

# **Appendix:**

## **Outcomes with Achievement Indicators Organized by Strand**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<b>Strand:</b> Number	<b>General Outcome:</b> Develop number sense
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following sets of indicators help determine whether students have met the corresponding specific outcome.</i>
8N1 Demonstrate an understanding of perfect square and square root, concretely, pictorially and symbolically (limited to whole numbers). [C, CN, R, V]	8N1.1 Represent a given perfect square as a square region using materials, such as grid paper or square shapes. 8N1.2 Determine whether or not a given number is a perfect square using materials and strategies, such as square shapes, grid paper or prime factorization, and explain the reasoning. 8N1.3 Determine the factors of a given perfect square, and explain why one of the factors is a square root and the others are not. 8N1.4 Determine a square root of a given perfect square and record it symbolically. 8N1.5 Determine the square of a given number.
8N2 Determine the approximate square root of numbers that are not perfect squares (limited to whole numbers). [C, CN, ME, R, T]	8N2.1 Estimate, or approximate, a square root of a given number that is not a perfect square using the roots of perfect squares as benchmarks. 8N2.2 Identify a whole number whose square root lies between two given numbers. 8N2.3 Approximate a square root of a given number that is not a perfect square using technology, e.g., calculator, computer. 8N2.4 Explain why a square root of a number shown on a calculator may be an approximation.
8N3 Demonstrate an understanding of percents greater than or equal to 0%. [CN, PS, R, V]	8N3.1 Provide a context where a percent may be more than 100% or between 0% and 1%. 8N3.2 Represent a given fractional percent using grid paper. 8N3.3 Represent a given percent greater than 100 using grid paper. 8N3.4 Determine the percent represented by a given shaded region on a grid and record it in decimal, fractional and percent form. 8N3.5 Express a given percent in decimal or fractional form. 8N3.6 Express a given decimal in percent or fractional form. 8N3.7 Express a given fraction in decimal or percent form. 8N3.8 Solve a given problem involving percents. 8N3.9 Solve a given problem involving combined percents. 8N3.10 Solve a given problem that involves finding the percent of a percent.

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Specific Outcomes <i>It is expected that students will:</i>	Achievement Indicators <i>The following sets of indicators help determine whether students have met the corresponding specific outcome.</i>
8N4 Demonstrate an understanding of ratio and rate. [C, CN, V]	8N4.1 Express a two-term ratio from a given context in the forms 3:5 or 3 to 5. 8N4.2 Express a three-term ratio from a given context in the forms 4:7:3 or 4 to 7 to 3. 8N4.3 Express a part-to-part ratio as a part-to-whole fraction. 8N4.4 Identify and describe ratios from real-life examples, and record them symbolically. 8N4.5 Express a given ratio as a percent. 8N4.6 Express a given rate using words or symbols, e.g., 20 L per 100 km or 20 L/100 km. 8N4.7 Identify and describe rates from real-life examples, and record them symbolically. 8N4.8 Explain why a rate cannot be represented as a percent.
8N5 Solve problems that involve rates, ratios and proportional reasoning. [C, CN, PS, R]	8N5.1 Explain the meaning of $\frac{a}{b}$ within a given context. 8N5.2 Provide a context in which $\frac{a}{b}$ represents a: <ul style="list-style-type: none"> <li>• fraction</li> <li>• rate</li> <li>• ratio</li> <li>• quotient</li> <li>• probability.</li> </ul> 8N5.3 Solve a given problem involving ratio. 8N5.4 Solve a given problem involving rate.

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Specific Outcomes <i>It is expected that students will:</i>	Achievement Indicators <i>The following set of indicators help determine whether students have met the corresponding specific outcome.</i>
8N6 Demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially and symbolically. [C, CN, ME, PS]	8N6.1 Model multiplication of a positive fraction by a whole number concretely or pictorially and record the process. 8N6.2 Model multiplication of a positive fraction by a positive fraction concretely or pictorially using an area model and record the process. 8N6.3 Provide a context that requires the multiplication of two given positive fractions. 8N6.4 Estimate the product of two given positive proper fractions to determine if the product will be closer to 0, $\frac{1}{2}$ or 1. 8N6.5 Generalize and apply rules for multiplying positive proper fractions, including mixed numbers. 8N6.6 Model division of a whole number and a positive proper fraction, concretely or pictorially and record the process. 8N6.7 Model division of a positive proper fraction by a positive proper fraction pictorially and record the process. 8N6.8 Estimate the quotient of two given positive fractions and compare the estimate to whole number benchmarks. 8N6.9 Generalize and apply rules for dividing positive proper fractions. 8N6.10 Model, generalize and apply rules for dividing fractions with mixed numbers. 8N6.11 Provide a context that requires the dividing of two given positive fractions. 8N6.12 Identify the operation required to solve a given problem involving positive fractions.

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Specific Outcomes <i>It is expected that students will:</i>	Achievement Indicators <i>The following set of indicators help determine whether students have met the corresponding specific outcome.</i>
8N7 Demonstrate an understanding of multiplication and division of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V]	8N7.1 Model the process of multiplying two integers using concrete materials or pictorial representations and record the process. 8N7.2 Generalize and apply a rule for determining the sign of the product of integers. 8N7.3 Provide a context that requires multiplying two integers. 8N7.4 Solve a given problem involving the multiplication of integers. 8N7.5 Model the process of dividing an integer by an integer using concrete materials or pictorial representations and record the process. 8N7.6 Generalize and apply a rule for determining the sign of the quotient of integers. 8N7.7 Provide a context that requires dividing two integers. 8N7.8 Solve a given problem involving the division of integers (2-digit by 1-digit) without the use of technology. 8N7.9 Solve a given problem involving the division of integers (2-digit by 2-digit) with the use of technology. 8N7.10 Identify the operation required to solve a given problem involving integers. 8N7.11 Solve a given problem involving integers taking into consideration order of operations.

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<b>Strand:</b> Patterns and Relations (Patterns)	<b>General Outcome:</b> Use patterns to describe the world and solve problems.
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following set of indicators help determine whether students have met the corresponding specific outcome.</i>
8PR1 Graph and analyze two-variable linear relations. [C, ME, PS, R, T, V]	8PR1.1 Create a table of values by substituting values for a variable in the equation of a given linear relation. 8PR1.2 Determine the missing value in an ordered pair for a given equation. 8PR1.3 Construct a graph from the equation of a given linear relation (limited to discrete data). 8PR1.4 Describe the relationship between the variables of a given graph.

<b>Strand:</b> Patterns and Relations (Variables and Equations)	<b>General Outcome:</b> Represent algebraic expressions in multiple ways.
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following set of indicators help determine whether students have met the corresponding specific outcome.</i>
8PR2 Model and solve problems using linear equations of the form: <ul style="list-style-type: none"> <li>• <math>ax = b</math></li> <li>• <math>\frac{x}{a} = b, a \neq 0</math></li> <li>• <math>ax + b = c</math></li> <li>• <math>\frac{x}{a} + b = c, a \neq 0</math></li> <li>• <math>a(x + b) = c</math></li> </ul> concretely, pictorially and symbolically, where $a, b$ and $c$ are integers. [C, CN, PS, V]	8PR2.1 Model a given problem with a linear equation and solve the equation using concrete models. 8PR2.2 Draw a visual representation of the steps used to solve a given linear equation and record each step symbolically. 8PR2.3 Verify the solution to a given linear equation using a variety of methods, including concrete materials, diagrams and substitution. 8PR2.4 Solve a given linear equation symbolically. 8PR2.5 Apply the distributive property to solve a given linear equation, e.g., $2(x + 3) = 5; 2x + 6 = 5; \dots$ 8PR2.6 Identify and correct an error in a given incorrect solution of a linear equation. 8PR2.7 Solve a given problem using a linear equation and record the process.

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Strand: Shape and Space (Measurement)	General Outcome: Use direct or indirect measurement to solve problems.
Specific Outcomes <i>It is expected that students will:</i>	Achievement Indicators <i>The following sets of indicators help determine whether students have met the corresponding specific outcome.</i>
8SS1 Develop and apply the Pythagorean theorem to solve problems. [CN, PS, R, T, V]	8SS1.1 Model and explain the Pythagorean theorem concretely, pictorially or using technology. 8SS1.2 Determine the measure of the third side of a right triangle, given the measures of the other two sides, to solve a given problem. 8SS1.3 Explain, using examples, that the Pythagorean theorem applies only to right triangles. 8SS1.4 Determine whether or not a given triangle is a right triangle by applying the Pythagorean theorem. 8SS1.5 Solve a given problem that involves Pythagorean triples, e.g., 3, 4, 5 or 5, 12, 13.
8SS2 Draw and construct nets for 3-D objects. [C, CN, PS, V]	8SS2.1 Match a given net to the 3-D object it represents. 8SS2.2 Draw nets for a given right circular cylinder, right rectangular prism and right triangular prism, and verify by constructing the 3-D objects from the nets. 8SS2.3 Predict 3-D objects that can be created from a given net and verify the prediction. 8SS2.4 Construct a 3-D object from a given net.
8SS3 Determine the surface area of: <ul style="list-style-type: none"> <li>• right rectangular prism</li> <li>• right triangular prism</li> <li>• right cylinders</li> </ul> to solve problems. [C, CN, PS, R, V]	8SS3.1 Identify all the faces of a given prism, including right rectangular and right triangular prisms. 8SS3.2 Explain, using examples, the relationship between the area of 2-D shapes and the surface area of a given 3-D object. 8SS3.3 Describe and apply strategies for determining the surface area of a given right rectangular or right triangular prism. 8SS3.4 Describe and apply strategies for determining the surface area of a given right cylinder. 8SS3.5 Solve a given problem involving surface area.
8SS4 Develop and apply formulas for determining the volume of right prisms and right cylinders. [C, CN, PS, R, V]	8SS4.1 Determine the volume of a given right prism, given the area of the base. 8SS4.2 Generalize and apply a rule for determining the volume of right cylinders. 8SS4.3 Explain the connection between the area of the base of a given 3-D object and the formula for the volume of the object. 8SS4.4 Demonstrate that the orientation of a given 3-D object does not affect its volume. 8SS4.5 Apply a formula to solve a given problem involving the volume of a right cylinder or a right prism.

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<b>Strand:</b> Shape and Space (3-D Objects and 2-D Shapes)	<b>General Outcome:</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following set of indicators help determine whether students have met the corresponding specific outcome.</i>
8SS5 Draw and interpret top, front and side views of 3-D objects composed of right rectangular prisms. [C, CN, R, T, V]	8SS5.1 Draw and label the top, front and side views for a given 3-D object on isometric dot paper. 8SS5.2 Compare different views of a given 3-D object to the object. 8SS5.3 Predict the top, front and side views that will result from a described rotation (limited to multiples of 90 degrees) and verify the prediction. 8SS5.4 Draw and label the top, front and side views that result from a given rotation (limited to multiples of 90 degrees). 8SS5.5 Build a 3-D block object, given the top, front and side views, with or without the use of technology. 8SS5.6 Sketch and label the top, front and side views of a 3-D object in the environment with or without the use of technology.

<b>Strand:</b> Shape and Space (Transformations)	<b>General Outcome:</b> Describe and analyze position and motion of objects and shapes.
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following set of indicators help determine whether students have met the corresponding specific outcome.</i>
8SS6 Demonstrate an understanding of tessellation by: <ul style="list-style-type: none"> <li>explaining the properties of shapes that make tessellating possible</li> <li>creating tessellations</li> <li>identifying tessellations in the environment.</li> </ul> [C, CN, PS, T, V]	8SS6.1 Identify, in a given set of regular polygons, those shapes and combinations of shapes that will tessellate, and use angle measurements to justify choices, e.g., squares, regular $n$ -gons. 8SS6.2 Identify, in a given set of irregular polygons, those shapes and combinations of shapes that will tessellate, and use angle measurements to justify choices. 8SS6.3 Identify a translation, reflection or rotation in a given tessellation. 8SS6.4 Identify a combination of transformations in a given tessellation. 8SS6.5 Create a tessellation using one or more 2-D shapes, and describe the tessellation in terms of transformations and conservation of area. 8SS6.6 Create a new tessellating shape (polygon or non-polygon) by transforming a portion of a given tessellating polygon, e.g., one by M.C. Escher, and describe the resulting tessellation in terms of transformations and conservation of area. 8SS6.7 Identify and describe tessellations in the environment.

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<b>Strand:</b> Statistics and Probability (Data Analysis)	<b>General Outcome:</b> Collect, display and analyze data to solve problems.
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following set of indicators help determine whether students have met the corresponding specific outcome.</i>
8SP1 Critique ways in which data is presented. [C, R, T, V]	8SP1.1 Compare the information that is provided for the same data set by a given set of graphs, including circle graphs, line graphs, bar graphs, double bar graphs and pictographs, to determine the strengths and limitations of each graph. 8SP1.2 Identify the advantages and disadvantages of different graphs, including circle graphs, line graphs, bar graphs, double bar graphs and pictographs, in representing a specific given set of data. 8SP1.3 Justify the choice of a graphical representation for a given situation and its corresponding data set. 8SP1.4 Explain how the format of a given graph, such as the size of the intervals, the width of bars and the visual representation, may lead to misinterpretation of the data. 8SP1.5 Explain how a given formatting choice could misrepresent the data. 8SP1.6 Identify conclusions that are inconsistent with a given data set or graph and explain the misinterpretation.

<b>Strand:</b> Statistics and Probability (Chance and Uncertainty)	<b>General Outcome:</b> Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following set of indicators help determine whether students have met the corresponding specific outcome.</i>
8SP2 Draw and interpret top, front and side views of 3-D objects composed of right rectangular prisms.	8SP2.1 Determine the probability of two given independent events and verify the probability using a different strategy. 8SP2.2 Generalize and apply a rule for determining the probability of independent events. 8SP2.3 Solve a given problem that involves determining the probability of independent events.

