OREGON MATH STANDARDS

GRADE 8 MATHEMATICS

OREGON
DEPARTMENT OF EDUCATION

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MATH PROJECT
Meaningful Math for Every Student

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OREGON MATH PROJECT

The Oregon Math Project (OMP) advances mathematics education in our state by cultivating a network of educators that promotes equitable math experiences for all students through guidance and the support of policies, standards, curricula, assessments, and instructional best practices. Realizing the vision of math education in Oregon includes ensuring that all students attain mathematics proficiency by having access to high-quality instruction that includes challenging and coherent content in a learning environment where each student receives the support they need to succeed in mathematics.

Please visit the OMP website to learn more about the project and opportunities to connect with this work.

CLARIFYING DOCUMENTS

The intent of clarifying statements is to provide additional guidance for educators to communicate the intent of the 2021 Oregon math standards to support the future development of aligned curricular resources and assessments.

Clarifying statements can be in the form of succinct sentences or paragraphs that attend to one of four types of clarifications: (1) Student Experiences; (2) Examples; (3) Boundaries; and (4) Connection to Math Practices.

Please use this form to provide suggestions to the Oregon Math Standards and/or Guidance document.

Questions, comment, or suggestions can also be emailed to: ODE.MathProject@ode.oregon.gov

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Grade 8 Overview

Critical Areas of Focus

In Grade 8, instructional time should focus on three critical areas:

1. Formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations;
2. Grasping the concept of a function and using functions to describe quantitative relationships;
3. Analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

Link to summary of Grade 8 Critical Areas

Students should spend the large majority[1] of their time on the major work of the grade (■). Supporting work (□) and, where appropriate, additional work (○) can engage students in the major work of the grade.

[1]At least 65% and up to approximately 85% of class time, with Grades K–2 nearer the upper end of that range, should be devoted to the major work of the grade. For more information, see the K-8 *major work of the grade developed by Student Achievement Partners*

DOMAINS AND CLUSTERS

8.AEE - Algebraic Reasoning: Expressions and Equations
- ■ **8.AEE.A** Expressions and Equations Work with radicals and integer exponents.
- ■ **8.AEE.B** Understand the connections between proportional relationships, lines, and linear equations.
- ■ **8.AEE.C** Analyze and solve linear equations and pairs of simultaneous linear equations.

8.AFN - Algebraic Reasoning: Functions
- ■ **8.AFN.A** Define, evaluate, and compare functions.
- ■ **8.AFN.B** Use functions to model relationships between quantities.

8.NS - Numeric Reasoning: Number Systems
- □ **8.NS.A** Know that there are numbers that are not rational, and approximate them by rational numbers.

8.GM - Geometric Reasoning and Measurement
- ■ **8.GM.A** Understand congruence and similarity using physical models, transparencies, or geometry software.
- □ **8.GM.B** Understand and apply the Pythagorean Theorem.
- ○ **8.GM.C** Solve mathematical problems in authentic contexts involving volume of cylinders, cones, and spheres.

8.DR - Data Reasoning
- ○ **8.DR.A** Formulate Statistical Investigative Questions.
- ○ **8.DR.B** Collect and Consider Data.
- □ **8.DR.C** Analyze, summarize, and describe data.
- ■ **8.DR.D** Interpret data and answer investigative questions.

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Grade 8 Math Standards (2021)

ALGEBRAIC REASONING: EXPRESSIONS AND EQUATIONS (8.AEE)

8.AEE.A *Expressions and Equations Work with radicals and integer exponents.*

8.AEE.A.1 Apply the properties of integer exponents using powers of 10 to generate equivalent numerical expressions.

8.AEE.A.2 Represent solutions to equations using square root and cube root symbols.

8.AEE.A.3 Estimate very large or very small quantities using scientific notation with a single digit times an integer power of ten.

8.AEE.A.4 Perform operations with numbers expressed in scientific notation.

8.AEE.B *Understand the connections between proportional relationships, lines, and linear equations.*

8.AEE.B.5 Graph proportional relationships in authentic contexts. Interpret the unit rate as the slope of the graph, and compare two different proportional relationships represented in different ways.

8.AEE.B.6 Write the equation for a line in slope intercept form $y = mx + b$, where m and b are rational numbers, and explain in context why the slope m is the same between any two distinct points.

8.AEE.C *Analyze and solve linear equations and pairs of simultaneous linear equations.*

8.AEE.C.7 Solve linear equations with one variable including equations with rational number coefficients, with the variable on both sides, or whose solutions require using the distributive property and/or combining like terms.

8.AEE.C.8 Find, analyze, and interpret solutions to pairs of simultaneous linear equations using graphs or tables.

ALGEBRAIC REASONING: FUNCTIONS (8.AFN)

8.AFN.A *Define, evaluate, and compare functions.*

8.AFN.A.1 Understand in authentic contexts, that the graph of a function is the set of ordered pairs consisting of an input and a corresponding output.

8.AFN.A.2 Compare the properties of two functions represented algebraically, graphically, numerically in tables, or verbally by description.

8.AFN.A.3 Understand and identify linear functions, whose graph is a straight line, and identify examples of functions that are not linear.

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8.AFN.B *Use functions to model relationships between quantities.*

8.AFN.B.4 Construct a function to model a linear relationship in authentic contexts between two quantities.

8.AFN.B.5 Describe qualitatively the functional relationship between two quantities in authentic contexts by analyzing a graph.

NUMERIC REASONING: NUMBER SYSTEMS (8.NS)

8.NS.A *Know that there are numbers that are not rational, and approximate them by rational numbers.*

8.NS.A.1 Know that real numbers that are not rational are called irrational.

8.NS.A.2 Use rational approximations of irrational numbers to compare size and locate on a number line.

GEOMETRIC REASONING AND MEASUREMENT (8.GM)

8.GM.A *Understand congruence and similarity using physical models, transparencies, or geometry software.*

8.GM.A.1 Verify experimentally the properties of rotations, reflections, and translations.

8.GM.A.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations.

8.GM.A.3 Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.

8.GM.A.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and/or dilations.

8.GM.A.5 Use informal arguments to establish facts about interior and exterior angles of triangles and angles formed by parallel lines cut with a transversal.

8.GM.B *Understand and apply the Pythagorean Theorem.*

8.GM.B.6 Distinguish between applications of the Pythagorean Theorem and its Converse in authentic contexts.

8.GM.B.7 Apply the Pythagorean Theorem in authentic contexts to determine unknown side lengths in right triangles.

8.GM.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

8.GM.C *Solve mathematical problems in authentic contexts involving volume of cylinders, cones, and spheres.*

8.GM.C.9 Choose and use the appropriate formula for the volume of cones, cylinders, and spheres to solve problems in authentic contexts.

DATA REASONING (8.DR)

8.DR.A   *Formulate Statistical Investigative Questions.*

8.DR.A.1   Formulate statistical investigative questions to articulate research topics and uncover patterns of association seen in bivariate categorical data.

8.DR.B   *Collect and Consider Data.*

8.DR.B.2   Collect or consider data using surveys and measurements to capture patterns of association, and critically analyze data collection methods.

8.DR.C   *Analyze, summarize, and describe data.*

8.DR.C.3   Analyze patterns of association between two quantitative or categorical variables and reason about distributions to compare groups.

8.DR.D   *Interpret data and answer investigative questions.*

8.DR.D.4   Interpret scatter plots for bivariate quantitative data to investigate patterns of association between two quantities to answer investigative questions.