

C3.1 solve problems and create computational representations of mathematical situations by writing and executing efficient code,

Grade 6 - DATA

D1.3 select from among a variety of graphs the type of graph best suited to represent various data.

D1.6 analyse different data sets presented in various ways, by asking and answering questions about the data and drawing conclusions, then make convincing arguments and informed decisions

Grade 6 - SPATIAL SENSE

E1.1 create lists of geometric properties of various types of quadrilaterals

Grade 7 - ALGEBRA

C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing patterns on the basis of their constant rates and initial values

C1.2 create and translate repeating, growing, and shrinking patterns involving whole numbers and decimal numbers using various representations

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns

C3.1 solve problems and create computational representations of mathematical situations by writing and executing efficient code,

Grade 7 - DATA

D1.3 select from among a variety of graphs the type of graph best suited to represent various data.

D1.6 analyse different data sets presented in various ways, by asking and answering questions about the data and drawing conclusions, then make convincing arguments and informed decisions

Grade 7 - SPATIAL SENSE

E1.1 describe and classify cylinders, pyramids, and prisms

Grade 8 - ALGEBRA

C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing and shrinking patterns on the basis of their constant rates and initial values

C1.2 create and translate repeating, growing, and shrinking patterns involving rational numbers using various representations

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in growing and shrinking patterns

C3.1 solve problems and create computational representations of mathematical situations by writing and executing code

Grade 8 - DATA

D1.3 select from among a variety of graphs the type of graph best suited to represent various data.

D1.6 analyse different data sets presented in various ways, by asking and answering questions about the data and drawing conclusions, then make convincing arguments and informed decisions

Grade 9 - ALGEBRA

C3. represent and compare linear and non-linear relations that model real-life situations, and use these representations to make predictions

C3.1 compare the shapes of graphs of linear and non-linear relations to describe their rates of change, to make connections to growing and shrinking patterns, and to make predictions

Grade 9 - DATA

D1. describe the collection and use of data, and represent and analyse data involving one and two variables

D2. apply the process of mathematical modelling, using data and mathematical concepts from other strands, to represent, analyse, make predictions, and provide insight into real-life situations

D2.1 describe the value of mathematical modelling and how it is used in real life to inform decisions

Grade 9 - GEOMETRY and MEASUREMENT

E1. demonstrate an understanding of the development and use of geometric and measurement relationships, and apply these relationships to solve problems, including problems involving real-life situations

E1.1 research a geometric concept or a measurement system to tell a story about its development and use in a specific culture or community, and describe its relevance in connection to careers and to other disciplines

6. Inequalities (1-9)

Students in **grades 1-3** create organized lists of number pairs whose sums are equal to 10 ($_ + _ = 10$) and less than 10 ($_ + _ < 10$) and notice patterns that emerge. In **grades 3-4**, students also plot these pairs on a grid. The pairs of numbers may also be plotted as coordinate pairs on the classroom floor.

In **grades 5-9**, students use conditional structures to model inequalities like $_ + _ > 100$ in 2D using Scratch. They alter the code to solve puzzles. They also use coordinate axes in the classroom space to visualize inequalities in 1D, 2D & 3D.

In **grades 7-9**, students extend these activities and connect them to the study of linear relationships and linear inequalities. They may also model these relationships in 2D and 3D using Desmos.



Grade 1 - NUMBER

B2.2 recall and demonstrate addition facts for numbers up to 10, and related subtraction facts

B2.3 use mental math strategies, including estimation, to add and subtract whole numbers that add up to no more than 20, and explain the strategies used

Grade 1 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns

C1.4 create and describe patterns to illustrate relationships among whole numbers up to 50

C2.1 identify quantities that can change and quantities that always remain the same in real-life contexts

C2.2 determine whether given pairs of addition and subtraction expressions are equivalent or not

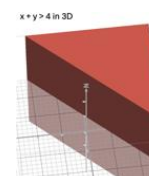
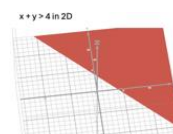
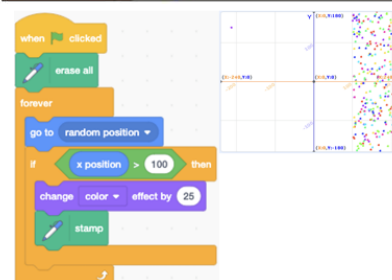
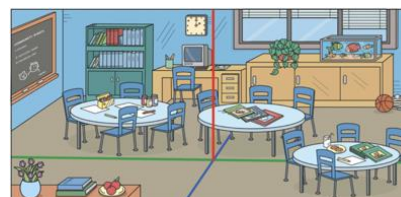
C2.3 identify and use equivalent relationships for whole numbers up to 50, in various contexts

C3. solve problems and create computational representations of mathematical situations using coding concepts and skills

C2.2 determine whether given pairs of addition and subtraction expressions are equivalent or not

C2.3 identify and use equivalent relationships for whole numbers up to 50, in various contexts

C3.1 solve problems and create computational representations of mathematical situations by writing and executing code



Grade 2 - NUMBER

B2.2 recall and demonstrate addition facts for numbers up to 20, and related subtraction facts

B2.3 use mental math strategies, including estimation, to add and subtract whole numbers that add up to no more than 50, and explain the strategies used

Grade 2 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns

C1.4 create and describe patterns to illustrate relationships among whole numbers up to 100

C2.1 identify when symbols are being used as variables, and describe how they are being used

C2.2 determine what needs to be added to or subtracted from addition and subtraction expressions to make them equivalent

C2.3 identify and use equivalent relationships for whole numbers up to 100, in various contexts

C3.1 solve problems and create computational representations of mathematical situations by writing and executing code

Grade 3 - NUMBER

B2.2 recall and demonstrate multiplication facts of 2, 5, and 10, and related division facts

B2.3 use mental math strategies, including estimation, to add and subtract whole numbers that add up to no more than 1000, and explain the strategies used

Grade 3 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns

C1.4 create and describe patterns to illustrate relationships among whole numbers up to 1000

C2.1 describe how variables are used, and use them in various contexts as appropriate

C2.2 determine whether given sets of addition, subtraction, multiplication, and division expressions are equivalent or not

C2.3 identify and use equivalent relationships for whole numbers up to 1000, in various contexts

C3.1 solve problems and create computational representations of mathematical situations by writing and executing code

Grade 4 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating and growing patterns

C2.1 identify and use symbols as variables in expressions and equations

C2.2 solve equations that involve whole numbers up to 50

C2.3 solve inequalities that involve addition and subtraction of whole numbers up to 20, and verify and graph the solutions

C3.1 solve problems and create computational representations of mathematical situations by writing and executing code

Grade 4 - SPATIAL SENSE

E1.2 plot and read coordinates in the first quadrant of a Cartesian plane

Grade 5 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements

C2.1 translate among words, algebraic expressions, and visual representations that describe equivalent relationships

C2.4 solve inequalities that involve one operation and whole numbers up to 50, and verify and graph the solutions

C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes

Grade 5 - SPATIAL SENSE

E1.4 plot and read coordinates in the first quadrant of a Cartesian plane

Grade 6 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements

C2.4 solve inequalities that involve two operations and whole numbers up to 100, and verify and graph the solutions

C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code

Grade 6 - SPATIAL SENSE

E1.3 plot and read coordinates in all four quadrants of a Cartesian plane

Grade 7 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns involving whole numbers and decimal numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns

C2.4 solve inequalities that involve multiple terms and whole numbers, and verify and graph the solutions

C3.1 solve problems and create computational representations of mathematical situations by writing and executing code

Grade 7 - SPATIAL SENSE

E1.1 describe and classify cylinders, pyramids, and prisms according to their geometric properties, including plane and rotational symmetry (Note: $a^2 + b^2 = c^2$ is the equation of a circle with radius c . Using Desmos 3D, $a^2 + b^2 = 4^2$ is a cylinder with radius 4; and $a^2 + b^2 = c^2$ is a cone)

Grade 8 - ALGEBRA

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in growing and shrinking patterns, and use algebraic representations of the pattern rules to solve for unknown values in linear growing and shrinking patterns

C2.4 solve inequalities that involve integers, and verify and graph the solutions

C3.1 solve problems and create computational representations of mathematical situations by writing and executing code

Grade 8 - SPATIAL SENSE

E2.4 describe the Pythagorean relationship using various geometric models, and apply the theorem to solve problems involving an unknown side length for a given right triangle (Note: $a^2 + b^2 = c^2$ is the equation of a circle with radius c . Using Desmos 3D, $a^2 + b^2 = 4^2$ is a cylinder with radius 4; and $a^2 + b^2 = c^2$ is a cone)

Grade 9 - ALGEBRA

C1. demonstrate an understanding of the development and use of algebraic concepts and of their connection to numbers, using various tools and representations

C1.1 research an algebraic concept to tell a story about its development and use in a specific culture, and describe its relevance in a current context

C2. apply coding skills to represent mathematical concepts and relationships dynamically, and to solve problems, in algebra and across the other strands

C4. demonstrate an understanding of the characteristics of various representations of linear and non-linear relations, using tools, including coding when appropriate

7. Parallel Lines (1-9)

In **grades 1-9**, students consider the puzzle of arriving back to the starting point when walking S-W-N. They compare what is similar and different when walking S-W-N on a flat map and on a globe.

In **grades 4-9**, students investigate the paths that airplanes travel, and consider which paths on the globe are “straight”: lines of latitude or lines of longitude? They learn about great circles.

Students investigate the sum of the angles in triangles formed with sides along the equator and 2 lines of longitude.



Grade 1 - SPATIAL SENSE

E1.1 sort three-dimensional objects and two-dimensional shapes according to one attribute at a time, and identify the sorting rule being used

E1.5 give and follow directions for moving from one location to another

Grade 2 - SPATIAL SENSE

E1.4 create and interpret simple maps of familiar places

E1.5 describe the relative positions of several objects and the movements needed to get from one object to another



Grade 3 - SPATIAL SENSE

E1.2 compose and decompose various structures, and identify the two-dimensional shapes and three-dimensional objects that these structures contain

E1.4 give and follow multistep instructions involving movement from one location to another,



Grade 4 - SPATIAL SENSE

E1.2 plot and read coordinates in the first quadrant of a Cartesian plane

E2.4 identify angles and classify them as right, straight, acute, or obtuse

Grade 5 - SPATIAL SENSE

E1.1 identify geometric properties of triangles, and construct different types of triangles when given side or angle measurements

E1.2 identify and construct congruent triangles, rectangles, and parallelograms



Grade 6 - SPATIAL SENSE

E1.3 plot and read coordinates in all four quadrants of a Cartesian plane

E2.3 use the properties of supplementary angles, complementary angles, opposite angles, and interior and exterior angles to solve for unknown angle measures

Grade 7 - SPATIAL SENSE

E1.3 plot and read coordinates in all four quadrants of a Cartesian plane

E2.6 represent cylinders as nets and determine their surface area by adding the areas of their parts

Grade 8 - SPATIAL SENSE

E1.4 plot and read coordinates in all four quadrants of a Cartesian plane

E2.2 solve problems involving angle properties, including the properties of intersecting and parallel lines and of polygons

Grade 9 - GEOMETRY and MEASUREMENT

E1. demonstrate an understanding of the development and use of geometric and measurement relationships, and apply these relationships to solve problems, including problems involving real-life situations

E1.1 research a geometric concept or a measurement system to tell a story about its development and use in a specific culture or community, and describe its relevance in connection to careers and to other disciplines

E1.2 create and analyse designs involving geometric relationships and circle and triangle properties

8. Sumerian Triples (7-9)

Students in **grades 7-9** investigate the concept, history and applications of the side relationship of right triangles, a.k.a. the Pythagorean Theorem ($a^2 + b^2 = c^2$), with references to the mathematics of ancient Sumer, Egypt and Greece.

Students also investigate integer triples (a, b, c) that satisfy $a^2 + b^2 = c^2$.

They may use Scratch to plot points (a, b) of triples (a, b, c) and notice patterns that emerge.

Students may also investigate the plot of triples (a, b, c) in 3D.

Students may share the *Placemat* and their learning at home.



Grade 7 - ALGEBRA

C1. identify, describe, extend, create, and make predictions about a variety of patterns, including those found in real-life contexts

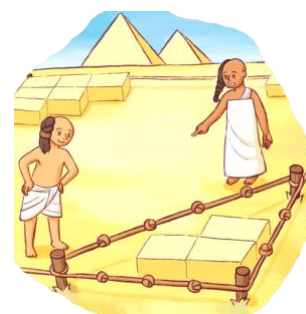
C2.3 solve equations that involve multiple terms, whole numbers, and decimal numbers in various contexts, and verify solutions

Grade 7 - DATA

D1.5 analyse different sets of data presented in various ways

Grade 7 - SPATIAL SENSE

E1.1 describe and classify cylinders, pyramids, and prisms according to their geometric properties, including plane and rotational symmetry (Note: The Pythagorean Theorem $a^2 + b^2 = c^2$ is the equation of a circle with radius c . Using Desmos 3D, $a^2 + b^2 = 4^2$ is a cylinder with radius 4; and $a^2 + b^2 = c^2$ is a cone)



Grade 8 - ALGEBRA

C1. identify, describe, and make predictions about a variety of patterns, including those found in real-life contexts

C2.3 solve equations that involve multiple terms, whole numbers, and decimal numbers in various contexts, and verify solutions

Grade 8 - DATA

D1.6 analyse different sets of data presented in various ways,

Grade 8 - SPATIAL SENSE

E2.4 describe the Pythagorean relationship using various geometric models, and apply the theorem to solve problems involving an unknown side length for a given right triangle



Grade 9 - ALGEBRA

C2. apply coding skills to represent mathematical concepts and relationships dynamically, and to solve problems, in algebra and across the other strands

Grade 9 - DATA

D1.5 analyse different sets of data presented in various ways

Grade 9 - GEOMETRY and MEASUREMENT

E1. demonstrate an understanding of the development and use of geometric and measurement relationships, and apply these relationships to solve problems, including problems involving real-life situations

E1.1 research a geometric concept or a measurement system to tell a story about its development and use in a specific culture or community, and describe its relevance in connection to careers and to other disciplines

E1.4 show how changing one or more dimensions of a two-dimensional shape and a three-dimensional object affects perimeter/circumference, area, surface area, and volume, using technology when appropriate (Note: The Pythagorean Theorem $a^2 + b^2 = c^2$ is the equation of a circle with radius c . Using Desmos 3D, $a^2 + b^2 = 4^2$ is a cylinder with radius 4; and $a^2 + b^2 = c^2$ is a cone)



E1.5 solve problems involving the side-length relationship for right triangles in real-life situations, including problems that involve composite shapes