

08 Transformations

Content Area: **Mathematics**
Course(s):
Time Period: **Week1**
Length: **1 Week**
Status: **Published**

Stage 1: Desired Results

Unit Overview/ Rationale

In this unit students will graph translations, reflections, and rotations. They will graph dilations and determine the scale factor of a dilation. They will identify sequences of transformations that produce congruent figures and those that produce similar figures. They will determine whether everyday figures have rotational symmetry.

Standards & Indicators

Common Core: Mathematics, Common Core: Grade 8 Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

MA.8.8.G

Geometry

MA.8.8.G.A

Understand congruence and similarity using physical models, transparencies, or

	geometry software.
MA.8.8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations:
MA.8.8.G.A.1a	Lines are transformed to lines, and line segments to line segments of the same length.
MA.8.8.G.A.1b	Angles are transformed to angles of the same measure.
MA.8.8.G.A.1c	Parallel lines are transformed to parallel lines.
MA.8.8.G.A.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
MA.8.8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
MA.8.8.G.A.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

Big Ideas - Students will understand that...

-Three types of transformations that change a figure's position, but not its size or shape, are translations, reflections, and rotations.

-A translation is described by the distance and direction that each point in the original figure moves to create the image.

-A reflection requires a line of reflection over which the original figure flips to form the image.

-A segment joining a point and its reflection image is perpendicular to the line of reflection.

-A figure can have zero, one, or more than one lines of symmetry.

-Every figure can be rotated 360° to match its original figure exactly.

-Rotating a figure 180° produces the same image as a reflection over the x-axis and y-axis.

-Transformations that translate, reflect, and rotate a figure do not change its size or shape.

-Transformations that translate, reflect, and rotate a figure can change the position and orientation of a figure.

-A dilation transformation changes the size but not the shape.

-To define dilation, you need to know the scale factor and the point that is the center of dilation.

-A dilation is a similarity transformation that reduces or enlarges a two-dimensional figure when using a scale that is not equal to 0 or 1.

-Because dilation changes the size of a figure, the transformed image is similar to the original figure.

-A series of transformations that includes a dilation results in a similar image.

Essential Questions - What provocative questions will foster inquiry and transfer of learning

-How can transformations and symmetry be used to investigate and describe geometric situations?

-How can transformations be used to investigate congruence, symmetry and vice versa?

-How can coordinate graphing aid reasoning to help solve real world problems?

-How can a coordinate grid be used to model and describe the results of various transformations?

Content - Students will know...

Key Vocabulary

Angle of rotation, center of rotation, dilation, enlargement, image, line of reflection, line of symmetry, reduction, reflection, reflectional symmetry, rotation, rotational symmetry, scale factor, transformation, translation

Skills - Students will be able to...

-Graph and describe translations in the coordinate plane.

-Graph reflections in the coordinate plane and to identify lines of symmetry.

-Graph rotations and identify rotational symmetry.

-Describe a sequence of transformations that maps one figure onto another.

-Determine whether two figures are congruent by using a sequence of transformations.

-Graph dilations and determine the scale factor of a dilation.

-Describe a sequence of transformations that maps one figure onto another.

-Determine whether two figures are similar by using a sequence of transformations.

Stage 2: Assessment Evidence

Assessment

Stage 3: Learning Plan

Learning Activities

Activities:

Students will graph and describe translations, reflection, and rotations in the coordinate plane. Students will identify lines of symmetry and describe sequences of transformations to map one figure onto another. Students will use sequences to determine if whether two figures are congruent.

Formal Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to describe the sequence of transformations to map one figure onto another.

Example:

Given these three congruent figures on the coordinate plane, describe the sequence of transformations that maps the original figure onto the final image.

Sample Solution:

Translation 6 units down, reflection over the y-axis

Activities:

Students will graph dilations and determine the scale factor of dilation.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will graph dilations and determine the scale factor of dilation.

Example"

The blue figure is a dilation of the black figure. Find the scale factor and classify the dilation as an enlargement or a reduction

Sample Solution:

Scale factor: 4, enlargement

Activities:

Students will describe sequences of transformations to map one figure onto another that is similar. Students will determine whether two figures are similar by using a sequence of transformations.

Formative Assessment:

Teacher observation of student work in small-group and independent practice.

Closure:

Students will be asked to describe the sequence of transformations to map one figure onto another.

Example:

Given 3 similar figures on the coordinate plane, describe the sequence of transformations to map the original figure onto the final image.

Sample Solution:

Translation 5 units right and 4 units up, dilation with scale factor 2 centered at (0,0)

Resources

Prentice Hall Course 3 Mathematics Common Core

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Chapter 8