

TOPIC 6

Congruence and Similarity

In this topic, students study transformations, congruent figures, and similar figures.



CONNECT THE MATH

Many digital artists use transformations in their work. They slide (*translate*), flip (*reflect*), turn (*rotate*), enlarge or reduce (*dilate*) images. Sometimes they combine transformed images together to make a new image.

A smartphone photo app transforms pictures in a photo library quickly and easily. Other transformations include mosaic tile patterns and kaleidoscopes.

Challenge yourself and your student to find pieces of art that have repeated patterns that use several different transformations.





LESSON 6-1

Analyze Translations

A translation moves every point of a figure the same distance in the same direction. The original figure and its translated image are the same size and shape, only at different locations.

LESSON OBJECTIVES

- Use coordinates to describe the rules of a translation.
- Translate a two-dimensional figure on a coordinate plane by mapping each of its vertices.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What Is a Translation?](#)
- [What Properties of a Figure Stay the Same After a Translation?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [image](#)
- [transformation](#)
- [translation](#)

You can use these search terms and phrases to help your student find additional help online:

- understanding translations
- translating a figure on the coordinate plane
- writing a rule for a translation

LESSON 6-2

Analyze Reflections

Reflections create images that have the same size and shape but different orientation. The image and preimage are the same distance from the line of reflection.

LESSON OBJECTIVES

- Understand reflections as a type of transformation and how they differ from translations.
- Use coordinates to describe the image created by a reflection.
- Reflect a two-dimensional figure on a coordinate plane.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What Is a Reflection?](#)
- [How Do You Use Coordinates to Reflect a Figure Over the y-Axis?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [line of reflection](#)
- [reflection](#)

You can use these search terms and phrases to help your student find additional help online:

- understanding reflections
- reflecting a figure on a coordinate plane
- writing a rule for a reflection



LESSON 6-3

Analyze Rotations

Rotations create images that have the same size, shape, and orientation as the preimages. A rotation is created by moving each point of the preimage around a fixed point, called the center of rotation. The number of degrees a figure is rotated around the center of rotation is the angle of rotation.

LESSON OBJECTIVES

- Identify and perform a rotation.
- Describe a rotation.
- Determine how a rotation affects a two-dimensional figure.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What Is a Rotation?](#)
- [How Do You Rotate a Figure 90 Degrees Clockwise Around the Origin?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [angle of rotation](#)
- [center of rotation](#)
- [rotation](#)

You can use these search terms and phrases to help your student find additional help online:

- understanding rotations
- reflecting a figure on the coordinate plane
- writing a rule for a reflection

LESSON 6-4

Compose Transformations

It is possible to use more than one transformation to map a preimage onto its image. This is called a sequence of transformations. Sometimes it can be easier to find a required transformation using a sequence of simple steps.

LESSON OBJECTIVES

- Describe and perform a sequence of transformations.
- Apply their knowledge of transformation to solve problems.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What is a Transformation?](#)
- [How Do You Use a Graph to Translate a Figure Horizontally?](#)

You can use these search terms and phrases to help your student find additional help online:

- understanding a sequence of transformations
- a sequence of transformations on a coordinate plane

LESSON 6-5

Understand Congruent Figures

When a sequence of transformations (translations, reflections, and rotations) maps one figure onto another figure with the same shape and size, the figures are congruent.

LESSON OBJECTIVES

- Use a sequence of transformations to justify the congruence of figures.
- Understand that reflections, rotations, and translations are actions that

produce congruent geometric figures.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What Does Congruence Mean?](#)
- [What is a Congruence Transformation, or Isometry?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [congruent figures](#)

You can use these search terms and phrases to help your student find additional help online:

- understanding congruence
 - identifying congruent figures
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LESSON 6-6

Describe Dilations

After the dilation of a figure, the preimage and its image are the same shape and orientation, but different sizes. A scale factor greater than 1 produces an enlargement. A scale factor between 0 and 1 produces a reduction.

LESSON OBJECTIVES

- Verify the properties of a dilation.
- Graph the image of a dilation given a fixed center and a common scale factor.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What is a Dilation?](#)
- [How Do You Make a Figure Larger Using a Dilation?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [dilation](#)
- [scale factor](#)
- [enlargement](#)
- [reduction](#)

You can use these search terms and phrases to help your student find additional help online:

- understanding dilations
- dilating to enlarge a figure
- dilating to reduce a figure

LESSON 6-7

Understand Similar Figures

Two figures can be shown to be similar by finding a sequence of transformations, including a dilation, that maps one figure onto the other.

LESSON OBJECTIVE

- Perform a sequence of transformations to identify similar figures.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What are Similar Figures?](#)
- [How Do You Identify a Similarity Transformation?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [Similar figures](#)

You can use these search terms and phrases to help your student find additional help online:

- understanding similarity
- identifying similar figures

LESSON 6-8

Angles, Lines, and Transversals

Corresponding angles and alternate interior angles formed by parallel lines and a transversal are congruent. Same-side interior angles are supplementary.

LESSON OBJECTIVES

- Identify relationships between angles formed by parallel lines and a transversal.
- Determine the measures of angles formed by parallel lines and a transversal.
- Reason about parallel lines.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [How Do You Find Missing Angles in a Transversal Diagram?](#)
- [What is a Transversal?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [transversal](#)
- [corresponding angles](#)
- [alternate interior angles](#)
- [same-side interior angles](#)

You can use these search terms and phrases to help your student find additional help online:

- identifying angles created by parallel lines cut by a transversal
- finding unknown angle measures
- using algebra to find unknown angle measures



LESSON 6-9

Interior and Exterior Angles of Triangles

The sum of the measures of the interior angles of a triangle is 180° . The measure of an exterior angle of a triangle is equal to the sum of the measures of the remote interior angles.

LESSON OBJECTIVES

- Determine unknown measures of interior and exterior angles of triangles.
- Write and solve algebraic equations to find angle measures.

HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What Is the Triangle Sum Theorem?](#)
- [How Can You Find the Remote Interior Angles and Exterior Angles of Triangles?](#)

Review Key Vocabulary

Review key vocabulary from this lesson in your student's glossary:

- [exterior angle of a triangle](#)
- [remote interior angles](#)

You can use these search terms and phrases to help your student find additional help online:

- finding exterior angle measures of a triangle
- finding interior angle measures of a triangle



LESSON 6-10

Angle-Angle Triangle Similarity

You can conclude that two triangles are similar by showing that two angles of one triangle are congruent to two angles of the other triangle using the Angle-Angle Criterion. Triangle similarity can be used to determine unknown angle measures.

LESSON OBJECTIVES

- Determine triangle similarity by comparing the angle measures of the triangles.
 - Solve algebraic problems involving similar triangles.
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HOW CAN YOU HELP WITH HOMEWORK

Review Lesson Content

Watch and share these video tutorials with your student:

- [What is the Angle-Angle Postulate for Triangle Similarity?](#)
- [How Do You Determine if Two Triangles are Similar Using the AA Similarity Postulate?](#)

You can use these search terms and phrases to help your student find additional help online:

- determining whether triangles are similar
- solving problems involving similar triangles