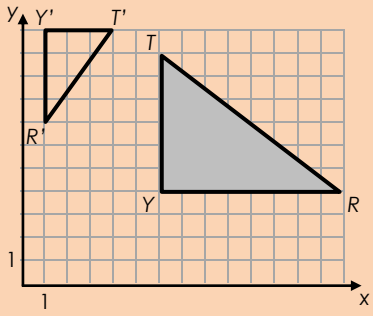
Unit 10: Similarity

Dear Parents/Guardians,

Unit 10 builds on the geometric concepts from Unit 9. In Lesson 1, students explore a fourth transformation, dilations. In Lesson 2, students see how dilations lead to a definition of similarity and compare this with the definition of congruence. In Lesson 3, students determine whether two triangles are similar using the Angle-Angle Criterion for Similarity of Triangles. They connect similar triangles to the slope of a line and solve triangle problems to find missing measures.

Dilations and Similarity

A dilation is a transformation where the image is not congruent to the original figure (unless the scale factor is 1).



Two figures are similar if one can be obtained from another by a sequence of (one or more) translations, rotations, reflections, and **dilations.**

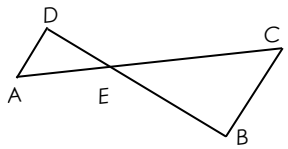
$\triangle R'Y'T'$ can be obtained from $\triangle RYT$ by:

- **Rotating** $\triangle RYT$ 90° clockwise around Y
- **Translating** $\triangle RYT$ up 7 and to the left 5
- **Dilating** $\triangle RYT$ with a scale factor of $\frac{1}{2}$

Similar Triangles

Another way to determine if two triangles are similar is the Angle-Angle Criterion for Similarity of Triangles. If two angles in one triangle are equal in measure to two angles in another triangle, then the triangles are similar.

Given: $\overline{AD} \parallel \overline{BC}$

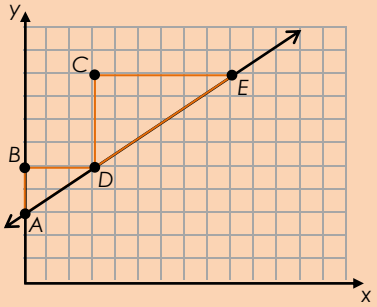


Statement	Reason
$\angle AED \cong \angle CEB$	Vertical angles are congruent.
$\angle DAE \cong \angle BCE$	Alternate interior angles are congruent.
$\Delta ADE \sim \Delta CBE$	Angle-Angle Criterion.

Similarity and Slope

Applying the Angle-Angle Criterion, students will determine that the slope of a line is always the same as the ratio of lengths of similar right triangle legs and use these properties to prove that triangles are similar.

Statement	Reason
$\angle ABD \cong \angle DCE$	Both are right angles.
$\overline{BD} \parallel \overline{CE}$	Both line segments are horizontal.
$\angle BDA \cong \angle CDE$	Line $\overleftrightarrow{AE}$ is the transversal. Corresponding angles are congruent.
$\triangle ABD \sim \triangle DCE$	AA Criterion



The lengths of corresponding sides of similar triangles are proportional.

$\frac{|AB|}{|BD|} = \frac{2}{3}$ $\frac{|CD|}{|CE|} = \frac{4}{6} = \frac{2}{3}$. The slope of line $\overleftrightarrow{AE}$ is $\frac{2}{3}$.

Center For Mathematics And Teaching

Math Links GRADE 8

By the end of the unit, your student should know…

- How perform and understand properties of dilations [Lesson 10.1]
- How to apply the Pythagorean theorem to explore properties of dilations and similarity [Lessons 10.1, 10.2]
- How do define similarity [Lesson 10.2]
- How similarity and congruence are the same and how they are different [Lessons 10.2, 10.3]
- How to define the angle-angle criterion for similarity of triangles and use it to solve problems [Lesson 10.3]
- How to use the connection between parallel lines and similar triangles to slopes of lines to solve for missing triangle measures [Lesson 10.3]

Additional Resources

- For definitions and additional notes please refer to Student Resources at the end of this unit.
- For more information on dilations: https://youtu.be/BCIlaARDOWI