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 Geometry

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 Geometry. The math content will focus on the following critical areas: drawing rigid transformations; using theorems, postulates, or definitions about lines and angles; determining similarity; using appropriate tools to find missing sides and angles in right triangles; justifying congruency and proving theorems; justifying a claim about a figure using the coordinate grid; applying the properties of angles within circles; applying geometric concepts in modeling situations; calculating volumes; and calculating conditional and independent probabilities. The eight mathematical practices define the ways that students engage with mathematics.

Geometry Learning Targets

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

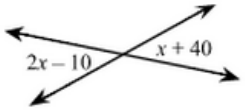
G1: Transformations

(Example: For a given shape, demonstrate a reflection, rotation, and a translation.)

- **G1a** - I can draw rigid transformations.

G2: Lines & Angles

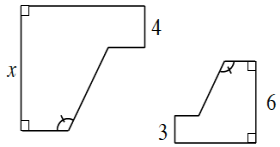
(Example: Solve for *x* and name the relationship you used.)



- **G2a** - I can use theorems, postulates, or definitions about lines and angles.

G3: Similarity

(Example: The two shapes are similar. Find the value of *x*. Show all work.)



- **G3a** - I can determine that two figures are similar.

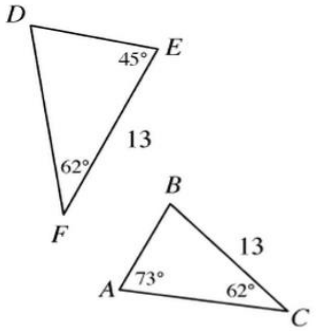
G4: Trigonometry

(Example: To paint a house, Travis leans a ladder against the wall. If the ladder is 16 feet long and it makes contact with the house 14 feet above the ground, what angle does the ladder make with the ground? Draw a diagram of this situation and show all work.)

- **G4a** - I can use appropriate tools to find missing sides and angles in right triangles.

G5: Triangles & Quadrilaterals: Application & Proof

(Example: In the diagram, determine whether the triangles are congruent or not. Make a flowchart/proof justifying your answer.)



- **G5a** - I can justify that two triangles are congruent and can use this to prove theorems about parallelograms.

G6: Coordinate Geometry

(Example: Plot and connect the points: *N* (-5,7) *O* (-1,13) and *D* (4,7). What kind of triangle is *NOD*? Justify your answer.)

- **G6a** - I can use coordinates of the vertices to compute perimeter and area.
- **G6b** - I can justify a claim about a figure using the coordinate grid.

G7: Circles

(Example: Identify the center & radius of the following circle: $(x + 5)^2 + (y - 7)^2 = 25$)

- **G7a** - I can apply the properties of angles within circles.
- **G7b** - I can calculate the area of a sector and arc length.
- **G7c** - I can identify the center and radius of a circle given its equation.

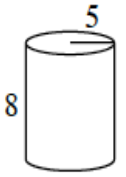
G8: Geometric Modeling & Constructions

(Example: Alaska is much less crowded than New Jersey. It has an approximate population of 698,000 and an area of 570,374 square miles. What is the density of people per square mile?)

- **G8a** - I can apply geometric concepts in modeling situations.
- **G8b** - I can use tools and methods to create constructions.

G9: Solids & Conics

(Example: Find the volume of the cylinder.)



- **G9a** - I can calculate the volume of a prism, cylinder, cone, pyramid, and sphere.
- **G9b** - I can identify the shapes of two-dimensional cross-sections of three-dimensional objects.

G10: Conditional Probability

(Example: Susannah has a stack of cards numbered 1 through 50. What is the probability that the card chosen at random is less than 23? What is the probability that the card chosen at random is a multiple of 5 or even?)

- **G10a** - I can calculate probabilities with unions and intersections.
- **G10b** - I can calculate conditional & independent probabilities.