Packet 14: Congruence and Similarity

Dear Parents/Guardians,

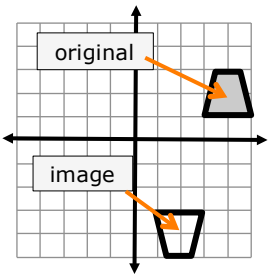
Packet 14 explores congruence and similarity through transformational geometry. In lesson 1, students use the three transformations they studied in Packet 13 to arrive at a definition of congruence. In lesson 2, students learn a fourth transformation, dilations. In lesson 3, students see how dilations lead to a definition of similarity.

Congruence

Two figures are congruent if one can be moved to exactly cover the other through a series of translations, reflections and/or rotations.

See Packet 13 for translations, reflections and rotations.

Using transformations, students draw congruent figures. They explain at least two different ways to obtain the congruent figure.



Method 1:
1. Reflect over the x-axis.
2. Translate 4 units down and 2 units left.

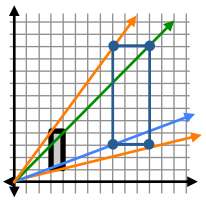
Method 2:
1. Rotate 180° around the origin.
2. Translate 2 units down and 4 units right.

Congruent figures:
- Have corresponding angles that are congruent.
- Have corresponding side lengths that are congruent.
- Are the same shape and same size.

Dilations and Similarity

A dilation is a transformation where the image is **not** the same size as the original figure (unless the scale factor is 1).

Example: Dilate the rectangle with a scale factor of 3, using the origin as the center.



1. Find the coordinates for the vertices of the rectangle.
   (3,1), (4,1), (3,4), (4,4)
2. Since the scale factor is 3 and the center is at the origin (0,0), multiply the coordinates of the original rectangle by 3.
   (9.3), (12,3), (9,12), (12,12)
3. Draw the dilation using the new coordinates.
4. To check that the center of the dilation is the origin, draw rays through corresponding vertices.

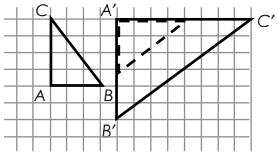
In the example above, the side lengths on the dilated figure are three times longer than the side lengths of the original rectangle. We say the two figures are similar.

Two figures are similar if one can be obtained from another by a sequence of translations, rotations, reflection, and **dilations.**

Similar figures:
- Have corresponding angles that are congruent.
- Have corresponding side lengths where one is the scale factor of the other.
- Are the same shape and proportional in size.

Comparing Similarity and Congruence

Students will draw figures and determine whether they are similar or congruent.



Triangle *A′B′C′* can be created from triangle *ABC* by
- Rotating triangle ABC 90° to the right
- Translating triangle ABC up 4 units and to the right 4 units
- Dilating triangle ABC with a scale factor of 2

Triangle *A′B′C′* is similar to triangle ABC, but not congruent.

Though all congruent figures are similar, not all similar figures are congruent.

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

The properties of congruent figures Lesson 14.1

How to apply properties of transformations to show that figures are congruent or similar Lessons 14.1 and 14.3

How to find the center point and scale factor of a dilation Lesson 14.2

The properties of similar figures Lesson 14.3

Additional Resources

Resource Guide (RG)
Part 2, page 49