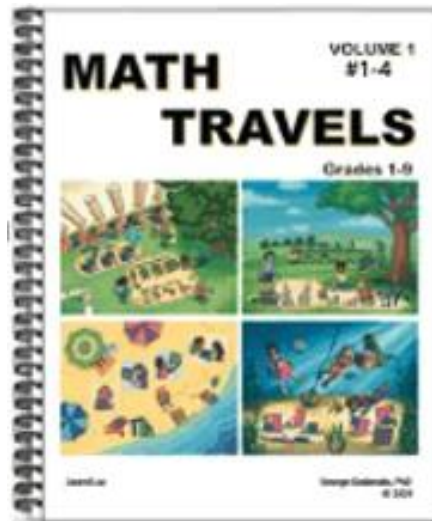


CURRICULUM CORRELATION

British Columbia 1-9 Mathematics

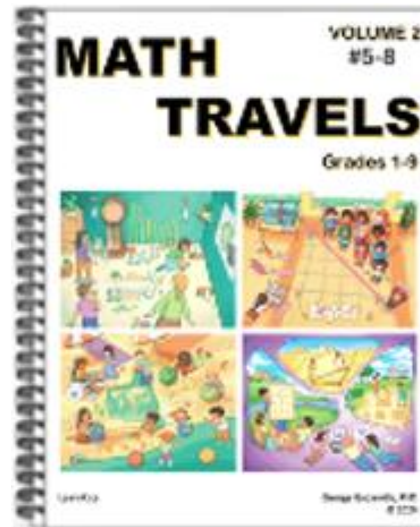
MATH TRAVELS vol. 1, #1-4



Page

- 2 1. Repeating patterns (K-6)
- 3 2. Growing patterns (1-9)
- 5 3. Where numbers hide (1-8)
- 7 4. Infinity in your hand (2-9)

MATH TRAVELS vol. 2, #5-8



Page

- 9 5. Math Waves (3-9)
- 11 6. Inequalities (1-9)
- 13 7. Parallel Lines (1-9)
- 24 8. Sumerian Triples (7-9)

MATH TRAVELS, vol. 1, #1-4

Curriculum Correlation: British Columbia 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.

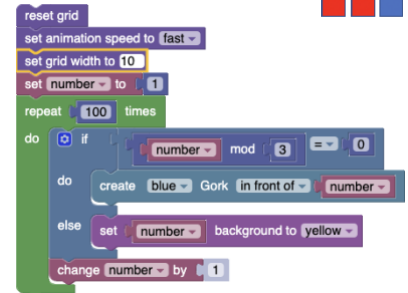
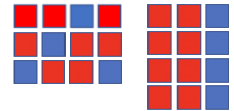


BIG IDEAS

- The regular change in increasing patterns can be identified and used to make generalizations.

CURRICULAR COMPETENCIES

- **Reasoning and analyzing**
 - o Reasoning; technology; modelling
- **Understanding and solving**
 - o Play, inquiry, and problem solving; visualize; multiple strategies
- **Communicating and representing**
 - o Communicate in many ways; explain and justify; represent in concrete, pictorial, and symbolic forms; reflect on mathematical thinking
- **Connecting and reflecting**
 - o Reflect on thinking; connect mathematical concepts



CONTENT

- **Grade 1**
 - o repeating patterns with two or three elements
 - o concrete or pictorial graphs as a visual tool
- **Grade 2**
 - o repeating and increasing patterns
 - o pictorial representation of concrete graphs
 - o number concepts to 100
 - o benchmarks of 25, 50, and 100 and personal referents
 - o addition and subtraction facts to 20 (introduction of computational strategies)
 - o addition and subtraction to 100
- **Grade 3**
 - o pattern rules using words and numbers, based on concrete experiences
 - o multiplication and division concepts
- **Grade 4**
 - o multiplication and division facts to 100
- **Grade 5**
 - o multiplication and division facts to 100

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

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.

BIG IDEAS

- Identified regularities in number patterns can be expressed in tables.
- Linear relations can be identified and represented using expressions with variables and line graphs and can be used to make generalizations.

CURRICULAR COMPETENCIES

- **Reasoning and analyzing**
 - o Reasoning; technology; modelling
- **Understanding and solving**
 - o Play, inquiry, and problem solving; visualize; multiple strategies
- **Communicating and representing**
 - o Communicate in many ways; explain and justify; represent in concrete, pictorial, and symbolic forms; reflect on mathematical thinking
- **Connecting and reflecting**
 - o Reflect on thinking; connect mathematical concepts

CONTENT

- **Grade 1**
 - o repeating patterns with multiple elements and attributes
 - o concrete graphs, using one-to-one correspondence
- **Grade 2**
 - o repeating and increasing patterns
 - o change in quantity, using pictorial and symbolic representation
 - o pictorial representation of concrete graphs, using one-to-one correspondence
- **Grade 3**
 - o increasing and decreasing patterns
 - o pattern rules using words and numbers, based on concrete experiences
 - o one-step addition and subtraction equations with an unknown number
 - o one-to-one correspondence with bar graphs, pictographs, charts, tables
- **Grade 4**
 - o increasing and decreasing patterns, using tables and charts
 - o algebraic relationships among quantities
 - o one-to-one correspondence, using bar graphs and pictographs
- **Grade 5**
 - o rules for increasing and decreasing patterns with words, numbers, symbols, and variables
 - o one-step equations with variables



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

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.

- **Grade 6**
 - increasing and decreasing patterns, using expressions, tables, and graphs as functional relationships
 - one-step equations with whole-number coefficients and solutions
 - line graphs
- **Grade 7**
 - discrete linear relations, using expressions, tables, and graphs
 - two-step equations with whole-number coefficients, constants, and solutions
 - Cartesian coordinates and graphing
- **Grade 8**
 - discrete linear relations (extended to larger numbers, limited to integers)
 - expressions- writing and evaluating using substitution
 - two-step equations with integer coefficients, constants, and solutions
- **Grade 9**
 - two-variable linear relations, using graphing, interpolation, and extrapolation
 - multi-step one-variable linear equations

3. Number Patterns (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.

BIG IDEAS

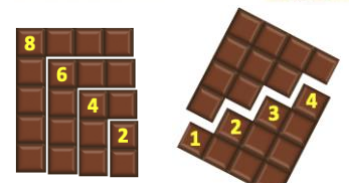
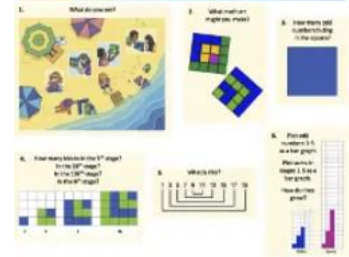
- Identified regularities in number patterns can be expressed in tables.
- Linear relations can be identified and represented using expressions with variables and line graphs and can be used to make generalizations.

CURRICULAR COMPETENCIES

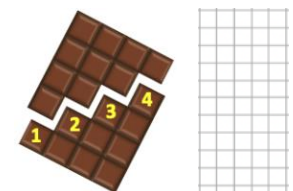
- **Reasoning and analyzing**
 - o Reasoning; technology; modelling
- **Understanding and solving**
 - o Play, inquiry, and problem solving; visualize; multiple strategies
- **Communicating and representing**
 - o Communicate in many ways; explain and justify; represent in concrete, pictorial, and symbolic forms; reflect on mathematical thinking
- **Connecting and reflecting**
 - o Reflect on thinking; connect mathematical concepts

CONTENT

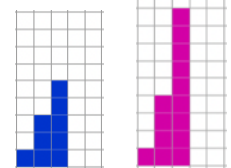
- **Grade 1**
 - o repeating patterns
 - o concrete graphs, using one-to-one correspondence
- **Grade 2**
 - o repeating and increasing patterns
 - o change in quantity, using pictorial and symbolic representation
 - o pictorial representation of concrete graphs, using one-to-one correspondence
- **Grade 3**
 - o increasing and decreasing patterns
 - o pattern rules using words and numbers, based on concrete experiences
 - o one-step addition and subtraction equations with an unknown number
 - o one-to-one correspondence with bar graphs, pictographs, charts, tables
- **Grade 4**
 - o increasing and decreasing patterns, using tables and charts
 - o algebraic relationships among quantities
 - o one-to-one correspondence, using bar graphs and pictographs
- **Grade 5**
 - o rules for increasing and decreasing patterns with words, numbers, symbols, and variables
- **Grade 6**
 - o increasing and decreasing patterns, using expressions, tables, and graphs as functional relationships
- **Grade 7**



4×5 or $N(N+1)$ $(4 \times 5)/2$ or $N(N+1)/2$

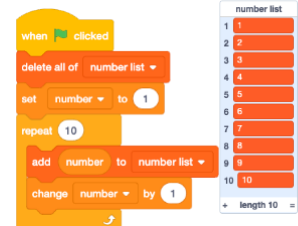


$(4 \times 5)/2$ or $N(N+1)/2$



Odds

Sums



```

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

```

- two-step equations with whole-number coefficients, constants, and solutions
- Cartesian coordinates and graphing
- **Grade 8**
 - expressions- writing and evaluating using substitution
 - two-step equations with integer coefficients, constants, and solutions
- **Grade 9**
 - two-variable linear relations, using graphing, interpolation, and extrapolation

4. Infinity Patterns (3-9)

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 $0.999\dots = 1$.

BIG IDEAS

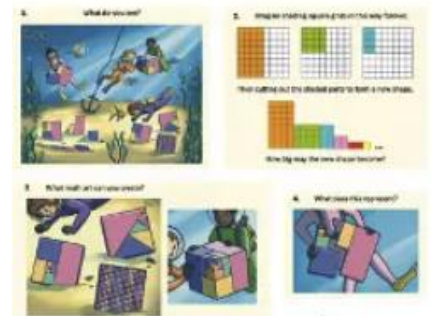
- Fractions and decimals are types of numbers that can represent quantities.
- Identified regularities in number patterns can be expressed in tables.
- Linear relations can be identified and represented using expressions with variables and line graphs and can be used to make generalizations.

CURRICULAR COMPETENCIES

- **Reasoning and analyzing**
 - o Reasoning; technology; modelling
- **Understanding and solving**
 - o Play, inquiry, and problem solving; visualize; multiple strategies
- **Communicating and representing**
 - o Communicate in many ways; explain and justify; represent in concrete, pictorial, and symbolic forms; reflect on mathematical thinking
- **Connecting and reflecting**
 - o Reflect on thinking; connect mathematical concepts

CONTENT

- **Grade 3**
 - o fraction concepts
 - o increasing and decreasing patterns
 - o pattern rules using words and numbers, based on concrete experiences
 - o one-step addition and subtraction equations with an unknown number
 - o one-to-one correspondence with bar graphs, pictographs, charts, tables
- **Grade 4**
 - o ordering and comparing fractions
 - o increasing and decreasing patterns, using tables and charts
 - o algebraic relationships among quantities
 - o one-to-one correspondence, using bar graphs and pictographs
- **Grade 5**
 - o equivalent fractions
 - o whole-number, fraction, and decimal benchmarks
 - o rules for increasing and decreasing patterns with words, numbers, symbols, and variables
- **Grade 6**
 - o increasing and decreasing patterns, using expressions, tables, and graphs as functional relationships
- **Grade 7**
 - o relationships between decimals, fractions, ratios, and percents



when clicked

delete all of SUMS

set sum to 0

set fraction to 1 / 2

repeat 10

change sum by fraction

add sum to SUMS

set fraction to fraction / 2

SUMS	
1	0.5
2	0.75
3	0.875
4	0.9375
5	0.96875
6	0.984375
7	0.9921875
8	0.99609375
9	0.998046875
10	0.9990234375
+ length 10 =	

```

1 SUM = 0
2 fraction = 1/2
3 for x in range(1,11):
4     SUM = SUM + fraction
5     fraction = fraction/2
6     print(SUM)

```

interval 10

squares 246745

guesses 821479

density 0.300367

when clicked

set interval to 10

set guesses to 0

set squares to 0

forever

set random number to pick random 1 to interval

if sign of random number = round sign of random number then

change squares by 1

set density to squares / guesses

change guesses by 1

- Cartesian coordinates and graphing
- **Grade 8**
 - operations with fractions
- **Grade 9**
 - operations with rational numbers (addition, subtraction, multiplication, division, and order of operations)

MATH TRAVELS, vol. 2, #5-8

Curriculum Correlation: British Columbia 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.

BIG IDEAS

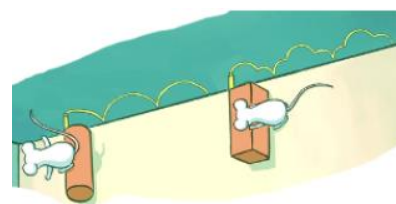
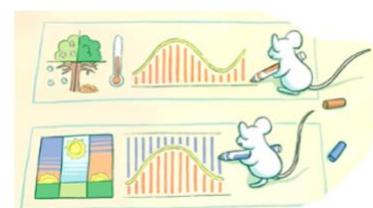
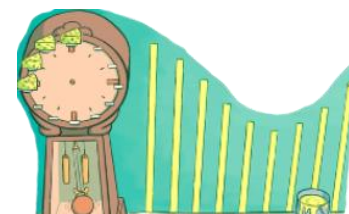
- Regular increases and decreases in patterns can be identified and used to make generalizations.
- Identified regularities in number patterns can be expressed in tables.
- Analyzing and interpreting experiments in data probability develops an understanding of chance.
- Analyzing the validity, reliability, and representation of **data** enables us to compare and interpret.

CURRICULAR COMPETENCIES

- **Reasoning and analyzing**
 - o Reasoning; technology; modelling
- **Understanding and solving**
 - o Play, inquiry, and problem solving; visualize; multiple strategies
- **Communicating and representing**
 - o Communicate in many ways; explain and justify; represent in concrete, pictorial, and symbolic forms; reflect on mathematical thinking
- **Connecting and reflecting**
 - o Reflect on thinking; connect mathematical concepts

CONTENT

- **Grade 3**
 - o increasing and decreasing patterns
 - o pattern rules using words and numbers, based on concrete experiences
 - o one-to-one correspondence with bar graphs and pictographs
 - o time concepts
 - o construction of 3D shapes
- **Grade 4**
 - o increasing and decreasing patterns, using tables and charts
 - o algebraic relationships among quantities
 - o one-to-one correspondence, using bar graphs and pictographs
 - o how to tell time with analog and digital clocks, using 12-and 24-hour clocks
- **Grade 5**



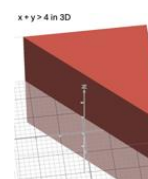
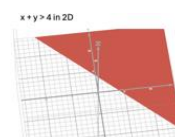
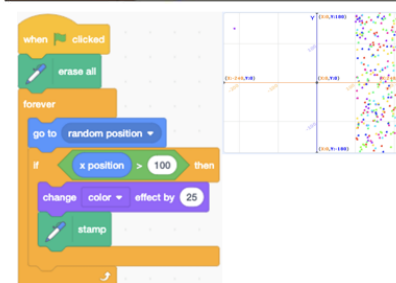
- rules for increasing and decreasing patterns with words, numbers, symbols, and variables
- **Grade 6**
 - increasing and decreasing patterns, using expressions, tables, and graphs as functional relationships
- **Grade 7**
 - Cartesian coordinates and graphing
- **Grade 8**
 - construction, views, and nets of 3D objects
- **Grade 9**
 - spatial proportional reasoning
 - statistics in society

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.



BIG IDEAS

- Addition and subtraction with numbers to 10 can be modelled concretely, pictorially, and symbolically to develop computational fluency.
- The regular change in increasing patterns can be identified and used to make generalizations.
- Identified regularities in number patterns can be expressed in tables.
- Linear relations can be identified and represented using expressions with variables and line graphs and can be used to make generalizations.

CURRICULAR COMPETENCIES

- **Reasoning and analyzing**
 - o Reasoning; technology; modelling
- **Understanding and solving**
 - o Play, inquiry, and problem solving; visualize; multiple strategies
- **Communicating and representing**
 - o Communicate in many ways; explain and justify; represent in concrete, pictorial, and symbolic forms; reflect on mathematical thinking
- **Connecting and reflecting**
 - o Reflect on thinking; connect mathematical concepts

CONTENT

- **Grade 1**
 - o ways to make 10
 - o concrete graphs, using one-to-one correspondence
 - o meaning of equality and inequality
- **Grade 2**
 - o addition and subtraction to 100
 - o symbolic representation of equality and inequality
 - o repeating and increasing patterns
 - o change in quantity, using pictorial and symbolic representation
- **Grade 3**
 - o increasing and decreasing patterns
 - o pattern rules using words and numbers, based on concrete experiences
 - o one-step addition and subtraction equations with an unknown number
 - o one-to-one correspondence with bar graphs, pictographs, charts, tables
- **Grade 4**
 - o increasing and decreasing patterns, using tables and charts

- algebraic relationships among quantities
- one-to-one correspondence, using bar graphs and pictographs
- **Grade 5**
 - rules for increasing and decreasing patterns with words, numbers, symbols, and variables
- **Grade 6**
 - increasing and decreasing patterns, using expressions, tables, and graphs as functional relationships
- **Grade 7**
 - two-step equations with whole-number coefficients, constants, and solutions
 - Cartesian coordinates and graphing
- **Grade 8**
 - expressions- writing and evaluating using substitution
 - two-step equations with integer coefficients, constants, and solutions
- **Grade 9**
 - two-variable linear relations, using graphing, interpolation, and extrapolation

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.

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



BIG IDEAS

- Objects and shapes have attributes that can be described, measured, and compared.
- Closed shapes have area and perimeter that can be described, measured, and compared using volume, area, perimeter, and angles.

CURRICULAR COMPETENCIES

- **Reasoning and analyzing**
 - o Reasoning; technology; modelling
- **Understanding and solving**
 - o Play, inquiry, and problem solving; visualize; multiple strategies
- **Communicating and representing**
 - o Communicate in many ways; explain and justify; represent in concrete, pictorial, and symbolic forms; reflect on mathematical thinking
- **Connecting and reflecting**
 - o Reflect on thinking; connect mathematical concepts



CONTENT

- **Grade 1**
 - o comparison of 2D shapes and 3D objects
- **Grade 2**
 - o multiple attributes of 2D shapes and 3D objects
- **Grade 3**
 - o construction of 3D shapes
- **Grade 4**
 - o regular and irregular polygons
- **Grade 5**
 - o classification of prisms
- **Grade 6**
 - o angle measurement and classification
- **Grade 8**
 - o construction, views, and nets of 3D objects
 - o surface area and volume of regular solids, including triangular and other right prisms and cylinders
- **Grade 9**
 - o spatial proportional reasoning

8. Sumerian Triples (7-9)

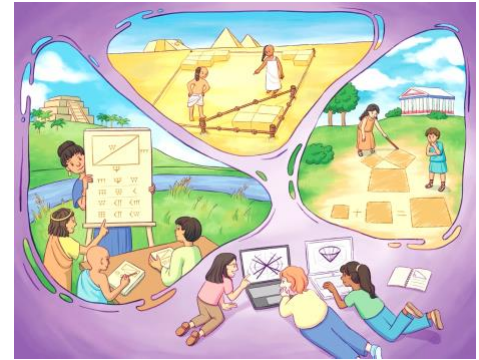
Students in **grades 7-9** investigate the concept, history and applications of the side relationship of right triangles, a.k.a. the Pythagorean Theorem ($a^2 + b^2 = c^2$), with references to the mathematics of ancient Sumer, Egypt and Greece.

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.

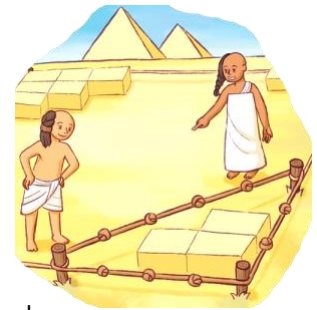


BIG IDEAS

- Computational fluency and flexibility with numbers extend to operations with integers and decimals.

CURRICULAR COMPETENCIES

- **Reasoning and analyzing**
 - o Reasoning; technology; modelling
- **Understanding and solving**
 - o Play, inquiry, and problem solving; visualize; multiple strategies
- **Communicating and representing**
 - o Communicate in many ways; explain and justify; represent in concrete, pictorial, and symbolic forms; reflect on mathematical thinking
- **Connecting and reflecting**
 - o Reflect on thinking; connect mathematical concepts



CONTENT

- **Grade 7**
 - o Cartesian coordinates and graphing
- **Grade 8**
 - o Pythagorean theorem
 - o construction, views, and nets of 3D objects

