Grade 6 Number Strand

Outcome	Achievement Indicators
6.N.1. Demonstrate an understanding of place value for numbers • greater than one million • less than one thousandth [C, CN, R, T]	➢ Explain how the pattern of the place value system (e.g., the repetition of ones, tens, and hundreds, makes it possible to read and write numerals for numbers of any magnitude). ➢ Provide examples of where large numbers and small decimals are used (e.g., media, science, medicine, technology).
6.N.2. Solve problems involving large numbers, using technology.	➢ Identify which operation is necessary to solve a problem and solve it. ➢ Determine the reasonableness of an answer. ➢ Estimate the answer and solve a problem. ➢ Identify and correct errors in a solution to a problem that involves large numbers.
6.N.3. Demonstrate an understanding of factors and multiples by • determining multiples and factors of numbers less than 100 • identifying prime and composite numbers • solving problems involving multiples	➢ Identify multiples for a number and explain the strategy used to identify them. ➢ Determine all the whole-number factors of a number using arrays. ➢ Identify the factors for a number and explain the strategy used (e.g., concrete or visual representations, repeated division by prime numbers or factor trees). ➢ Provide an example of a prime number and explain why it is a prime number. ➢ Provide an example of a composite number and explain why it is a composite number. ➢ Sort a set of numbers as prime and composite. ➢ Solve a problem involving factors or multiples. ➢ Explain why 0 and 1 are neither prime nor composite.
6.N.4. Relate improper fractions to mixed numbers.	➢ Demonstrate using models that an improper fraction represents a number greater than 1. ➢ Express improper fractions as mixed numbers. ➢ Express mixed numbers as improper fractions. ➢ Place a set of fractions, including mixed numbers and improper fractions, on a number line, and explain strategies used to determine position.

6.N.5. Demonstrate an understanding of ratio, concretely, pictorially, and symbolically.	➢ Provide a concrete or pictorial representation for a given ratio. ➢ Write a ratio from a concrete or pictorial representation. ➢ Express a ratio in multiple forms, such as 3:5, $\frac{3}{5}$, or 3 to 5. ➢ Identify and describe ratios from real-life contexts and record them symbolically. ➢ Explain the part/whole and part/part ratios of a set (e.g., for a group of 3 girls and 5 boys, explain the ratios 3:5, 3:8, and 5:8). ➢ Solve a problem involving ratio.
6.N.6. Demonstrate an understanding of percent (limited to whole numbers) concretely, pictorially, and symbolically.	➢ Explain that "percent" means "out of 100." ➢ Explain that percent is a ratio of a certain number of units to 100 units. ➢ Use concrete materials and pictorial representations to illustrate a percent. ➢ Record the percent displayed in a concrete or pictorial representation. ➢ Express a percent as a fraction and a decimal. ➢ Identify and describe percents from real-life contexts and record them symbolically. ➢ Solve a problem involving percents.
6.N.7. Demonstrate an understanding of integers, concretely, pictorially, and symbolically.	➢ Extend a number line by adding numbers less than zero and explain the pattern on each side of zero. ➢ Place a set of integers on a number line and explain how integers are ordered. ➢ Describe contexts in which integers are used (e.g., on a thermometer). ➢ Compare two integers, represent their relationship using the symbols <, >, and =, and verify using a number line. ➢ Order integers in ascending or descending order.

6.N.8. Demonstrate an understanding of multiplication, and division of decimals (1-digit whole-number multipliers and 1-digit natural number divisors).	➢ Place the decimal point in a product using front-end estimation (e.g., for 15.205 m × 4, think 15 m × 4, so the product is greater than 60 m). ➢ Place the decimal point in a quotient using front-end estimation (e.g., for \$26.83 ÷ 4, think \$24 ÷ 4, so the quotient is greater than \$6). ➢ Predict products and quotients of decimals using estimation strategies. ➢ Correct errors of decimal point placement in a given product or quotient by estimating. ➢ Solve a problem that involves multiplication and division of decimals using multipliers from 0 to 9 and divisors from 1 to 9. ➢ Use mental math to determine products or quotients involving decimals when the multiplier or divisor is a multiple of 10 (e.g. 2.47 x 10 = 24.7; 31.9 ÷ 100 = 0.319).
6.N.9. Explain and apply the order of operations, excluding exponents (limited to whole numbers).	➢ Demonstrate and explain with examples why there is a need to have a standardized order of operations. ➢ Apply the order of operations to solve multi-step problems with or without technology.

Grade 6 Patterns & Relations Strand

Outcome	Achievement Indicator
6.PR.1. Demonstrate an understanding of the relationships within tables of values to solve problems.	➢ Generate values in one column of a table of values, values in the other column and a pattern rule. ➢ State, using mathematical language, the relationship in a table of values. ➢ Create a concrete or pictorial representation of the relationship shown in a table of values. ➢ Predict the value of an unknown term using the relationship in a table of values and verify the prediction. ➢ Formulate a rule to describe the relationship between two columns of numbers in a table of values. ➢ Identify missing elements in a table of values. ➢ Identify errors in a table of values. ➢ Describe the pattern within each column of a table of values. ➢ Create a table of values to record and reveal a pattern to solve a problem.
6.PR.2. Represent and describe patterns and relationships using graphs and tables.	➢ Translate a pattern to a table of values and graph the table of values (limit to linear graphs with discrete elements). ➢ Create a table of values from a pattern or a graph. ➢ Describe, using everyday language, orally or in writing, the relationship shown on a graph.
6.PR.3 Represent generalizations arising from number relationships using equations with letter variables.	➢ Write and explain the formula for finding the perimeter of any rectangle. ➢ Write and explain the formula for finding the area of any rectangle. ➢ Develop and justify equations using letter variables that illustrate the commutative property of addition and multiplication (e.g., $a + b = b + a$ or $a \times b = b \times a$). ➢ Describe the relationship in a table using a mathematical expression. ➢ Represent a pattern rule using a simple mathematical expression, such as $4d$ or $2n + 1$.

6.PR.4 Demonstrate and explain the meaning of preservation of equality concretely, pictorially, and symbolically.	➢ Model the preservation of equality for addition using concrete materials, such as a balance or using pictorial representations, and orally explain the process. ➢ Model the preservation of equality for subtraction using concrete materials, such as a balance or using pictorial representations, and orally explain the process. ➢ Model the preservation of equality for multiplication using concrete materials, such as a balance or using pictorial representations, and orally explain the process. ➢ Model the preservation of equality for division using concrete materials, such as a balance or using pictorial representations, and orally explain the process. ➢ Write equivalent forms of a given equation by applying the preservation of equality, and verify using concrete materials (e.g., $3b = 12$ is the same as $3b + 5 = 12 + 5$ or $2r = 7$ is the same as $3[2r] = 3[7]$).

Grade 6 Shape and Space strand

Outcome	Achievement Indicators
6.SS.1. Demonstrate an understanding of angles by • identifying examples of angles in the environment • classifying angles according to their measure • estimating the measure of angles using 45°, 90°, and 180° as reference angles • determining angle measures in degrees • drawing and labelling angles when the measure is specified	➢ Provide examples of angles found in the environment. ➢ Classify a set of angles according to their measure (e.g., acute, right, obtuse, straight, reflex). ➢ Sketch 45°, 90°, and 180° angles without the use of a protractor, and describe the relationship among them. ➢ Estimate the measure of an angle using 45°, 90°, and 180° as reference angles. ➢ Measure, using a protractor, angles in various orientations. ➢ Draw and label a specified angle in various orientations using a protractor. ➢ Describe the measure of an angle as the measure of rotation of one of its sides. ➢ Describe the measure of angles as the measure of an interior angle of a polygon.
6.SS.2. Demonstrate that the sum of interior angles is • 180° in a triangle • 360° in a quadrilateral	➢ Explain, using models, that the sum of the interior angles of a triangle is the same for all triangles. ➢ Explain, using models, that the sum of the interior angles of a quadrilateral is the same for all quadrilaterals.
6.SS.3. Develop and apply a formula for determining the • perimeter of polygons • area of rectangles • volume of right rectangular prisms	➢ Explain, using models, how the perimeter of any polygon can be determined. ➢ Generalize a rule (formula) for determining the perimeter of polygons. ➢ Explain, using models, how the area of any rectangle can be determined. ➢ Generalize a rule (formula) for determining the area of rectangles. ➢ Explain, using models, how the volume of any right rectangular prism can be determined. ➢ Generalize a rule (formula) for determining the volume of right rectangular prisms. ➢ Solve a problem involving the perimeter of polygons, the area of rectangles, and/or the volume of right rectangular prisms.

6.SS.4. Construct and compare triangles, including • scalene • isosceles • equilateral • right • obtuse • acute in different orientations.	➢ Sort a set of triangles according to the length of the sides. ➢ Sort a set of triangles according to the measures of the interior angles. ➢ Identify the characteristics of a set of triangles according to their sides and/or their interior angles. ➢ Sort a set of triangles and explain the sorting rule. ➢ Draw a triangle (e.g., scalene). ➢ Replicate a triangle in a different orientation and show that the two are congruent.
6.SS.5. Describe and compare the sides and angles of regular and irregular polygons.	➢ Sort a set of 2-D shapes into polygons and non-polygons, and explain the sorting rule. ➢ Demonstrate congruence (sides to sides and angles to angles) in a regular polygon by superimposing. ➢ Demonstrate congruence (sides to sides and angles to angles) in a regular polygon by measuring. ➢ Demonstrate that the sides of a regular polygon are of the same length and that the angles of a regular polygon are of the same measure. ➢ Sort aset of polygons as regular or irregular and justify the sorting. ➢ Identify and describe regular and irregular polygons in the environment.
6.SS.6. Perform a combination of transformations (translations, rotations, or reflections) on a single 2-D shape, and draw and describe the image.	➢ Demonstrate that a 2-D shape and its transformation image are congruent. ➢ Model a set of successive translations, successive rotations, or successive reflections of a 2-D shape. ➢ Model a combination of two different types of transformations of a 2-D shape. ➢ Draw and describe a 2-D shape and its image, given a combination of transformations. ➢ Describe the transformations performed on a 2-D shape to produce a given image. ➢ Model a given set of successive transformations (translation, rotation, and/or reflection) of a 2-D shape. ➢ Perform and record one or more transformations of a 2-D shape that will result in a given image.
6.SS.7. Perform a combination of successive transformations of 2-D shapes to create a design, and identify and describe the transformations.	➢ Analyze a design created by transforming one or more 2-D shapes, and identify the original shape and the transformations used to create the design. ➢ Create a design using one or more 2-D shapes and describe the transformations used.

6.SS.8. Identify and plot points in the first quadrant of a Cartesian plane using whole-number ordered pairs.	➢ Label the axes of the first quadrant of a Cartesian plane and identify the origin. ➢ Plot a point in the first quadrant of a Cartesian plane given its ordered pair. ➢ Match points in the first quadrant of a Cartesian plane with their corresponding ordered pair. ➢ Plot points in the first quadrant of a Cartesian plane with intervals of 1, 2, 5, or 10 on its axes, given whole-number ordered pairs. ➢ Draw shapes or designs, given ordered pairs in the first quadrant of a Cartesian plane. ➢ Determine the distance between points along horizontal and vertical lines in the first quadrant of a Cartesian plane. ➢ Draw shapes or designs in the first quadrant of a Cartesian plane and identify the points used to produce them.
6.SS.9. Perform and describe single transformations of a 2-D shape in the first quadrant of a Cartesian plane (limited to whole-number vertices).	➢ Identify the coordinates of the vertices of a 2-D shape (limited to the first quadrant of a Cartesian plane). ➢ Perform a transformation on a given 2-D shape and identify the coordinates of the vertices of the image (limited to the first quadrant). ➢ Describe the positional change of the vertices of a given 2-D shape to the corresponding vertices of its image as a result of a transformation (limited to first quadrant).

Grade 6 Statistics and Probability strand

Outcome	Achievement Indicators
6.SP.1. Create, label, and interpret line graphs to draw conclusions.	➢ Determine the common attributes (title, axes, and intervals) of line graphs by comparing a set of line graphs. ➢ Determine whether a set of data can be represented by a line graph (continuous data) or a series of points (discrete data), and explain why. ➢ Create a line graph from a table of values or set of data. ➢ Interpret a line graph to draw conclusions.
6.SP.2. Select, justify, and use appropriate methods of collecting data, including • questionnaires • experiments • databases • electronic media	➢ Select a method for collecting data to answer a question and justify the choice. ➢ Design and administer a questionnaire for collecting data to answer a question and record the results. ➢ Answer a question by performing an experiment, recording the results and drawing a conclusion. ➢ Explain when it is appropriate to use a database as a source of data. ➢ Gather data for a question by using electronic media including selecting data from databases.
6.SP.3. Graph collected data and analyze the graph to solve problems.	➢ Determine an appropriate type of graph for displaying a set of collected data and justify the choice of graph. ➢ Solve a problem by graphing data and interpreting the resulting graph.

6.SP.4. Demonstrate an understanding of probability by • identifying all possible outcomes of a probability experiment • differentiating between experimental and theoretical probability • determining the theoretical probability of outcomes in a probability experiment • determining the experimental probability of outcomes in a probability experiment • comparing experimental results with the theoretical probability for an experiment.	➢ List the possible outcomes of a probability experiment, such as • tossing a coin • rolling a die with a given number of sides • spinning a spinner with a given number of sectors ➢ Determine the theoretical probability of an outcome occurring for a probability experiment. ➢ Predict the probability of an outcome occurring for a probability experiment by using theoretical probability. ➢ Conduct a probability experiment, with or without technology, and compare the experimental results to the theoretical probability. ➢ Explain that as the number of trials in a probability experiment increases, the experimental probability approaches theoretical probability of a particular outcome. ➢ Distinguish between theoretical probability and experimental probability and explain the differences.