

Grade Level Expectations for the Sunshine State Standards

Mathematics Eighth Grade



F L O R I D A
Department
of Education

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**Sunshine State Standards
Grade Level Expectations
Mathematics
Eighth Grade**

The eighth grade student:

Number Sense, Concepts, and Operations

- knows word names and standard numerals for integers, fractions, decimals, numbers expressed as percents, numbers with exponents, numbers expressed in scientific notation, absolute value, radicals, and ratios.
- compares and orders fractions, decimals, integers, and radicals using graphic models, number lines, and symbols.
- compares and orders numbers expressed in absolute value, scientific notation, integers, percents, numbers with exponents, fractions, decimals, radicals, and ratios.
- knows examples of rational and irrational numbers in real-world situations.
- describes the meanings of rational and irrational numbers using physical or graphical displays.
- knows the relationships among fractions, decimals, and percents given a real-world context.
- simplifies expressions using integers, exponents, and radicals.
- knows equivalent forms of large and small numbers in scientific and standard notation.
- identifies and explains the absolute value of a number.
- expresses rational numbers in exponential notation including negative exponents (for example, $2^{-3} = \frac{1}{2^3} = 1/8$).
- expresses numbers in scientific or standard notation including decimals between 0 and 1.
- evaluates numerical or algebraic expressions that contain exponential notation.
- expresses base ten numbers as equivalent numbers in different bases, such as base two, base five, and base eight.
- discusses the application of the binary (base two) number system in computer technology.
- expresses non-base ten numbers as equivalent numbers in base ten.
- knows the effects of the four basic operations on whole numbers, fractions, mixed numbers, decimals, and integers.
- knows the inverse relationship of positive and negative numbers.
- applies the properties of real numbers to solve problems (commutative, associative, distributive, identity, equality, inverse, and closure).
- knows the appropriate operations to solve real-world problems involving integers, ratios, rates, proportions, numbers expressed as percents, decimals, and fractions.
- solves real-world problems involving integers, ratios, proportions, numbers expressed as percents, decimals, and fractions in two- or three-step problems.

**Sunshine State Standards
Grade Level Expectations
Mathematics
Eighth Grade**

- solves real-world problems involving percents including percents greater than 100% (for example percent of change, commission).
- writes and simplifies expressions from real-world situations using the order of operations.
- solves multi-step real-world problems involving fractions, decimals, and integers using appropriate methods of computation, such as mental computation, paper and pencil, and calculator.
- knows appropriate estimation techniques for a given situation using real numbers.
- estimates to predict results and to check reasonableness of results.
- knows if numbers are relatively prime.
- applies number theory concepts to determine the terms in a real number sequence.
- applies number theory concepts, including divisibility rules, to solve real-world or mathematical problems.

Measurement

- uses concrete and graphic models to explore and derive formulas for surface area and volume of three-dimensional regular shapes, including pyramids, prisms, and cones.
- solves and explains real-world problems involving surface area and volume of three-dimensional shapes.
- applies formulas for finding rates, distance, time, and angle measures.
- describes and uses rates of change (for example, temperature as it changes throughout the day, or speed as the rate of change in distance over time) and other derived measures.
- knows how a change in a figure's dimensions affects its perimeter, area, circumference, surface area, or volume.
- knows how changes in the volume, surface area, area, or perimeter of a figure affect the dimensions of the figure.
- interprets and applies various scales including those based on number lines, graphs, models, and maps. (Scale may include rational numbers.)
- constructs and uses scale drawings to recreate a given situation.
- finds measures of length, weight or mass, and capacity or volume using proportional relationships and properties of similar geometric figures.
- solves problems using mixed units within each system, such as feet and inches, hours and minutes.
- solves problems using the conversion of measurements within either the customary or the metric system.

**Sunshine State Standards
Grade Level Expectations
Mathematics
Eighth Grade**

- knows a variety of strategies to estimate, describe, make comparisons, and solve real-world and mathematical problems involving measurements.
- selects the appropriate unit of measure for a given situation.
- knows the precision of different measuring instruments and determines the appropriate precision unit for a given situation.
- identifies the number of significant digits as it relates to the least precise unit of measure.
- determines the greatest possible error of a given measurement and the possible actual measurements of an object.
- applies significant digits in the real-world context.
- selects and uses appropriate instruments, technology, and techniques to measure quantities and dimensions to a specified degree of accuracy.

Geometry and Spatial Sense

- determines and justifies the measures of various types of angles based upon geometric relationships in two- and three-dimensional shapes.
- compares regular and irregular polygons and two- and three-dimensional shapes.
- draws and builds three-dimensional figures from various perspectives (for example, flat patterns, isometric drawings, nets).
- knows the properties of two- and three-dimensional figures.
- uses the properties of parallelism, perpendicularity, and symmetry in solving real-world problems.
- identifies congruent and similar figures in real-world situations and justifies the identification.
- identifies and performs the various transformations (reflection, translation, rotation, dilation) of a given figure on a coordinate plane.
- predicts and verifies patterns involving tessellations (a covering of a plane with congruent copies of the same pattern with no holes and no overlaps, like floor tiles).
- observes, explains, makes and tests conjectures regarding geometric properties and relationships (among regular and irregular shapes of two and three dimensions).
- applies the Pythagorean Theorem in real-world problems (for example, finds the relationship among sides in $45^\circ - 45^\circ$ and $30^\circ - 60^\circ$ right triangles).
- given an equation or its graph, finds ordered-pair solutions (for example, $y = 2x$).
- given the graph of a line, identifies the slope of the line (including the slope of vertical and horizontal lines).
- given the graph of a linear relationship, determines the x and y intercepts of the line.

**Sunshine State Standards
Grade Level Expectations
Mathematics
Eighth Grade**

- given the graph of a linear relationship, applies and explains the properties of lines on a graph.

Algebraic Thinking

- reads, analyzes, and describes graphs of linear relationships.
- uses variables to represent unknown quantities in real-world problems.
- uses the information provided in a table, graph, or rule to determine if a function is linear and justifies reasoning.
- finds a function rule to describe tables of related input-output variables.
- predicts outcomes based upon function rules.
- interprets and creates tables and graphs (function tables).
- writes equations and inequalities to express relationships.
- graphs equations and inequalities to explain cause-and-effect relationships.
- interprets the meaning of the slope of a line from a graph depicting a real-world situation.
- translates verbal expressions and sentences into algebraic expressions, equations, and inequalities.
- translates algebraic expressions, equations, or inequalities representing real-world relationships into verbal expressions or sentences.
- solves single- and multiple-step linear equations and inequalities in concrete or abstract form.
- graphs linear equations on the coordinate plane using tables of values.
- graphically displays real-world situations represented by algebraic equations or inequalities.
- evaluates algebraic expressions, equations, and inequalities by substituting integral values for variables and simplifying the results.
- simplifies algebraic expressions that represent real-world situations by combining like terms and applying the properties of real numbers.
- simplifies algebraic expressions with a maximum of two variables.
- solves single- and multi-step linear equations and inequalities that represent real-world situations.

Data Analysis and Probability

- reads and interprets data displayed in a variety of forms including histograms.
- constructs and interprets displays of data, (including circle, line, bar, and box-and-whisker graphs) and explains how different displays of data can lead to different interpretations.

**Sunshine State Standards
Grade Level Expectations
Mathematics
Eighth Grade**

- interprets measures of dispersion (range) and of central tendency.
- determines appropriate measures of central tendency for a given situation or set of data.
- determines the mean, median, mode, and range of a set of real-world data using appropriate technology.
- organizes, graphs and analyzes a set of real-world data using appropriate technology.
- compares and explains the results of an experiment with the mathematically expected outcomes.
- calculates simple mathematical probabilities for independent and dependent events.
- predicts the mathematical odds for and against a specified outcome in a given real-world situation.
- formulates a hypothesis, designs and performs an experiment, and collects, organizes, and displays the data.
- evaluates the hypothesis by making inferences and drawing conclusions based on statistical results.
- knows appropriate uses of statistics and probability in real-world situations.
- knows when statistics and probability are used in misleading ways.
- identifies and uses different types of sampling techniques (for example, random, systematic, stratified).
- knows whether a sample is biased.



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