

MATHEMATICS Sixth Grade

VALUES AND ATTITUDES	The student will: Realize that there is a definite sense of order in God's world. Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Realize God's universe is composed of appropriate spacing, measurement and geometric designs. Use visualization, spatial reasoning, and geometric modeling. Understand patterns, relations, and functions. Use varied methods for analyzing data. Use the ability to reason with our mind. Develop mathematical knowledge through problem solving.
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STRAND A Number Sense, Numeration, and Numerical Operations

OBJECTIVES
Rational numbers <ul style="list-style-type: none">• Read, and write numbers including percents and exponentials.• Relate fractions, decimals, and percents.• Compare and order fractions, decimals, and percents.• Relate concepts of ratio, proportion, and percent; record results using models and pictures.• Interpret the ratios in different contexts to show the relative sizes of two quantities, using appropriate notations (a/b, a to b, $a:b$).• Use proportions to solve problems.• Use models and pictures to demonstrate understanding of integers.• Compare and order integers.• Simplify numerical expressions with parentheses and exponents using the order of operations.• Translate word problems into number sentences, solve and explain.• Analyze problem situations to determine if there is adequate information to solve the problem.• Identify missing or extraneous data, select appropriate strategies, and use an organized approach to solve multi-step problems.
Addition, subtraction, multiplication, and division. <ul style="list-style-type: none">• Solve problems involving addition, subtraction, multiplication and division of positive fractions.• Explain why a particular operation was used for a given situation.• Explain the meaning of multiplication and division of positive fractions and perform the calculations.• Solve addition, subtraction, multiplication, and division problems that use positive and negative integers and combinations of these operations.• Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions.• Multiply and divide fractions, mixed numbers, and decimals.• Add and subtract fractions and mixed numbers with unlike denominators.• Use estimation and mental math to solve problems with fractions, decimals, and percents.• Solve problems using prime factorization, common factors and common multiples.

STRAND B Spatial Sense, Measurement, and Geometry

OBJECTIVES

Properties and relationships in geometry, and standard units of metric and customary measurement

- Construct congruent segments, congruent angles, bisectors of line segments and bisectors of angles.
- Define and identify interior, exterior, complementary, and supplementary angles and pairs of lines.
- Define and identify alternate interior, alternate exterior, corresponding and vertical angles.
- Identify and distinguish among similar, congruent and symmetric figures.
- Locate, give the coordinates of, and graph plane figures which are the results of translations or reflections in the first quadrant.
- Investigate and determine the relationship between the diameter and circumference of a circle and the value of pi.
- Calculate the circumference of a circle.
- Know the formulas for the volume of triangular prisms and cylinders; compare the formulas and explain the similarity between them and the formula for the volume of a rectangular solid.
- Identify the relationship between areas of triangles and rectangles with the same base and height.
- Develop formulas for finding areas of triangles, parallelograms and circles using models.
- Calculate area and perimeter of triangles, parallelograms and circles.
- Model the concept of volume for rectangular solids.
- Convert measures of length, area, capacity, weight and time to other units in the same measurement system.
- Estimate solutions to problems involving geometry and measurement.
- Analyze problem situations, select appropriate strategies, and use an organized approach to solve non-routine and complex problems involving geometry and measurement.

STRAND C Patterns, Algebra, and Functions

OBJECTIVES

Patterns, relationships, and algebraic representations

- Describe and write rules for a variety of patterns.
- Use a given rule to generate a set of ordered pairs.
- Identify the rule used to generate a group of ordered pairs.
- Use variables to describe numerical expressions and relationships.
- Use graphs and tables to represent ordered pairs.
- Recognize both linear and nonlinear relationships.
- Identify and use patterning to solve problems.

Algebraic expressions and equations

- Write and solve one-step linear equations in one variable.
- Write and evaluate an algebraic expression for a given situation, using up to three variables.
- Apply algebraic order of operations and the commutative, associative, and distributive properties to evaluate expressions; justify each step in the process.
- Solve problems manually by using the correct order of operations or by using a scientific calculator.

Tables, graphs, and rules to solve problems involving rates and proportions

- Convert one unit of measurement to another.
- Demonstrate an understanding that rate is a measure of one quantity per unit value of another quantity.
- Solve problems involving rates, average speed, distance and time.

Investigate geometric patterns

- Use variables in expressions describing geometric quantities, e.g., $P=2W + 2L$.
- Express in symbolic form simple relationships arising from geometry.

STRAND D Data, Probability, and Statistics

OBJECTIVES

Graphing, probability, and data analysis

- Create and evaluate graphic representations of data.
- Analyze data using spreadsheets.
- Compute the range, mean, median, and mode of data sets.
- Use ordered pairs to locate points in all quadrants of the coordinate plane.
- Compare two sets of data using measures of central tendency.
- Construct convincing arguments based on analysis of data and interpretation of graphs.
- Understand how additional data added to data sets may affect these computations of measures of central tendency.
- Understand how the inclusion or exclusion of outliers affects measures of central tendency.
- Know why a specific measure of central tendency (mean, median, and mode) provides the most useful information in a given context.
- Design an experiment to test a theoretical probability.
- Make predictions based on the probabilities of simple events.
- Solve problems using inductive and deductive reasoning.
- Solve problems involving probability and statistics.
- Analyze, organize and select appropriate strategies to solve problems.

Data samples

- Compare different samples of a population with the data from the entire population and identify a situation in which it makes sense to use a sample.
- Identify different ways of selecting a sample and which method makes a sample more representative for a population.
- Analyze data displays. Explain why the way in which the question was asked might have influenced the results obtained and why the way in which the results were displayed might have influenced the conclusions reached.
- Identify data that represent sampling errors and explain why the sample and/or display might be biased.
- Identify claims based on statistical data and evaluate the validity of claims.

Theoretical and experimental probabilities

- Represent all possible outcomes for compound events in an organized way and express the theoretical probability of each outcome.
- Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable.

- Know that if P is the probability of an event, $1 - P$ is the probability of an even not occurring.
- Understand that the probability of either of two disjoint events occurring is the sum of the two individual probabilities and that the probability of one event following another, in independent trials, is the product of the two probabilities.
- Understand the difference between independent and dependent events.

STRAND E Mathematical Reasoning

OBJECTIVES

Problem solving

- Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.
- Formulate and justify mathematical conjectures based on general description of the mathematical question or problem posed.
- Determine when and how to break a problem into simpler parts.
- Use estimation to verify the reasonableness of calculated results.
- Apply strategies and results from simpler problems to more complex problems.
- Estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques.
- Use a variety of methods, i.e. words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.
- Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.
- Make precise calculations and check the validity of the results from the context of the problem.
- Evaluate the reasonableness of the solution in the context of the original situation.
- Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
- Develop generalizations of the results obtained and the strategies used and apply them in new problem situations.

