

8TH GRADE MATHEMATICS

CURRICULUM GUIDE

BIG IDEAS

- ◆ Linear equations can mathematically represent real-life situations.
 - ◆ Algebraic solutions can be visualized on graphs.
 - ◆ There are precise and systematic ways to solve both inequalities and linear equations.
 - ◆ Measures of central tendency are used to describe data.
 - ◆ Geometric properties and formulas (Pythagorean Theorem) can be used to determine measurements including distance and angles.
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THEMATIC FOCUS

- ◆ Math classrooms are lively places for learning where students receive a rich diet of the following:
 - The use of mathematics to *solve problems*.
 - Application of *logical reasoning* to justify procedures and solutions.
 - Design and analyze multiple *representations*, make *connections* in and out of school.
 - See the National Council of Teachers of Mathematics (NCTM) [PRINCIPLES & STANDARDS FOR SCHOOL MATHEMATICS](#) for further information.
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UNITS OF STUDY

- ◆ Real Numbers and Right Triangles
 - ◆ Data Analysis, Measures of Central Tendency and Probability
 - ◆ Angle Relationships
 - ◆ Linear Functions
 - ◆ Systems of Equations
 - ◆ Square Root Applications & Pythagorean Theorem
 - ◆ Similarity, Congruence, and Angle Measures
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CONCEPTS AND SKILLS

It is essential that the following concepts and skills be addressed in contexts that promote problem solving, reasoning, communication, making connections and designing and analyzing representations. See [FOCAL POINTS](#) for more information about grade level content for mathematics.

8.1 Algebra: Analyze and represent linear functions, and solve linear equations and systems of linear equations

- Translate among contextual, verbal, tabular, graphical, and algebraic representations of linear functions. (8.1.1)
- Determine the slope of a line and understand that it is a constant rate of change. (8.1.2)
- Identify and interpret the properties (i.e. slope, intercepts, continuity, and discreteness) of linear relationships as they are shown in the different representations and recognize proportional relationships ($y/x = k$ or $y = kx$) as a special case. (8.1.3)
- Use linear functions and equations to represent, analyze and solve problems, and to make predictions and inferences. (8.1.4)
- Relate systems of two linear equations in two variables and their solutions to pairs of lines that are intersecting, parallel, or the same line. (8.1.5)
- Use informal strategies (e.g., graphs or tables) to solve problems involving systems of linear equations in two variables. (8.1.6)

8.2 Data Analysis and Algebra: Analyze and summarize data sets

- Organize and display data (e.g., histograms, box-and-whisker plots, scatter plots, double bar graphs) to pose and answer questions; and justify the reasonableness of the choice of display. (8.2.1)
- Use measures of center and spread to summarize and compare data sets. (8.2.2)

CONCEPTS AND SKILLS (CONTINUED)

- Interpret and analyze displays of data and descriptive statistics. (8.2.3)
- Compare descriptive statistics and evaluate how changes in data affect those statistics. (8.2.4)
- Describe the strengths and limitations of a particular statistical measure, and justify or critique its use in a given situation. (8.2.5)
- Use sample data to make predictions regarding a population. (Lines of best fit) (8.2.6)
- Identify claims based on statistical data and evaluate the reasonableness of those claims. (8.2.7)
- Use data to estimate the likelihood of future events and evaluate the reasonableness of predictions. (8.2.8)

8.3 Geometry and Measurement: Analyze two- and three-dimensional spaces and figures by using distance and angle

- Use properties of parallel lines, transversals, and angles to find missing sides and angles, and to solve problems including determining similarity or congruence of triangles. (8.3.1)
- Use models to show that the sum of the angles of any triangle is 180 degrees and apply this fact to find unknown angles. (8.3.2)
- Use models and logical arguments to show that the sum of the angles of any quadrilateral is 360 degrees, and apply this fact to find unknown angles. (8.3.3)
- Use models to explore the validity of the Pythagorean Theorem, and use it to find missing lengths. (8.3.4)
- Apply the Pythagorean Theorem to find distances in a variety of 2- and 3-dimensional contexts, including distances on coordinate graphs. (8.3.5)
- Use models and referents to explore and estimate square roots. (8.3.6)

◆ **8th Grade Connections**

(Not standards for mastery, but are important topics to use to support and enrich the focal points.)

- Algebra
 - Basic quadratic and exponential functions
- Geometry
 - Slope triangles in coordinate plane
- Data Analysis
 - Quartiles
 - Scatterplots of bivariate data with estimated best fit line
- Number and Operations
 - Scientific notation to describe very large/small numbers

◆ **Math Work Samples & Assessment** In 8th grade, students should be provided multiple opportunities to complete math work samples and are required to complete at least one teacher-scored math work sample based on the official scoring guide. 8th graders are also required to take the Oregon Assessment of Knowledge and Skills (OAKS) test in the spring (see [Assessment](#) section for math scoring guides, sample tasks, and additional information).

◆ **Problem Solving** (see [Problem Solving](#) section for definitions, grade level descriptions, and instructional resources)

◆ **Math Placement** (see [Placement](#) section for course flowcharts, placement criteria, and additional information)

ESSENTIAL QUESTIONS

- ◆ What are linear equations? How can we use them in real life?
- ◆ What information can one derive from the graph of an equation or inequality?
- ◆ How do we solve linear equations and inequalities?
- ◆ What are the strengths and limitations of a given statistical measure of central tendency?
- ◆ How are the different representations of linear equations related?
- ◆ How can slope (rate of change) be used to make predictions of future outcomes?
- ◆ How can geometric properties and formulas (Pythagorean Theorem) be used to determine real-life measurements?

ESSENTIAL SKILLS

- ◆ Apply mathematics in a variety of settings
 - Interpret a situation and apply workable mathematical concepts and strategies, using appropriate technologies where applicable.
 - Produce evidence, such as graphs, data, or mathematical models, to obtain and verify a solution.
 - Communicate and defend the verified process and solution, using pictures, symbols, models, narrative or other methods.
- ◆ Think critically and analytically. This skill includes all of the following:
 - Identify and explain the key elements of a complex event, text, issue, problem or phenomenon.
 - Develop a method to explore the relationships between the key elements of a complex event, text, issue, problem or phenomenon.
 - Propose defensible conclusions that address multiple and diverse perspectives.
 - Evaluate the strength of conclusions, differentiating reasoning based on facts from reasoning based on opinions.
 - See [ESSENTIAL SKILLS](#) for more information about ODE requirements.