

Geometry

In eighth grade, students explore angles and incorporate ideas about similarity and congruency to describe and analyze two-dimensional figures. Two shapes are **similar** when their corresponding angles are equal and their sides are in proportion—they have the same shape, but not necessarily the same size. Sometimes shapes need to be rotated (turned), reflected (flipped), translated (slid), or dilated (resized) to actually determine whether or not they are similar.

Shapes are **congruent** when they are the same shape and size. Whether they are rotated, reflected, or translated, they maintain their size and shape. For example, an equilateral triangle with a side length of 3 inches is similar to an equilateral triangle with a side length of 5 inches. However, it is congruent only to another equilateral triangle with a side length of 3 inches.

Students will learn and apply the **Pythagorean Theorem**, which describes the relationship between the three sides of a right triangle. The theorem is stated mathematically for a triangle having side lengths a , b , and c as $a^2 + b^2 = c^2$, where c is the hypotenuse. The Pythagorean theorem can be applied in many practical ways (e.g., in construction). Knowing that a triangle has a right angle helps in calculating an unknown length of a side; conversely, knowing the lengths of the sides can help in determining whether a triangle has a right angle.

The Grade 8 Common Core State Standards for Geometry specify that students should—

- Understand congruence and similarity using physical models, transparencies, or geometry software.
- Understand and apply the Pythagorean Theorem.
- Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

The following hands-on activities will help students learn geometry concepts in a meaningful way. Mathematically proficient students explain correspondences between equations and representations. They ask whether an answer makes sense within the context of a problem they are solving. Teachers should facilitate this process. For example, teachers will want to help students understand the meaning behind the Pythagorean theorem, and not merely teach the application of the formula.