

The Common Curriculum Framework

for

# K-12 MATHEMATICS

( 10-12 is under development )

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Western Canadian Protocol for Collaboration in Basic Education

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**GRADE 7**

JUNE 1995

## VI. GENERAL OUTCOMES, AND SPECIFIC OUTCOMES WITH ILLUSTRATIVE EXAMPLES (K–9)

This section elaborates on the general outcomes and specific outcomes by providing illustrative examples, by grade, for the K–9 program. Note that the specific outcomes and illustrative examples for the Grade 10 to Grade 12 program will be developed at a later date.

### CODING FOR ILLUSTRATIVE EXAMPLES (IEs)

The illustrative examples (IEs) listed on the following pages are organized by grade and have been correlated to specific outcomes (SOs). The coding used recognizes that IEs relating to more than one SO are listed before those relating to only one SO. Examples of the coding system are listed below.

1–4	Means that the IE relates to specific outcomes one through four in the subsection being addressed.
1, 3	Means that the IE relates to specific outcomes one and three in the subsection being addressed.
1, 3.1 1, 3.2	Means that the IEs relate to specific outcomes one and three in the subsection being addressed and that there are two of them.
6.1	Means that the IE relates to specific outcome six in the subsection being addressed.
4.1 4.2 4.3	Means that the IEs relate to specific outcome four in the subsection being addressed and that there are three of them.

Grade 7  
Strand: Number (Number Concepts)

Students will:

- use numbers to describe quantities
- represent numbers in multiple ways.

General Outcome	Specific Outcomes	Illustrative Examples
<p>Demonstrate a number sense for decimals and integers, including whole numbers.</p>	<p>1. Define and use power, base and exponent to represent repeated multiplication. [C, T, V]</p> <p>2. Write a whole number as:           <ul style="list-style-type: none"> <li>• an expanded numeral, using powers of 10</li> <li>• scientific notation, and vice versa. [C, CN, V]</li> </ul> </p> <p>3. Use divisibility rules to determine if a number is divisible by 2, 3, 4, 5, 6, 9, 10. [CN, R]</p> <p>4. Read and write numbers to any number of decimal places. [C, CN, V]</p>	<p>1.1 If the base-10 blocks represent the first four powers of ten, what will the first four powers of two look like? Use centicubes to construct 3-D models. Use your models to explain the shape and size of the fifth and sixth powers of 2. Sketch a diagram of the six models. Label the dimensions, and write the total number of centicubes used in each. How will models representing the powers of three be like the models you have sketched? How will they be different?</p> <p>1.2 Which is greater, <math>2^5</math>, or <math>5^2</math>? Explain your choice.</p> <p>2.1 The Sun has a diameter of about 1 382 400 km and is about 148 640 000 km from Earth. Write these numbers in the following two forms:           <ul style="list-style-type: none"> <li>– using expanded notation with powers of 10 and kilometres as units of length.</li> <li>– using scientific notation and kilometres as units of length.</li> </ul>           For what kind of numbers is the use of scientific notation most appropriate? How are the numbers affected, if metres are used as units of length?         </p> <p>2.2 The national debt of Canada in January 1995 was <math>5.46 \times 10^{11}</math> dollars. Express this in decimal notation.</p> <p>3.1 There are nine players on a baseball team. If 365 people showed up for a tournament, and teams were made up, would there be anyone left over?           <ul style="list-style-type: none"> <li>– Use a divisibility rule to decide without dividing.</li> <li>– Represent the 365 people with base-10 blocks and explain why the rule for 9 works. (Hint: how many groups of 9 are there in 100 and 10?)</li> </ul> </p> <p>3.2 A bag of marbles can be divided into equal parts among 2, 3, 4, 5 or 6 friends (with none left over). What is the smallest number of marbles the bag can contain?</p> <p>4.1 Carl saved his money and bought a mountain bike. His dad had given him \$179.49, which was half the cost of the bike. Carl wrote a cheque for the full cost. Show how he wrote the amount in words and in numbers on the cheque.</p>

Grade 7  
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Students will:

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General Outcome	Specific Outcomes	Illustrative Examples
<p>Demonstrate a number sense for decimals and integers, including whole numbers.</p>	<p>5. Demonstrate and describe equivalent mixed numbers and improper fractions concretely, pictorially and symbolically. [C, R, V]</p> <p>6. Compare and/or order improper fractions, mixed numbers and decimals to thousandths. [R, T, V]</p>	<p>4.2 At his garage sale, Bryan priced comic books at 20 for \$1.00. He wrote the price on each comic book as 0.05¢. Is this correct? Explain.</p> <p>4.3 Enter the following numbers on your calculator. After you enter each number, press +. Two and one hundred four thousandths. Seven hundred five and seven hundred five thousandths. Fourteen and one hundred fourteen ten thousandths. Your calculator should now read 721.8204.</p> <p>5.1 Hexagonal work tables can be separated into two half-tables that are trapezoidal in shape. Jamesie wants to make some work tables. He has 13 half-tables. How many work tables can he make? – Use pattern blocks to represent the trapezoidal and hexagonal tables and solve the problem. – Draw a diagram of your solution. – Use this model to explain how <math>\frac{13}{2}</math> can be written as a mixed number.</p> <p>5.2 A candy bar can be broken into six equivalent pieces. Zoe said she had <math>2\frac{4}{6}</math> of these candy bars. Does Zoe have enough one-sixth pieces so that she and her 12 friends can each have a one-sixth piece? Use a manipulative to model and solve the problem. Write <math>2\frac{4}{6}</math> as an improper fraction and explain your answer with the candy bar model.</p> <p>6.1 Explain how you could order the following numbers from least to greatest, using a number line with the benchmarks of <math>\frac{1}{2}</math> and 1.  <math>\frac{3}{7}, 1\frac{1}{3}, \frac{5}{9}, \frac{13}{12}, 1\frac{4}{9}</math></p> <p>6.2 Estimate the numerator of the fraction that satisfies: <math>0.45 &lt; \frac{\square}{8} &lt; 0.7</math>  Explain how you can use your calculator to verify your estimate.</p>

Grade 7  
Strand: Number (Number Concepts)

Students will:

- use numbers to describe quantities
- represent numbers in multiple ways.

General Outcome	Specific Outcomes	Illustrative Examples
<p>Demonstrate a number sense for decimals and integers, including whole numbers.</p>	<p>7. Recognize and illustrate that all fractions and mixed numbers can be represented in decimal form (include terminating and repeating decimals). [R, V]</p> <p>8. Convert from terminating decimals to fractions. [R]</p> <p>9. Convert from single-digit repeater (0.<math>\dot{3}</math>) decimal numbers to fractions, using patterns. [CN, R, V]</p>	<p>7.1 Juan was recording the results from probability experiments. The data were gathered as common fractions, but he wanted to write them in decimal form because it is easier to compare results that way. Whenever possible, he did it mentally, by finding an equivalent common fraction with a denominator that is a power of 10. Finish his work shown below. For which examples can you not use his mental method? Explain.</p> $\frac{3}{5} = \frac{6}{10} = 0.6 \quad \frac{13}{25} = ? \quad \frac{2}{3} = ? \quad \frac{5}{8} = ? \quad \frac{7}{12} = ? \quad \frac{13}{20} = ?$ <p>7.2 Sarah used her calculator to find the decimal equivalent for <math>\frac{1}{3}</math>. Show how she did this. Sarah then explained why the decimal repeats by trying to take <math>\frac{1}{3}</math> of a base-10 thousand block. First, she traded it for 10, hundred flats and made 3 sets of 300. She then took one of the sets and said, “So far, I have three flats or 0.3 of the block, but there is a hundred flat left over.” Can you finish the activity and explain why the decimal repeats?</p> <p>8.1 Sometimes it is useful to write decimals in common fraction form. For example, it may be easier to visualize <math>\frac{1}{4}</math> of a box of candy than 0.25 of a box. Show how you could write the following decimals as fractions in lowest terms. 0.245 1.62</p> <p>9.1 Bart used his calculator to express the following fractions as decimals:</p> $\frac{1}{9} = 0.111\dots$ $\frac{2}{9} = 0.222\dots$ $\frac{3}{9} = 0.333\dots$ <p>Predict the decimals for <math>\frac{4}{9}</math> and <math>\frac{7}{9}</math>. Predict what fraction will have 0.888... as a decimal. Check your predictions on your calculator. Can you explain the pattern in words?</p>

**Grade 7**  
**Strand: Number (Number Concepts)**

*Students will:*

- use numbers to describe quantities
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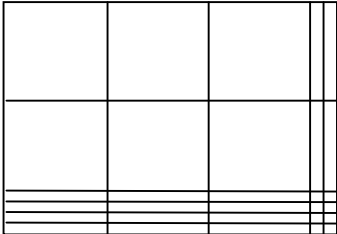
General Outcome	Specific Outcomes	Illustrative Examples
<p>Demonstrate a number sense for decimals and integers, including whole numbers.</p>	<p>10. Demonstrate, concretely and pictorially, that the sum of opposite integers is zero. [R, V]</p> <p>11. Represent integers in a variety of concrete, pictorial and symbolic ways. [R, V]</p> <p>12. Compare and order integers. [R, V]</p>	<p>10–11</p> <p>Play a game. Toss a red die and a green die together. For each toss, the red die shows how many points you win and the green die shows how many points you lose. Represent the points you win with red chips and the points you lose with green chips. If each point lost (green chip) can cancel a point won (red chip), show how you can find your score for each toss. How many ways could you get a score of zero (0)?</p> <p>12.1 Temperatures at a variety of places across Canada at 3:00 p.m. on a certain day were as follows: +8°C, -3°C, -7°C, 0°C, +3°C, -12°C, +10°C. Arrange the temperatures from lowest to highest.</p>

Grade 7

Strand: Number (Number Operations)

Students will:

- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

General Outcome	Specific Outcomes	Illustrative Examples
<p>Apply arithmetic operations on decimals and integers, and illustrate their use in solving problems.</p>	<p>13. Use patterns, manipulatives and diagrams to demonstrate the concepts of multiplication and division by a decimal. [CN, PS, R, V]</p> <p>14. Use estimation strategies to justify or assess the reasonableness of calculations. [E, PS]</p> <p>15. Add, subtract, multiply and divide decimals (for more than 2-digit divisors or multipliers, the use of technology is expected). [E, PS, T]</p>	<p>13.1 Revalue the base-10 blocks. For example, let the “flat” represent one. Then the “long” represents one tenth, and the “unit” represents one hundredth. The diagram below shows the multiplication <math>3.2 \times 2.4</math>.</p> <div style="text-align: center;"> <math display="block">\begin{array}{r} 3.2 \times 2.4 \\ 2.4 \end{array}</math>  </div> <p>Use base-10 blocks and this diagram to find the product and explain your procedure.</p> <p>13.2 Jacques bought 13.2 m of fabric to make table cloths. Each cloth takes 2.4 m of fabric. How many table cloths can he make? Use base-10 blocks to find the answer. Explain how your answer is related to the answer you get on your calculator.</p> <p>14–15.1 Liam bought 3 equally priced CDs and a tape priced at \$11.95. He paid \$71.20 in total. What was the cost of each CD? Before you calculate the exact answer, explain why it must be less than \$24.00.</p> <p>14–15.2 Apples cost \$1.39 per kilogram. If you have \$6.00, can you purchase a 3.75 kg bag of these apples? Explain how you could make an estimate to be sure, before you purchase the apples. Find the cost of the apples.</p>

Grade 7

Strand: Number (Number Operations)

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- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

General Outcome	Specific Outcomes	Illustrative Examples
<p>Apply arithmetic operations on decimals and integers, and illustrate their use in solving problems.</p>	<p>16. Add, subtract, multiply and divide integers concretely, pictorially and symbolically. [PS, V]</p> <p>17. Illustrate and explain the order of operations, using paper and pencil or a calculator. [PS, T, V]</p>	<p>16.1 Show how you can use two different coloured cubes to represent the following numbers, and combine them.</p> $+10 + -6$ $-4 + -7$ $-8 + +5$ <p>16.2 Calvin put equal numbers of white and black cubes in a container to make a neutral charge. He then put in 6 white cubes to make a charge of <math>-6</math>. From this container he removed four black cubes and wrote <math>-6 - +4 = -10</math>. Show why this is true and use a similar method to find:</p> $+5 - -2$ $-3 - -5$ $+7 - +6.$ <p>16.3 Hoang explained <math>+5 \times -2</math> as <u>putting</u> 5 groups of 2 white chips each <u>into</u> a container for a product of <math>-10</math>. He explained <math>-6 \times +4</math> as <u>taking</u> 6 groups of 4 black chips <u>out</u> of a neutral container for a product of <math>-24</math>. Using Hoang's reasoning, demonstrate and explain <math>-3 \times -5</math> and <math>+7 \times +6</math></p> <p>16.4 The temperature fell <math>2^{\circ}\text{C}</math> per hour for a total temperature change of <math>-10^{\circ}\text{C}</math>. How many hours did this take?</p> <p>16.5 Extend the following pattern, and describe the rule that is used. <math>-3, 6, -12, \dots</math></p> <p>17.1 Determine the missing operation signs so that the following statement is true.  <math>(7.4 \square 2.1) \square 14 = 1.11</math></p> <p>17.2 Place parentheses in the following equation to make it true.  <math>4 + 5 \times 3 - 8 = 19</math></p>

Grade. 7

Strand: Number (Number Operations)

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- demonstrate an understanding of and proficiency with calculations
- decide which arithmetic operation or operations can be used to solve a problem and then solve the problem.

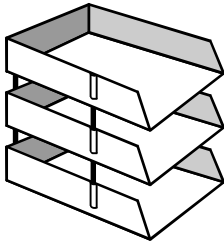
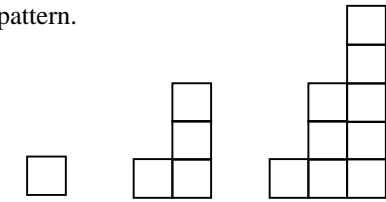
General Outcome	Specific Outcomes	Illustrative Examples												
<p>Illustrate the use of rates, ratios, percentages and decimals in solving problems.</p>	<p>18. Estimate and calculate percentages. [E, PS]</p> <p>19. Distinguish between rate and ratio, and use them to solve problems. [PS]</p> <p>20. Explain, demonstrate and use proportion in solving problems. [C, PS, V]</p> <p>21. Convert, mentally, among fractions, decimals and per cents to facilitate the solution of problems. [E, PS]</p>	<p>18.1 (Links to Data Analysis SO 7) Les Krantz, in his book called <i>What the Odds Are</i> found that men will suffer severe hair loss—baldness—by the time they reach the age ranges listed below:</p> <table border="1" data-bbox="1346 488 1561 667"> <tbody> <tr> <td>20–29</td> <td>1 in 5</td> </tr> <tr> <td>30–39</td> <td>3 in 10</td> </tr> <tr> <td>40–49</td> <td>2 in 5</td> </tr> <tr> <td>50–59</td> <td>1 in 2</td> </tr> <tr> <td>60–69</td> <td>2 in 3</td> </tr> <tr> <td>70–79</td> <td>3 in 4</td> </tr> </tbody> </table> <p>How many men in every hundred would you expect to have lost most of their hair by the time they reach these age ranges?            – 20 to 29                      – 40 to 49                      – 60 to 69            Predict the percentage of men between the ages of 80 to 89 who will be bald. Explain your reasoning for each prediction.</p> <p>18.2 You say that an increase from 5 to 20 is a 300% increase, then that means a decrease from 20 to 5 must be a 300% decrease. What is wrong with this reasoning?</p> <p>18.3 Almost 14% of Canada’s land surface is covered by wetlands. If Canada’s land surface is 1020 million hectares, how many hectares are covered by wetlands?</p> <p>19.1 Travelling from Saskatoon to Regina, a distance of 276 km, took 3 hours. What was the rate?</p> <p>20.1 Geela makes orange paint with 5 parts yellow to every 2 parts red. If she used 6 parts red, how many parts yellow would she need?</p> <p>20.2 Jenny read 26 pages in 2 hours. At that rate, how many pages would she read in 5 hours?</p> <p>21.1 25% of the 600 people at the basketball game were with the visiting team. Use mental mathematics to find how many people were with the visiting team.</p>	20–29	1 in 5	30–39	3 in 10	40–49	2 in 5	50–59	1 in 2	60–69	2 in 3	70–79	3 in 4
20–29	1 in 5													
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Grade 7

Strand: Patterns and Relations (Patterns)

Students will:

- use patterns to describe the world and to solve problems.

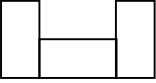

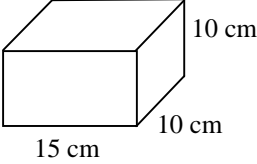
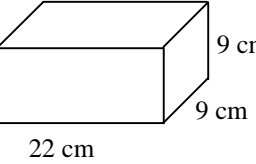
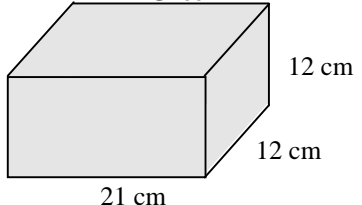
General Outcome	Specific Outcomes	Illustrative Examples
<p>Express patterns, including those used in business and industry, in terms of variables, and use expressions containing variables to make predictions.</p>	<p>1. Predict and justify possible <math>n</math>th values of a number pattern. [C, CN, R]</p>	<p>1, 5.1</p>  <p>Stacks of filing trays can be made by spacing the trays with riser rods. Four riser rods are needed for each space between the trays.</p> <p>How many riser rods are needed for a stack of:</p> <ul style="list-style-type: none"> <li>– 3 trays</li> <li>– 6 trays?</li> </ul> <p>Write a formula for the number of riser rods (<math>r</math>) in terms of the number of trays (<math>t</math>).</p> <p>1, 5.2</p> <p>Use cubes to copy and extend these hotels, according to the pattern up to the fifth hotel. Predict the total number of cubes needed for the 10th hotel, 25th hotel. Explain why.</p> <p>Develop a chart to record and reveal number patterns. Explain how your pattern grows. Write an open number expression to show your pattern.</p>  <p style="text-align: center;">Hotel 1      Hotel 2      Hotel 3</p>

Grade. 7

Strand: Patterns and Relations (Patterns)

Students will:

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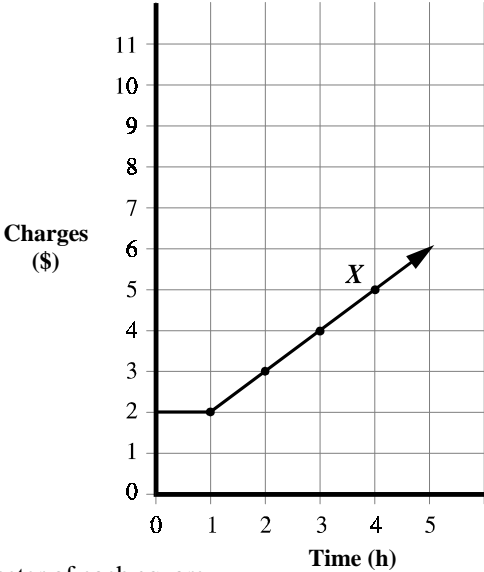
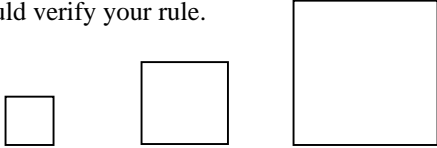
General Outcome	Specific Outcomes	Illustrative Examples
Express patterns, including those used in business and industry, in terms of variables, and use expressions containing variables to make predictions.		<p>1, 5.3</p> <p>Ms Fix would like to have a brick border for one side of her garden. She does not know yet which of the two basic patterns to choose: Classic or Modern.</p> <p>Classic </p> <p>Modern </p> <p>In order to make the brick border long enough, she has to repeat the basic pattern a number of times. The length of the side of the garden is 14.20 metres. At the brickyard, Ms Fix can choose from three different kinds of bricks.</p> <p><b>Yellow</b>  10 cm</p> <p><b>Red</b>  9 cm</p> <p><b>Green</b>  12 cm</p> <ul style="list-style-type: none"><li>- Write a letter to Ms Fix in which you explain to her what to do. Include in your letter what bricks she can buy, how many, and justify your solution to her design problem.</li><li>- Actually, Ms Fix wanted to have the Modern pattern, 25 times repeated along the side of her garden, but she cannot find bricks that she can use. What would be the dimensions of the brick she is looking for? Explain how you got your answer.</li><li>- Write a rule, or a formula, that Ms Fix can use to find out how many bricks she needs for any length of a border, and for any kind of brick. Explain how your rule, or formula, works.</li></ul>

Grade 7

Strand: Patterns and Relations (Patterns)

Students will:

- use patterns to describe the world and to solve problems.

General Outcome	Specific Outcomes	Illustrative Examples
<p>Express patterns, including those used in business and industry, in terms of variables, and use expressions containing variables to make predictions.</p>	<p>2. Interpolate and extrapolate number values from a given graph. [E, PS, V]</p> <p>3. Graph relations, analyze the result and draw a conclusion from a pattern. [R, V]</p> <p>4. Use patterns and relations to represent simple oral and written expressions as mathematical symbols, and vice versa. [CN, PS, R]</p>	<p>2.1 This graph shows how much Mitch charges to babysit. How can you find out how much he would get paid for <math>2\frac{1}{2}</math> h? Can you determine how much he would get for <math>\frac{1}{2}</math> h? Explain. Explain, in words, how Mitch gets paid. Estimate how much he would get paid for 6 h. Extend the graph to check your estimate. How long did he babysit, and how much did he earn at the point X?</p>  <p>3.1 Measure the sides of each of the squares provided. Find the perimeter of each square. Make a graph by plotting the length of the sides on the horizontal axis and the perimeters on the vertical axis. Describe the pattern in the graph. From the results of this graph, make a rule for finding the perimeter of a square. Explain how you could verify your rule.</p>  <p>4.1 When you double Daniel's age and add 10, you get his mother's age. Write a mathematics expression that shows his mother's age.</p> <p>4.2 If <math>d</math> represents the number of dogs in the park, what situation could <math>4d</math> represent? <math>d-3</math>?</p>

Grade 7

Strand: Patterns and Relations (Variables and Equations)

Students will:

- represent algebraic expressions in multiple ways.


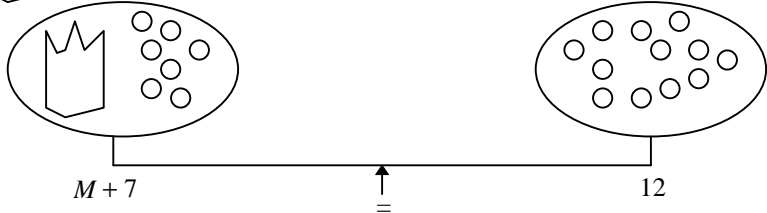
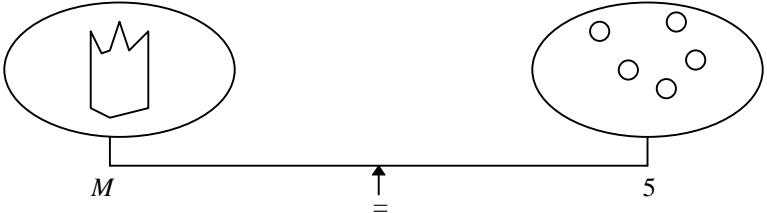
General Outcome	Specific Outcomes	Illustrative Examples
Use variables and equations to express, summarize and apply relationships as problem-solving tools in a restricted range of contexts.	<p>5. Write mathematical expressions that arise from problem-solving contexts. [C, CN, PS]</p> <p>6. Evaluate expressions with and without concrete models. [R, V]</p>	<p>5.1 An equal arm scale is balanced when there are three marbles on one pan and 410 g on the other. Write an equation to show this relationship.</p> <p>6.1 An expression for the mass of two cans and five marbles is <math>2c + 5m</math>. Find the total mass, if each can has a mass of 200 g and each marble a mass of 75 g.</p> <p>6.2 A formula for finding the perimeter of a rectangle is <math>P = 2(l + w)</math>. Find the perimeter when <math>l</math> is 8 cm and <math>w</math> is 6 cm.</p>

Grade 7

Strand: Patterns and Relations (Variables and Equations)

Students will:

- represent algebraic expressions in multiple ways.


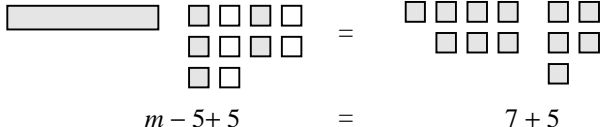
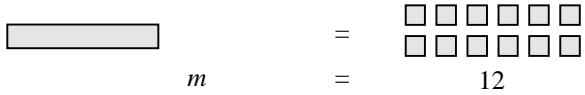
General Outcome	Specific Outcomes	Illustrative Examples
<p>Use variables and equations to express, summarize and apply relationships as problem-solving tools in a restricted range of contexts.</p>	<p>7. Illustrate the solution process for a one-step, single-variable, first-degree equation, using concrete materials or diagrams. [CN, PS, V]</p> <p>8. Solve and verify one-step linear equations, using a variety of techniques. [PS, R]</p>	<p>7-9.1</p> <p>Jill had some marbles in a bag. After Jay gave her 7 more, she had 12 marbles in all. How many marbles were in the bag?</p> <p>Jose wrote the equation <math>M + 7 = 12</math>. He used a balance scale model to solve it.</p> <p>Let  represent the marbles Jill originally had.</p>  <p>He took 7 marbles off each side.</p>  <p>Jill had 5 marbles in the bag.</p> <p>Illustrate Jose's method in solving the following problem: Bill had six books. Teruko gave him some more, and then he had 10 books. How many books did Teruko give Bill?</p>

Grade 7

Strand: Patterns and Relations (Variables and Equations)

Students will:

- represent algebraic expressions in multiple ways.

General Outcome	Specific Outcomes	Illustrative Examples
<p>Use variables and equations to express, summarize and apply relationships as problem-solving tools in a restricted range of contexts.</p>	<p>9. Explain how to solve simple problems, using informal algebraic methods. [C, PS, R]</p>	<p>7-9.2            Sharon had some money, she spent \$5 and then she had \$7 left. How much money did Sharon have to begin with? Ted wrote the equation <math>m - 5 = 7</math> and used algebra tiles to solve it.</p>  <p style="text-align: center;"><math>m - 5 = 7</math></p>  <p style="text-align: center;"><math>m - 5 + 5 = 7 + 5</math></p>  <p style="text-align: center;"><math>m = 12</math></p> <p>Sharon had \$12 to begin with.</p> <p>Use Ted's method to solve:            Barb had some sports cards. She sold six and then she had 10 left. How many did she have to start with?</p> <p>9.1 Nat had some stamps. He divided them into sets of six to put in his album. He made 17 sets. How many stamps did Nat have?</p>

Grade 7

Strand: Shape and Space (Measurement)

Students will:

- describe and compare everyday phenomena, using either direct or indirect measurement.

General Outcome	Specific Outcomes	Illustrative Examples																
<p>Solve problems involving the properties of circles and their connections with angles and time zones.</p>	<p>1. Measure the diameters, radii and circumferences of circles, and establish the relationships among them. [CN, R]</p> <p>2. Solve problems involving the radii, diameters and circumferences of circles. [PS, T]</p> <p>3. Explain how time zones are determined. [C, PS]</p>	<p>1.1 Gunther gathered a variety of circular objects, such as container lids and wheels. For each object, he measured the diameter with calipers and the circumference with a tape measure. He started making this chart:</p> <table border="1" data-bbox="1233 500 2349 711"> <thead> <tr> <th>Object</th> <th>Diameter (cm)</th> <th>Circumference (cm)</th> <th>Relationship between Diameter and Circumference</th> </tr> </thead> <tbody> <tr> <td>nut can lid</td> <td></td> <td></td> <td></td> </tr> <tr> <td>bicycle wheel</td> <td></td> <td></td> <td></td> </tr> <tr> <td>oat meal container</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>He noticed a pattern in how the two measures for each object were related. Estimate the relationship between diameter and circumference. Test it by measuring the diameter of another object and predicting the circumference before measuring it. Use your calculator to find the relationship in each case. Make a rule that relates the diameter and circumference of a circle.</p> <p>2.1 Elena is making a tablecloth for a round table with a diameter of 90 cm. She wants an overhang of 10 cm. What length of fringe must she buy to decorate the edge of the tablecloth?</p> <p>2.2 The point on the minute hand of a clock travels 132 cm each hour. How long is the minute hand?</p> <p>2.3 If my bicycle wheel is 70 cm in diameter, how far can I go in one revolution? In 10 revolutions? The radius of the wheel on my little brother's bike is 20 cm. How far does he go in one revolution?</p> <p>3.1 Investigate how time zones are determined. Write some questions you want answered, and decide where you can get the information you need. (You may use school or community libraries or computer searches, for example.) Make a report on your findings.</p>	Object	Diameter (cm)	Circumference (cm)	Relationship between Diameter and Circumference	nut can lid				bicycle wheel				oat meal container			
Object	Diameter (cm)	Circumference (cm)	Relationship between Diameter and Circumference															
nut can lid																		
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oat meal container																		

**Grade 7**

**Strand: Shape and Space (Measurement)**

*Students will:*

- describe and compare everyday phenomena, using either direct or indirect measurement.

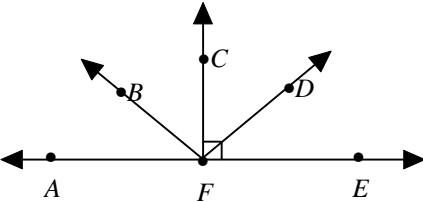
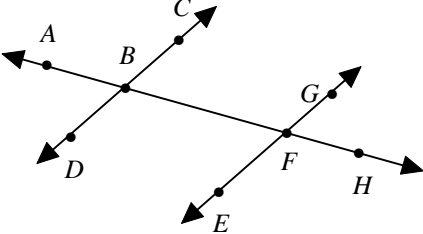
<b>General Outcome</b>	<b>Specific Outcomes</b>	<b>Illustrative Examples</b>
Solve problems involving the properties of circles and their connections with angles and time zones.	4. Research and report how measurement instruments are used in the community. [C, CN]	3.2 Look at a map that shows the time zones in Canada. Why are the actual zones not all evenly spaced? 3.3 If you left Vancouver at 8:25 a.m. (Pacific Time) and arrived in Winnipeg at 1:40 p.m. (Central Time), how long was your flight? 4.1 Make arrangements to visit businesses and services in your community. Prepare questions about how the people use measurement. Be sure to consider all types of measure: linear, volume, capacity, area, mass, time, angles, money. Look for common and unique measures and processes of measuring. Make a report on your findings.

Grade 7

Strand: Shape and Space (3-D Objects and 2-D Shapes)

Students will:

- describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

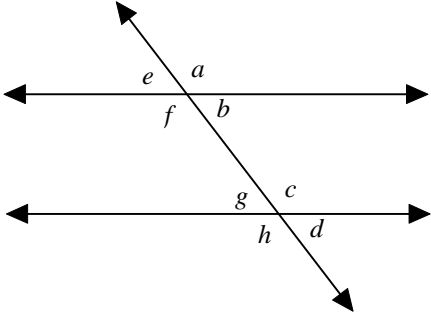
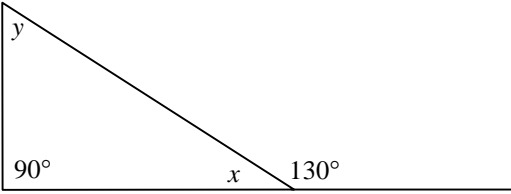
General Outcome	Specific Outcomes	Illustrative Examples
<p>Link angle measures to the properties of parallel lines.</p>	<p>5. Measure and classify pairs of angles as complementary or supplementary angles. [E]</p> <p>6. Investigate, identify and name pairs of angles pertaining to parallel lines and transversals, including:</p> <ul style="list-style-type: none"> <li>• corresponding</li> <li>• vertically opposite</li> <li>• interior on the same side of the transversal</li> <li>• exterior on the same side of the transversal</li> <li>• alternate angles.</li> </ul> <p>[C, V]</p>	<p>5.1 In the diagram below, name a pair of complementary angles and a pair of supplementary angles.</p>  <p>5.2 Explain what is meant by complementary angles and supplementary angles, by drawing a pair of each.</p> <p>6.1 In the diagram below, name pairs of angles that are:</p> <ul style="list-style-type: none"> <li>– corresponding</li> <li>– vertically opposite</li> <li>– interior on the same side of the transversal</li> <li>– exterior on the same side of the transversal</li> <li>– interior alternate.</li> </ul> 

Grade 7

Strand: Shape and Space (3-D Objects and 2-D Shapes)

Students will:

- describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

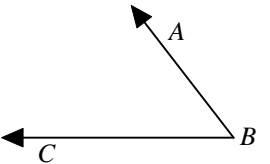
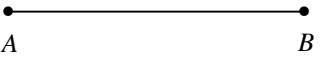
General Outcome	Specific Outcomes	Illustrative Examples
<p>Link angle measures to the properties of parallel lines.</p>	<p>7. Describe the relationships between the pairs of angles pertaining to parallel lines and transversals. [C, R, T]</p> <p>8. Explain, in more than one way, why the sum of the measures of the angles of a triangle is <math>180^\circ</math>. [C, R, T]</p> <p>9. Use mathematical reasoning to determine the measures of angles in a diagram. [R, V]</p>	<p>7, 9 If <math>a</math> is <math>100^\circ</math>, calculate the measures of each of the other angles. Justify each calculation.</p>  <p>8.1 Myra drew several triangles of different sizes and shapes and cut them out. She marked the vertices and cut off the three vertices of each triangle. Make some triangles like Myra's, and explain how you can use the three vertices from each triangle to show that their sum is <math>180^\circ</math>.</p> <p>9.1 Find the measures of the indicated angles in the diagram below.</p> 

Grade 7

Strand: Shape and Space (3-D Objects and 2-D Shapes)

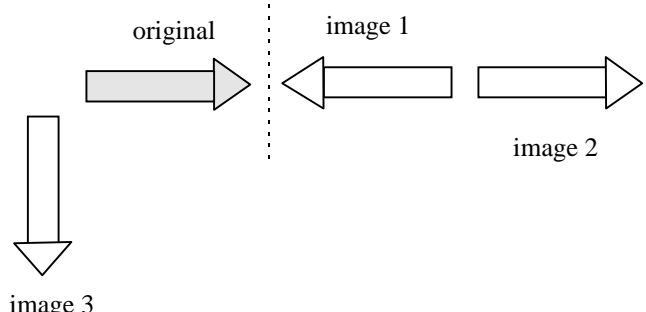

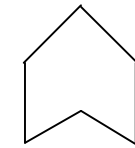
Students will:

- describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

General Outcome	Specific Outcomes	Illustrative Examples
Link angle measures to the properties of parallel lines.	10. Construct angle bisectors and perpendicular bisectors. [R, T, V]	<p>10.1 Construct the bisector of <math>\angle ABC</math>.</p>  <p>10.2 Construct the perpendicular bisector of the line segment <math>AB</math>.</p> 

Grade 7  
 Strand: Shape and Space (Transformations)  
 Students will:

- perform, analyze and create transformations.

General Outcome	Specific Outcomes	Illustrative Examples
<p>Create and analyze patterns and designs, using congruence, symmetry, translation, rotation and reflection.</p>	<p>11. Create, analyze and describe designs, using translations (slides), rotations (turns) and reflections (flips). [C, T, V]</p>	<p>11–12          The picture below shows three images of an arrow. Identify each transformation and explain how the image is the same and how it is different from the original figure.</p>  <p>11.1 Make a design by drawing this figure on paper and then making six slide images of the figure.</p>  <p>Describe the direction and length of each slide motion so that someone else, given the same figure, can replicate your design.</p> <p>11.2 Make a design by drawing this figure on paper and then making four turn images of the figure.</p>  <p>Describe the turn centre, direction and degree of each turn so someone else, given the same figure, can replicate your design.</p>



Grade 7  
 Strand: Shape and Space (Transformations)

*Students will:*

- perform, analyze and create transformations.

General Outcome	Specific Outcomes	Illustrative Examples
<p>Create and analyze patterns and designs, using congruence, symmetry, translation, rotation and reflection.</p>	<p>14. Relate reflections to lines and planes of symmetry. [CN, V]</p>	<p>14.1 Draw in and label the line(s) of symmetry.</p> <div data-bbox="1292 467 1548 634" data-label="Image"> </div> <p>14.2 Use a miraboard to show that a square has four lines of symmetry, but other rectangles have only two.</p> <p>14.3 Ardith made a sphere with molding clay. She cut the sphere in half with a knife and placed a sheet of paper between the pieces to represent a plane of symmetry. Make a cube with molding clay and explain how you can show planes of symmetry.</p>

**Grade 7**

**Strand: Statistics and Probability (Data Analysis)**

*Students will:*

- collect, display and analyze data to make predictions about a population.

General Outcome	Specific Outcomes	Illustrative Examples
<p>Develop and implement a plan for the collection, display and analysis of data, using measures of variability and central tendency.</p>	<ol style="list-style-type: none"> <li>1. Formulate questions for investigation, from a real-world context. [C, CN, R]</li> <li>2. Select, defend and use appropriate methods of collecting data:               <ul style="list-style-type: none"> <li>• designing and using questionnaires</li> <li>• interviews</li> <li>• experiments</li> <li>• research.</li> </ul>               [C, PS, T]             </li> <li>3. Describe issues to be considered when collecting data; e.g., appropriate language, ethics, cost, privacy, cultural sensitivity. [C, CN, R]</li> <li>4. Display data by hand or by computer in a variety of ways, including circle graphs. [C, T, V]</li> </ol>	<p>1–4 Design a questionnaire containing five questions to obtain information you would like from your classmates. Have at least one question to collect numerical data. Survey 10 students, keeping track of the results. Complete the survey by giving the questionnaire to the remainder of the students. Compare your results from the first 10 with those from a survey of all Grade 7s, using the same questionnaire. What may account for any differences or similarities? Enter the data into a database, after setting up the necessary categories. Use some of the features of the database to output two or three different reports, using a variety of the information collected. Enter the numerical data into a spreadsheet and have the computer generate two or three different types of graphs. Which graph is most effective in displaying the information. Why? What conclusions can you draw from the data collected?</p> <p>1–3 For each of these questions:</p> <ul style="list-style-type: none"> <li>– Is there a relationship between wrist circumference and height?</li> <li>– Does smoking cause lung cancer?</li> <li>– Does pet ownership enhance the quality of life for senior citizens?</li> </ul> <p>Explain what would be the most appropriate methods for collecting data. Identify potential ethical problems, need for sensitivity to personal and cultural beliefs, and cost when designing questions and collecting data.</p> <p>4–8 Estimate how many minutes it took you to get to school this morning. Share this time with other members of your class. Collect and display the data appropriately. Defend your choices for collection and display. Determine the median time, calculate the mean time, and determine if there is a mode for the data. Are these measures of central tendency similar? Examine the data to determine and discuss the distribution.</p> <ul style="list-style-type: none"> <li>– Are there any extremely long or short times?</li> <li>– What factors; e.g., traffic, roads, method of travel, might account for extreme times, gaps or clusters?</li> </ul> <p>Could you use this information to predict what time most students leave for school in the morning?</p> <ul style="list-style-type: none"> <li>– For what reason could this information be important?</li> </ul>

Grade 7

Strand: Statistics and Probability (Data Analysis)

Students will:

- collect, display and analyze data to make predictions about a population.

General Outcome	Specific Outcomes	Illustrative Examples
<p>Develop and implement a plan for the collection, display and analysis of data, using measures of variability and central tendency.</p>	<p>5. Read and interpret graphs. [C, E, PS, R]</p> <p>6. Determine measures of central tendency for a set of data:</p> <ul style="list-style-type: none"> <li>• mode</li> <li>• median</li> <li>• mean.</li> </ul> <p>[PS]</p>	<p>4-7 It is well known that <math>6 + 6 = 12</math>, but does one 12-sided die equal two 6-sided dice when they are thrown a number of times?            Throw a 12-sided die 50 times, and record the results in a suitable chart.            Throw a pair of 6-sided dice 50 times, and record the results in a second chart. The result to be recorded is the total of the two numbers appearing on the top faces.            Graph the results. Answer the following questions.</p> <ul style="list-style-type: none"> <li>- Which die (12-sided or pair of 6-sided) gives the higher average score?</li> <li>- Are the shapes of the graphs the same or different for the two experiments?</li> </ul> <p>4, 5 Keep a record of all your activities in a typical school day (24 h). Decide on categories for which the activities can be reported in number of hours (sleeping is an activity).            Make a circle graph to show your typical school day.            Share and compare graphs with other students. How can someone else's graph be useful to you?</p> <p>5.1 Find some graphs in your local newspaper. Working in a group, discuss the following questions.</p> <ul style="list-style-type: none"> <li>- Does the data give the information indicated?</li> <li>- Is the type of graph appropriate for the data?</li> <li>- Have scales, pictures or data groupings been selected to distort data?</li> <li>- Does the graph present data clearly? Is it visually appealing?</li> </ul> <p>6.1 One measure of central tendency for a set of five numbers is 23. What might the numbers be? Find an example for each measure of central tendency.</p>

**Grade 7**

**Strand: Statistics and Probability (Data Analysis)**

*Students will:*

- collect, display and analyze data to make predictions about a population.

General Outcome	Specific Outcomes	Illustrative Examples																				
<p>Develop and implement a plan for the collection, display and analysis of data, using measures of variability and central tendency.</p>	<p>7. Determine measures of the distribution of a set of data:</p> <ul style="list-style-type: none"> <li>• range</li> <li>• extremes, gaps and clusters</li> <li>• quartiles.</li> </ul> <p>[PS]</p> <p>8. Interpolate from data to make predictions. [E, PS, R]</p>	<p>6.2 Four students were going on a camping trip. They agreed to share the weight of all their supplies evenly but could not agree what fair loads would be. They weighed all their materials. Here is what they recorded.</p> <table data-bbox="1220 500 1919 662"> <tr> <td>Tent</td> <td>7.0 kg</td> <td>Utensils</td> <td>2.2 kg</td> </tr> <tr> <td>Guitar</td> <td>5.3 kg</td> <td>Charcoal</td> <td>4.0 kg</td> </tr> <tr> <td>Axe</td> <td>2.75 kg</td> <td>Hammock</td> <td>3.5 kg</td> </tr> <tr> <td>Camp stove</td> <td>2.75 kg</td> <td>Food</td> <td>4.75 kg</td> </tr> <tr> <td>Four sleeping bags</td> <td>1.75 kg (each)</td> <td></td> <td></td> </tr> </table> <p>How close can you come to four fair loads?</p> <p>8.1 Collect data on the population of your school over the last 10 years. Graph the information. What would you predict the school population will be in six years? What trends do you see in the population? Can you suggest any reasons for these trends? Would enrollment figures suggest a need to increase the size of your school facility in the next ten years? Why or why not?</p>	Tent	7.0 kg	Utensils	2.2 kg	Guitar	5.3 kg	Charcoal	4.0 kg	Axe	2.75 kg	Hammock	3.5 kg	Camp stove	2.75 kg	Food	4.75 kg	Four sleeping bags	1.75 kg (each)		
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Grade 7

Strand: Statistics and Probability (Chance and Uncertainty)

Students will:

- use experimental or theoretical probability to represent and solve problems involving uncertainty.

General Outcome	Specific Outcomes	Illustrative Examples
Create and solve problems, using probability.	<p>9. Use a table to identify all possible outcomes of two independent events. [PS, R]</p> <p>10. Create and solve problems, using the numerical definition of probability as favourable outcomes divided by possible outcomes. [PS, R]</p>	<p>9, 10 For a picnic, Rosanna prepared some ham, some chicken and some cheese sandwiches. She also wrapped pieces of apple and cherry pie. Pauloosi picked a sandwich and a piece of pie. Make a table to show all the possible combinations of sandwich and pie that Pauloosi could have picked. Rosanna prepared 5 ham sandwiches, 6 chicken sandwiches and 4 cheese sandwiches. Pauloosi's favourite sandwich is chicken. If he chooses a sandwich without looking, what is the probability that it is chicken?</p> <p>9.1 Using a regular six-sided die and a coin, list all possible outcomes, if they are tossed together. How many possible outcomes are there?</p> <p>10.1 In pairs, draw a card from a deck of playing cards and record its value, regardless of the suit. Replace the card and draw again, recording the results. After doing this experiment 20 times, calculate the probability of drawing a jack from a standard deck of cards. Compare your results with another pair. Calculate the probability of drawing a jack based on the combined results of the class. Compare the results from your pair with those of the class. Calculate the theoretical probability of drawing a jack from a regular deck of cards and compare it to the experimental results.</p>

Grade 7

Strand: Statistics and Probability (Chance and Uncertainty)

Students will:

- use experimental or theoretical probability to represent and solve problems involving uncertainty.

General Outcome	Specific Outcomes	Illustrative Examples																																										
<p>Create and solve problems, using probability.</p>	<p>11. Use the Monte Carlo simulation method to solve probability problems. [CN, E, PS, T]</p>	<p>11.1 A breakfast cereal company has randomly placed one of four prizes in each cereal box it manufactures. How many cereal boxes need to be purchased in order to be sure you will collect at least one of each prize. In order to use the Monte Carlo method to answer this question, use a spinner with four, 90° sectors or a four-sided die and complete a chart like the following to document the number of spins/throws required to get at least one of each 1, 2, 3 or 4, which represent each prize.</p> <table border="1" data-bbox="1225 594 2185 1008"> <thead> <tr> <th>Trial</th> <th>Prize 1</th> <th>Prize 2</th> <th>Prize 3</th> <th>Prize 4</th> <th>Total Spins/Throws</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>    </td> <td>   </td> <td>    </td> <td> </td> <td>12</td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>...</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>In Trial 1, there were 12 spins/throws required to get at least one tally mark in each column. This would imply that 12 boxes of cereal would need to be purchased in order to get at least one of each size. Try some more trials so you can answer the question.</p>	Trial	Prize 1	Prize 2	Prize 3	Prize 4	Total Spins/Throws	1					12	2						3						4						5						...					
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