

## Grade 8 Number Strand

Outcome	Achievement Indicators
<p>8.N.1. Demonstrate an understanding of perfect square and square root, concretely, pictorially, and symbolically (limited to whole numbers).</p>	<ul style="list-style-type: none"> <li>➤ Represent a perfect square as a square region using materials, such as grid paper or square shapes.</li> <li>➤ Determine the factors of a perfect square, and explain why one of the factors is the square root and the others are not.</li> <li>➤ Determine whether or not a number is a perfect square, using materials and strategies such as square shapes, grid paper, or prime factorization, and explain the reasoning.</li> <li>➤ Determine the square root of a perfect square and record it symbolically.</li> <li>➤ Determine the square of a number.</li> </ul>
<p>8.N.2. Determine the approximate square root of numbers that are not perfect squares (limited to whole numbers).</p>	<ul style="list-style-type: none"> <li>➤ Estimate the square root of a number that is not a perfect square using the roots of perfect squares as benchmarks.</li> <li>➤ Approximate the square root of a number that is not a perfect square using technology (e.g., calculator, computer).</li> <li>➤ Explain why the square root of a number shown on a calculator may be an approximation.</li> <li>➤ Identify a number with a square root that is between two given numbers.</li> </ul>
<p>8.N.3. Demonstrate an understanding of percents greater than or equal to 0%.</p>	<ul style="list-style-type: none"> <li>➤ Provide a context where a percent may be more than 100% or between 0% and 1%.</li> <li>➤ Represent a fractional percent using grid paper.</li> <li>➤ Represent a percent greater than 100 using grid paper.</li> <li>➤ Determine the percent represented by a shaded region on a grid, and record it in decimal, fractional, and percent form.</li> <li>➤ Express a percent in decimal or fractional form.</li> <li>➤ Express a decimal in percent or fractional form.</li> <li>➤ Express a fraction in decimal or percent form.</li> <li>➤ Solve a problem involving percents.</li> <li>➤ Solve a problem involving combined percents (e.g., addition of percents, such as GST + PST).</li> <li>➤ Solve a problem that involves finding the percent of a percent (e.g., A population increased by 10% one year and then increased by 15% the next year. Explain why there was not a 25% increase in population over the two years).</li> </ul>

<p>8.N.4. Demonstrate an understanding of ratio and rate.</p>	<ul style="list-style-type: none"> <li>➤ Express a two-term ratio from a context in the forms 3:5 or 3 to 5.</li> <li>➤ Express a three-term ratio from a context in the forms 4:7:3 or 4 to 7 to 3.</li> <li>➤ Express a part to part ratio as a part to whole fraction (e.g., frozen juice to water; 1 can concentrate to 4 cans of water can be represented as <math>\frac{1}{5}</math>, which is the ratio of concentrate to solution, or <math>\frac{4}{5}</math>, the ratio of water to solution).</li> <li>➤ Identify and describe ratios and rates from real-life examples, and record them symbolically.</li> <li>➤ Express a rate using words or symbols (e.g., 20 L per 100 km or 20 L/100 km).</li> <li>➤ Express a ratio as a percent and explain why a rate cannot be represented as a percent. [SEE NOTE.]</li> </ul> <p>NOTE: Ratio and rate are conceptually the same. They differ by the language and notation we use to describe them and differ in contexts from which they arise. Therefore ratio and rate can neither be represented by a percent except in the case of where a ratio happens to compare the same units.]</p>
<p>8.N.5. Solve problems that involve rates, ratios, and proportional reasoning.</p>	<ul style="list-style-type: none"> <li>➤ Explain the meaning of <math>\frac{a}{b}</math> within a context.</li> <li>➤ Provide a context in which <math>\frac{a}{b}</math> represents a <ul style="list-style-type: none"> <li>• Fraction (NOTE: in the sense of part of whole or set, or measure)</li> <li>• rate</li> <li>• ratio</li> <li>• quotient</li> <li>• probability</li> </ul> </li> <li>➤ Solve a problem involving rate, ratio, or percent.</li> </ul>
<p>8.N.6. Demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially, and symbolically.</p>	<ul style="list-style-type: none"> <li>➤ Identify the operation required to solve a problem involving positive fractions.</li> <li>➤ Provide a context that requires the multiplying of two positive fractions.</li> <li>➤ Provide a context that requires the dividing of two positive fractions.</li> <li>➤ Express a positive mixed number as an improper fraction and a positive fraction as a mixed number.</li> <li>➤ Model multiplication of a positive fraction by a whole number, concretely or pictorially, and record the process.</li> <li>➤ Model multiplication of a positive fraction by a positive fraction, concretely or pictorially using an area model, and record the process.</li> <li>➤ Model division of a positive proper fraction by a whole number, concretely or pictorially, and record the process.</li> <li>➤ Model pictorially division of a positive proper fraction by a positive proper fraction, and record the process.</li> <li>➤ Generalize and apply rules for multiplying and dividing positive fractions, including mixed numbers.</li> <li>➤ Solve a problem involving positive fractions taking into consideration order of operations (limited to problems with positive solutions).</li> </ul>

<p>8.N.7. Demonstrate an understanding of multiplication and division of integers, concretely, pictorially, and symbolically.</p>	<ul style="list-style-type: none"> <li>➤ Identify the operation required to solve a problem involving integers.</li> <li>➤ Provide a context that requires multiplying two integers.</li> <li>➤ Provide a context that requires dividing two integers.</li> <li>➤ Model the process of multiplying two integers using concrete materials or pictorial representations, and record the process.</li> <li>➤ Model the process of dividing an integer by an integer using concrete materials or pictorial representations, and record the process.</li> <li>➤ Generalize and apply a rule for determining the sign of the product and quotient of integers.</li> <li>➤ Solve a problem involving integers taking into consideration order of operations.</li> </ul>
<p>8.N.8. Solve problems involving positive rational numbers.</p>	<ul style="list-style-type: none"> <li>➤ Identify the operation necessary to solve a problem involving positive rational numbers and solve it.</li> <li>➤ Determine the reasonableness of an answer to a problem involving positive rational numbers.</li> <li>➤ Estimate the solution and solve a problem involving positive rational numbers.</li> <li>➤ Identify and correct errors in the solution to a problem involving positive rational numbers.</li> </ul>

## Grade 8 Patterns & Relations Strand

Outcome	Achievement Indicator
<p>8.PR.1. Graph and analyze two-variable linear relations.</p>	<ul style="list-style-type: none"> <li>➤ Determine the missing value in an ordered pair for an equation of a linear relation.</li> <li>➤ Create a table of values for the equation of a linear relation.</li> <li>➤ Construct a graph from the equation of a linear relation (limited to discrete data).</li> <li>➤ Describe the relationship between the variables of a graph.</li> </ul>
<p>8.PR.2. Model and solve problems using linear equations of the form:</p> <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> <p>concretely, pictorially, and symbolically, where <math>a</math>, <math>b</math>, and <math>c</math> are integers. [C, CN, PS, V]</p>	<ul style="list-style-type: none"> <li>➤ Model a problem with a linear equation and solve the equation using concrete models.</li> <li>➤ Verify the solution to a linear equation using a variety of methods, including concrete materials, diagrams, and substitution.</li> <li>➤ Draw a visual representation of the steps used to solve a linear equation and record each step symbolically.</li> <li>➤ Solve a linear equation symbolically.</li> <li>➤ Identify and correct errors in an incorrect solution of a linear equation.</li> <li>➤ Apply the distributive property to solve a linear equation (e.g., <math>2[x + 3] = 5</math>; <math>2x + 6 = 5</math>; ...)</li> <li>➤ Solve a problem using a linear equation and record the process.</li> </ul>

## Grade 8 Shape and Space strand

Outcome	Achievement Indicators
<p>8.SS.1. Develop and apply the Pythagorean theorem to solve problems.</p>	<ul style="list-style-type: none"> <li>➤ Model and explain the Pythagorean theorem concretely, pictorially, or by using technology.</li> <li>➤ Explain, using examples, that the Pythagorean theorem applies only to right triangles.</li> <li>➤ Determine whether or not a triangle is a right triangle by applying the Pythagorean theorem.</li> <li>➤ Determine the measure of the third side of a right triangle, given the measures of the other two sides, to solve a problem.</li> <li>➤ Solve a problem that involves Pythagorean triples (e.g., 3, 4, 5 or 5, 12, 13).</li> </ul>
<p>8.SS.2. Draw and construct nets for 3-D objects.</p>	<ul style="list-style-type: none"> <li>➤ Match a net to the 3-D object it represents.</li> <li>➤ Construct a 3-D object from a net.</li> <li>➤ Draw nets for a right circular cylinder, right rectangular prism and right triangular prism, and verify by constructing the 3-D objects from the nets.</li> <li>➤ Predict 3-D objects that can be created from a net and verify the prediction.</li> </ul>
<p>8.SS.3. Determine the surface area of</p> <ul style="list-style-type: none"> <li>• right rectangular prisms</li> <li>• right triangular prisms</li> <li>• right cylinders</li> </ul> <p>to solve problems.</p>	<ul style="list-style-type: none"> <li>➤ Explain, using examples, the relationship between the area of 2-D shapes and the surface area of a 3-D object.</li> <li>➤ Identify all the faces of a prism, including right rectangular and right triangular prisms.</li> <li>➤ Describe and apply strategies for determining the surface area of a right rectangular or right triangular prism.</li> <li>➤ Describe and apply strategies for determining the surface area of a right cylinder.</li> <li>➤ Solve a problem involving surface area.</li> </ul>
<p>8.SS.4. Develop and apply formulas for determining the volume of right prisms and right cylinders.</p>	<ul style="list-style-type: none"> <li>➤ Determine the volume of a right prism, given the area of the base.</li> <li>➤ Generalize and apply a rule for determining the volume of right cylinders.</li> <li>➤ Explain the relationship between the area of the base of a right 3-D object and the formula for the volume of the object.</li> <li>➤ Demonstrate that the orientation of a 3-D object does not affect its volume.</li> <li>➤ Apply a formula to solve a problem involving the volume of a right cylinder or a right prism.</li> </ul>

<p>8.SS.5. Draw and interpret top, front, and side views of 3-D objects composed of right rectangular prisms.</p>	<ul style="list-style-type: none"> <li>➤ Draw and label the top, front, and side views for a 3-D object on isometric dot paper.</li> <li>➤ Compare different views of a 3-D object to the object.</li> <li>➤ Predict the top, front, and side views that will result from a described rotation (limited to multiples of 90°) and verify predictions.</li> <li>➤ Draw and label the top, front, and side views that result from a rotation (limited to multiples of 90°).</li> <li>➤ Build a 3-D block object, given the top, front, and side views, with or without the use of technology.</li> <li>➤ Sketch and label the top, front, and side views of a 3-D object in the environment with or without the use of technology.</li> </ul>
<p>8.SS.6. Demonstrate an understanding of tessellation by</p> <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>	<ul style="list-style-type: none"> <li>➤ Identify, in a set of regular polygons, those shapes and combinations of shapes that will tessellate, and use angle measurements to justify choices.</li> <li>➤ Identify, in a set of irregular polygons, those shapes and combinations of shapes that will tessellate, and use angle measurements to justify choices.</li> <li>➤ Identify a translation, reflection, or rotation in a tessellation.</li> <li>➤ Identify a combination of transformations in a tessellation.</li> <li>➤ Create a tessellation using one or more 2-D shapes, and describe the tessellation in terms of transformations and conservation of area.</li> <li>➤ Create a new tessellating shape (polygon or non-polygon) by transforming a portion of a given tessellating polygon, and describe the resulting tessellation in terms of transformations and conservation of area.</li> <li>➤ Identify and describe tessellations in the environment.</li> </ul>

## Grade 8 Statistics and Probability strand

Outcome	Achievement Indicators
<p>8.SP.1. Critique ways in which data are presented.</p>	<ul style="list-style-type: none"><li>➤ Compare the information that is provided for the same data set by a set of graphs, including circle graphs, line graphs, bar graphs, double bar graphs, and pictographs, to determine the strengths and limitations of each graph.</li><li>➤ Identify the advantages and disadvantages of different graphs, including circle graphs, line graphs, bar graphs, double bar graphs, and pictographs, in representing a specific set of data.</li><li>➤ Justify the choice of a graphical representation for a situation and its corresponding data set.</li><li>➤ Explain how a given formatting choice, such as size of the intervals, the width of bars, or the visual representation, may lead to misrepresentation of the data.</li><li>➤ Identify conclusions that are inconsistent with a data set or graph and explain the misinterpretation.</li></ul>
<p>8.SP.2. Solve problems involving the probability of independent events.</p>	<ul style="list-style-type: none"><li>➤ Determine the probability of two independent events and verify the probability using a different strategy.</li><li>➤ Generalize and apply a rule for determining the probability of independent events.</li><li>➤ Solve a problem that involves determining the probability of independent events.</li></ul>