

MATHEMATICS CURRICULUM OVERVIEW GRADE SIX

A. Number Sense

Understanding the number system is the basis of mathematics. Students continue to develop their understanding of the relationship between fractions and decimals. They extend the number system to include negative numbers. They also relate percentages to fractions and decimals and begin learning how to use ratios. They find multiples and factors of whole numbers, using the multiples and factors to solve problems involving fractions.

The students will:

- Represent, compare, and order on a number line: positive and negative integers, fractions, decimals (to thousandths), and mixed numbers.
- Understand and apply the basic concept of negative numbers (number line, counting, temperatures, “owing”). Illustrate on a number line.
- Interpret the absolute value of a number as its distance from zero, and find the absolute value of real numbers. Know that the distance between two numbers on a number line is the absolute value of their difference.
- Use percents to represent parts of a whole and find the percentage part of a whole.
- Recognize commonly used fractions, decimals, and percents and convert between those forms without using a calculator.
- Interpret and model ratios to show the relative sizes of two quantities.
- Find the least common multiple (LCM) and greatest common factor (GCF) of whole numbers. Use LCM and GCF to solve problems with fractions.

B. Computation

Fluency in computation is essential. Students add, subtract, multiply, and divide whole numbers, fractions, decimals, and integers. They solve problems using ratios, proportions, and percentages. They use mental arithmetic to add or subtract simple fractions and decimals.

The students will:

- Add, subtract, multiply, and divide positive and negative integers. Recognize/explain the effect of negative integers on operations.
- Add, subtract, multiply, and divide decimals.
- Add, subtract, multiply, and divide fractions.
- Explain the relationship between the procedures in multiplying and dividing fractions.

- Select the correct operation to solve problems involving fractions, and explain why a particular operation was used.
- Interpret and use ratios to show relative sizes of two quantities, using formats a to b , $a:b$, or a/b .
- Write equivalent ratios. Express a ratio in its simplest form.
- Set up proportions (equal ratios) to solve problems. Find the missing term in a pair of equivalent ratios.
- Calculate and solve problems involving percentages of quantities (e.g. tax, discount, interest, tips).
- Use rounding/estimation to approximate an answer to a given degree (e.g. to nearest dollar/cent, nearest 100).
- Use estimation to determine whether answers to decimal problems are reasonable.
- Use mental math to add, subtract, multiply, or divide simple fraction and decimal problems.

C. Algebra and Functions

Algebra is a language of patterns, rules, and symbols. Students at this level write and solve simple equations and inequalities, writing and using formulas to solve problems.

The students will:

- Write and solve one-step linear equations and inequalities with a singular variable and check the answer.
- Write and use formulas with up to three variables to solve problems.
- Evaluate expressions with or without grouping symbols (e.g. parentheses) using established order of operations (PEMDAS).
- Use parentheses to indicate order when writing expressions containing more than two terms and different operations.
- Use variables in expressions describing geometric quantities (e.g. $P = 2l + 2w$)
- Identify and use number properties. (identity, inverse, commutative, associative, distributive).
- Identify and label the axes and origin on a coordinate plane.
- Identify and graph ordered pairs in the four quadrants of a coordinate plane.
- Solve problems involving linear functions with integer values. Create a table and graph the resulting ordered pairs.
- Investigate how a change in one variable relates to a change in a second variable.

D. Geometry

Students develop a sense of spatial relationships. They recognize and understand the relationship between special types of angles and shapes. They measure and calculate dimensions, angles, area, and volume of two- and three-dimensional shapes. They learn

about the number π and its relationship to circumferences and areas of circles. They develop spatial reasoning through manipulation of shapes.

The students will:

- Identify, draw, measure, and bisect angles using appropriate tools (ruler, protractor, compass).
- Calculate measurement of angles based on angle properties:
 - Right, acute, obtuse
 - Complementary, supplementary
 - Interior, exterior
 - Adjacent, vertical/opposite
 - Corresponding, alternate
- Construct quadrilaterals and triangles from given information.
- Calculate the measure of angles in quadrilaterals and triangles based on the sum of angles.
- Identify the radius, diameter, and circumference of a circle. Develop and use formulas for the circumference and area of a circle.
- Identify and draw congruent and similar two-dimensional shapes.
- Identify and draw transformations (rotations, reflections, translations) of shapes.
- Use transformations to determine measurements of congruent shapes.

E. Measurement

Students measure and compare lengths, areas, volumes, weights, times, temperatures, etc. They construct models and measure two- and three-dimensional figures. Students convert between metric and U.S. units.

The students will:

- Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, angles.
- Develop and use formulas to calculate the perimeter and area of quadrilaterals and triangles.
- Calculate the perimeter and area of complex shapes.
- Develop and use formulas for the volume and surface area of rectangular solids and cylinders.
- Convert units within a system of measurement (e.g. miles/yards/feet, meters/kilometers, hours/minutes/seconds).
- Convert units between U.S. and metric systems/scales.

F. Data Analysis and Probability

Students recognize that data can be organized, analyzed, and used to summarize and make predictions. They use statistical analysis (e.g. mean, median, mode, range), find probabilities for single and compound events, and express them as fractions, decimals, and percentages.

The students will:

- Organize and display single-variable data in appropriate graphs (pictograph, histogram, line, broken-line, bar, circle, stem-and-leaf plot) and explain why each graph is appropriate to a given situation.
- Make frequency tables for numerical data. Understand and find relative and cumulative frequency for a data set.
- Compare the mean, median, and mode for a set of data and explain which measure is most appropriate in a given context.
- Show all possible outcomes for compound events in an organized way, and find the theoretical probability of each outcome.
- Compare theoretical and experimental probability outcomes.
- Use data to estimate the probability of future events.
- Understand and represent probabilities as ratios, measures of relative frequency, decimals between/including 0 and 1, and percentages between/including 1 and 100.
- Apply knowledge of probability to activities of chance (e.g. drawings, lotteries).

G. Problem Solving

Students make decisions about how to approach problems and analyze and communicate ideas.

The students will:

- Use a variety of strategies (“Super Seven”) to solve problems: guess and check, drawing pictures, organized lists, look for patterns, make a table or chart, use logical reasoning, work backwards.
- Understand and use grade-level appropriate math vocabulary and symbols.
- Analyze problems by identifying relationships, determining relevant and/or missing information, sequencing and prioritizing information, and observing patterns.
- Decide when and how to break a problem into simpler parts. Apply strategies and results from simpler problems to solve more complex problems.
- Recognize advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.
- Select and apply appropriate methods for estimating results of computations.
- Use graphs to estimate solutions and check the estimates.

- Make precise calculations and check the validity of the results in the context of the problem. (Does the solution make sense?)
- Understand the value of estimation for checking the validity of results.
- Express solutions clearly and logically by using appropriate math vocabulary, symbols, and notation. Support solutions with written work. (“Show work.”)
- Analyze own and others’ work to determine errors in arithmetic, concepts, and/or process.