

Standards for Mathematical Practice

The eight standards for mathematical practice describe the “know-how” or habits of mind that we seek to develop in students. These practices define important methods and skills that students need to be mathematically proficient.

- 1. Make sense of problems and persevere in solving them.**
Students seek the meaning of a problem and looks for efficient ways to represent and solve it. They may check their thinking by asking themselves, “What is the most efficient way to solve this?”, “Does this make sense?”, and “Can I solve the problem in a different way?”.
- 2. Reason abstractly and quantitatively.**
Students represent a wide variety of real world contexts through the use of real numbers and variables in mathematical expressions, equations, and inequalities.
- 3. Construct viable arguments and critique the reasoning of others.**
Students construct arguments using verbal or written explanations. They further refine their mathematical communication skills through mathematical discussions in which they critically evaluate their own thinking and the thinking of other students.
- 4. Model with mathematics.**
Students model problem situations symbolically, graphically, tabularly, and contextually. Students need many opportunities to connect and explain the connections between the different representations.
- 5. Use appropriate tools strategically.**
Students consider available tools (including estimation and technology) when solving a mathematical problem and decide when certain tools might be helpful.
- 6. Attend to precision.**
Students use clear and precise language in their mathematical discussions with others and in their own reasoning.
- 7. Look for and make use of structures.**
Students routinely seek patterns or structures to model and solve problems. For instance, students recognize patterns that exist in ratio tables recognizing both the additive and multiplicative properties.
- 8. Look for and express regularity in repeated reasoning.**
Students’ use of repeated reasoning to understand algorithms and make generalizations about patterns.

Portland Public Schools



Great Expectations: Standards and Practices for 8th Grade Mathematics

What are the Common Core State Standards?

For over a decade, research studies of mathematics education in high performing countries have concluded that mathematics instruction in the United States must become more focused and coherent in order to improve mathematics achievement. Historically, math standards have varied from state to state. In June of 2009, the development of the **Common Core State Standards** (CCSS) began. Oregon, along with over 45 other states, has adopted the CCSS and started assessing them in the 2014-15 school year.

The CCSS provide a clear and consistent understanding of what students are expected to learn in K-12 math. Common standards will help ensure that students are receiving a high quality education consistently, from school to school, and state to state. CCSS for mathematics includes two types of standards: one for **mathematical practices** (how students engage, apply, and extend their understandings of mathematical concepts) and one for **mathematical content** (what mathematical skills and procedures students are expected to know).

This guide outlines the mathematical content and practice standards that are taught in 8th Grade Math. The math content will focus on the following critical areas: knowing that not all numbers are rational; solving problems with exponents; connecting the ideas of proportional relationships, lines, and linear equations; understanding what a function is; using functions to model relationships between quantities; understanding congruence and similarity; understanding and applying the Pythagorean Theorem; solving real-world problems involving volume; and investigating patterns in two variable data. The eight mathematical practices define the ways that students engage with mathematics.

Eighth Grade Math Learning Targets

These learning targets encompass what a student should be proficient in by the end of Math 8.
Mastery of this content will ensure student success at the next level.

The Number System

(Example: Determine whether each number is rational or irrational: a. 16 b. 13 c. π d. $1.\bar{6}$ e. 6^2 Explain how you know.)

- **8.NS.1** - I can identify and convert rational and irrational numbers.
- **8.NS.2** - I can compare rational and irrational numbers using approximation.

Expressions and Equations

(Example: Solve and identify how many solutions each problem has:
a. $5x + 8 = 5x + 3$ b. $9x = 8 + 5x$ c. $6x + 3 + 9 = 6x + 12$)

- **8.EE.1** - I can apply the properties of integer exponents to simplify expressions.
- **8.EE.2** - I can solve an equation with square and cube roots.
- **8.EE.3** - I can compare and perform operations with scientific notation.
- **8.EE.4** - I can compare proportional relationships by graphing, finding slope, and writing an equation.
- **8.EE.5** - I can solve linear equations.
- **8.EE.6** - I can solve a system graphically and algebraically.

Functions

(Example: Is $-4x + y = 7$ a function? Describe the properties that either make it a function or not.)

- **8.F.1** - I can identify, model, and compare functions.

Geometry

(Example: Are the following three side lengths a right triangle? Prove your answer.
a. 3, 4, 5 b. 6, 8, 15)

- **8.G.1** - I can rotate, reflect, translate, and dilate figures.
- **8.G.2** - I can describe how two figures are similar or congruent using transformations.
- **8.G.3** - I can solve problems involving angles.
- **8.G.4** - I can apply the Pythagorean Theorem.
- **8.G.5** - I know and can use the formulas for the volumes of cones, cylinders, and spheres.

Statistics and Probability

(Example: Following is 10 days of data which shows the sale of apples and mangoes. Describe the association between the apple and mango sales.)

Days	1	2	3	4	5	6	7	8	9	10
Apple	62	49	81	26	45	55	16	74	97	34
Mango	36	44	49	37	26	11	76	83	64	81

- **8.SP.1** - I can construct a scatter plot and use it to interpret patterns in data.
- **8.SP.2** - I can construct a two-way table to interpret its relative frequencies.