SHAPE NAMES

Three-Dimensional Figures or Space Figures
- Rectangular Prism
- Cylinder
- Cone
- Sphere

Two-Dimensional Figures or Plane Figures
- Square
- Rectangle
- Triangle
- Circle

Name each shape.

1. Triangle
2. Cone
3. Square
4. Circle
5. Rectangular Prism
6. Circle
7. Cylinder
8. Rectangle

9. Which figures in the exercises are plane figures? 1, 3, 6, 8
10. Which figures in the exercises are space figures? 2, 4, 5, 7

CHALLENGE
Name a real-life example of a rectangular prism, a cylinder, a cone, and a sphere.

[Answers may vary. Possible answers: rectangular prism: cereal box; cylinder: can of soup; cone: ice cream cone; sphere: ball]
SHAPE NAMES

Three-Dimensional Figures

cube  rectangular prism  square pyramid  sphere  cylinder  cone

Polygons

triangle  rectangle  square  pentagon  hexagon  octagon

Name each figure.

1. square pyramid
2. cylinder
3. pentagon
4. triangle

5. rectangle
6. sphere
7. hexagon
8. cone

CHALLENGE

A polygon with four sides is called a quadrilateral. Draw a quadrilateral that is not a rectangle. Then draw another quadrilateral that is not a parallelogram and not a trapezoid.
SHAPE NAMES

Polygons

<table>
<thead>
<tr>
<th>Triangle</th>
<th>Quadrilateral</th>
<th>Pentagon</th>
<th>Hexagon</th>
<th>Octagon</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Triangle" /></td>
<td><img src="image2" alt="Quadrilateral" /></td>
<td><img src="image3" alt="Pentagon" /></td>
<td><img src="image4" alt="Hexagon" /></td>
<td><img src="image5" alt="Octagon" /></td>
</tr>
<tr>
<td>3 sides</td>
<td>4 sides</td>
<td>5 sides</td>
<td>6 sides</td>
<td>8 sides</td>
</tr>
<tr>
<td>3 angles</td>
<td>4 angles</td>
<td>5 angles</td>
<td>6 angles</td>
<td>8 angles</td>
</tr>
</tbody>
</table>

Special Quadrilaterals

<table>
<thead>
<tr>
<th>Trapezoid</th>
<th>Parallelogram</th>
<th>Rectangle</th>
<th>Rhombus</th>
<th>Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only two</td>
<td>Opposite sides</td>
<td>Parallelogram</td>
<td>Parallelogram</td>
<td>Rectangle</td>
</tr>
<tr>
<td>parallel sides.</td>
<td>are parallel and</td>
<td>with 4 right</td>
<td>with all sides the</td>
<td>with all sides the</td>
</tr>
<tr>
<td></td>
<td>the same length.</td>
<td>angles.</td>
<td>same length.</td>
<td>same length.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Name each polygon.

1. 
2. 
3. 
4. 

Classify each quadrilateral. Some may have more than one name.

5. 
6. 
7. 

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PROPERTIES OF GEOMETRIC FIGURES

**Angles**

**Right Angle**
A right angle forms a square corner.

The square in the corner means the angle is a right angle.

**Acute Angle**
An acute angle is less than a right angle.

**Obtuse Angle**
An obtuse angle is greater than a right angle.

Tell whether each angle is right, acute, or obtuse.


Tell whether the angle each arrow points to is right, acute, or obtuse.

5. [Obtuse] 6. [Right]

**CHALLENGE**

Draw a triangle with an obtuse angle.
**PROPERTIES OF GEOMETRIC FIGURES**

**Angles**

- **Right Angle**
  A right angle forms a square corner.

- **Acute Angle**
  An acute angle is less than a right angle.

- **Obtuse Angle**
  An obtuse angle is greater than a right angle.

An angle can be named in three ways.

- $\angle B$ or $\angle ABC$ or $\angle CBA$
- Read: angle B or angle ABC or angle CBA
- Two rays meet at an endpoint to form an angle. The endpoint is always included in the angle name.

**Tell whether each angle is right, acute, or obtuse.**

1.  
2.  
3.  
4.  

**For each figure, tell whether $\angle ABC$ is right, acute, or obtuse.**

5.  
6.  
7.  
8.  

**CHALLENGE**

Classify each of the angles of the parallelogram.
PROPERTIES OF GEOMETRIC FIGURES

An angle is formed when two rays meet at the same endpoint, or vertex. The angle can be named by three letters or by its vertex:

\[ \triangle B \] or \[ \triangle ABC \] or \[ \triangle CBA \]

Angles are measured in degrees (°).

<table>
<thead>
<tr>
<th>Right Angle</th>
<th>Acute Angle</th>
<th>Obtuse Angle</th>
<th>Straight Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>A right angle measures 90°.</td>
<td>An acute angle is greater than 0° and less than 90°.</td>
<td>An obtuse angle is greater than 90° and less than 180°.</td>
<td>A straight angle measures 180°.</td>
</tr>
</tbody>
</table>

Use the figure below. Tell whether each angle is right, acute, obtuse, or straight.

1. \( \triangle DCG \)
2. \( \triangle GDE \)
3. \( \triangle CDE \)
4. \( \triangle CDG \)

Use the figure below. Name as many examples of each type of angle as possible.

5. acute
6. obtuse
7. right
8. straight
ALTERING SHAPES

Shapes can be combined to make different shapes.
Joining two squares makes a rectangle:

<table>
<thead>
<tr>
<th>Joining two squares makes a rectangle:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Shapes can be divided to make different shapes.
Dividing a rectangle along the diagonal makes two triangles:

<table>
<thead>
<tr>
<th>Dividing a rectangle along the diagonal makes two triangles:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Name the shapes used to make each figure.

1. [Diagram of a figure made from a square and two triangles]

2. [Diagram of a figure made from a rectangle and two triangles]

3. [Diagram of a figure made from a square and a triangle]

4. [Diagram of a figure made from two rectangles and four triangles]

5. [Diagram of a figure made from six triangles]

6. [Diagram of a figure made from three rectangles]

CHALLENGE

Make a new shape by combining at least 3 different geometric shapes.
ALTERING SHAPES

Polygons can be combined to make different polygons.
Joining a square and two triangles makes a trapezoid:

Polygons can be divided to make different polygons.
Dividing a parallelogram along the diagonal makes two triangles:

Name the polygons used to make each figure. Then identify the figure.

1. 

2. 

3. 

4. 

5. 

6. 

CHALLENGE
Make a new shape by combining at least 3 different polygons.
ALTERING SHAPES

Polygons can be combined to make different polygons.

Joining two parallelograms can make a hexagon:

Polygons can be divided to make different polygons.

A hexagon can be divided into two trapezoids:

Name the polygons used to make each figure. Then identify the figure.

1. 

2. 

3. 

4. 

5. 

6. 

CHALLENGE

Make a pentagon by joining together 4 triangles.

Make a hexagon by joining together 6 triangles.
CONGRUENT AND SIMILAR SHAPES

Congruent Figures

These rectangles are congruent. Congruent figures have the same shape and the same size.

Similar Figures

These rectangles are similar. Similar figures have the same shape but not the same size.

Are the figures congruent, similar, or neither?

1. [congruent]

2. [congruent]

3. [congruent]

4. [similar]

5. [similar]

6. [neither]

7. [congruent]

8. [neither]
CONGRUENT AND SIMILAR SHAPES

**Congruent Figures**

Congruent figures have the same shape and the same size.

The rectangles are congruent.

**Similar Figures**

Similar figures have the same shape but not the same size.

The rectangles are similar.

Are the figures congruent, similar, or neither?

1. [Congruent]
2. [Similar]
3. [Congruent]
4. [Congruent]
5. [Congruent]
6. [Neither]

**CHALLENGE**

Danny takes a photograph of his house. Then he has the photograph enlarged. Is the house in the enlargement congruent to the house in the original photograph? Is it similar? Explain.

[It is not congruent because the enlargement is larger than the original. It is similar since everything should be enlarged by the same ratio.]
CONGRUENT AND SIMILAR SHAPES

Similar Figures
Similar figures have the same shape but not the same size.

The triangles are similar. The corresponding angles of the triangles are equal. The ratios of corresponding sides are equal.

Congruent Figures
Congruent figures have the same shape and the same size.

The triangles are congruent. Since they are the same shape, the triangles are also similar. The ratios of corresponding sides of the triangles is 1:1.

Are the figures congruent, similar, neither, or both?

1. [similar]
2. [neither]
3. [both]
4. [neither]

CHALLENGE
Draw a rectangle on the grid. Then draw a rectangle that is similar but not congruent to your rectangle. Explain how you know the rectangles are similar.
Write translation, reflection, or rotation to describe how each figure was moved.

1. 

2. 

3. 

4. 

CHALLENGE

Is the reflection of a figure congruent to the original figure? Explain.
**MOTION GEOMETRY**

**Translation**  
A translation slides a figure along a straight line left, right, up, or down.

**Reflection**  
A reflection flips a figure across a line. A reflection makes a mirror image.

**Rotation**  
A rotation is a turn that moves a figure around a point.

Write *translation*, *reflection*, or *rotation* to describe how each figure was moved.

1. \[ \text{R} \rightarrow \text{R} \]
2. \[ \text{R} \rightarrow \text{F} \]
3. \[ \text{G} \rightarrow \text{G} \]
4. \[ \text{D} \rightarrow \text{D} \]
5. \[ \text{C} \rightarrow \text{C} \]
6. \[ \text{F} \rightarrow \text{E} \]

**CHALLENGE**

Translations, reflections, and rotations are transformations of a figure. Do these transformations result in a figure congruent to the original figure? Explain.
MOTION GEOMETRY

A transformation moves a figure without changing its size or shape.

Transformations

Translation
A translation moves a figure along a straight line.

Reflection
A reflection flips a figure across a line. A reflection makes a mirror image.

Rotation
A rotation moves a figure by turning it around a point. All the points on the figure move in a circle. Some points move farther than others, depending on how far from the center of rotation they are.

Write translation, reflection, or rotation to describe how each figure was moved.

1. 

2. 

3. 

4. 

CHALLENGE

Draw a translation, reflection, and rotation of the triangle shown on the grid. Label each transformation.
LINES AND ANGLES

Lines, line segments, and rays are straight paths.

**Line**
A line goes on without end in two directions.

**Line Segment**
A line segment has two endpoints.

**Ray**
A ray has one endpoint and goes on without end in one direction.

**Special Types of Lines**

**Intersecting**
Intersecting lines are lines that cross at one point.

**Perpendicular**
Perpendicular lines cross at right angles.

**Parallel**
Parallel lines are lines in one plane that never cross.

Name each figure.

1. 
2. 
3. 
4. 

CHALLENGE
Which statement is always true? Explain.
(a) Intersecting lines are always perpendicular.
(b) Perpendicular lines always intersect.
LINES AND ANGLES

Lines, line segments, and rays are straight paths.

**Line**
A line is a straight path that goes on without end in two directions.

- line AB

**Line Segment**
A line segment is a part of a line. It has two endpoints.

- line segment CD

**Ray**
A ray is a part of a line. It has one endpoint and goes on without end in one direction.

- ray JK

**Intersecting Lines**
Intersecting lines are lines that cross at one point.

- line AB and line CD intersect at point E

**Perpendicular Lines**
Perpendicular lines intersect at right angles.

- line EF is perpendicular to line GH

**Parallel Lines**
Parallel lines are lines in one plane that never intersect.

- line MN is parallel to line QR

Name each figure.

1. \[\text{ray PQ}\]
2. \[\text{perpendicular lines AB and CD}\]
3. \[\text{parallel lines GH and JK}\]
4. \[\text{line XY}\]

**CHALLENGE**
Draw and label a diagram to illustrate each of the following:

- line GH parallel to line LM
- line RS and line XZ intersecting at point P
LINES AND ANGLES

**Line**
A line is a straight path that goes on without end in two directions.

- Line AB or \( \overline{AB} \)
- Line BA or \( \overline{BA} \)

**Line Segment**
A line segment is a part of a line. It has two endpoints.

- Line segment CD or \( \overline{CD} \)
- Line segment DC or \( \overline{DC} \)

**Ray**
A ray is a part of a line. It has one endpoint and goes on without end in one direction.

- Ray JK or \( \overline{JK} \)

**Intersecting Lines**
Intersecting lines are lines that cross at one point.

- \( \overline{AB} \) and \( \overline{CD} \) intersect at point E

**Perpendicular Lines**
Perpendicular lines intersect at right angles.

- \( \overline{EF} \perp \overline{GH} \)
- \( \perp \) means “is perpendicular to”

**Parallel Lines**
Parallel lines are lines in one plane that never intersect.

- \( \overline{MN} \parallel \overline{QR} \)
- \( \parallel \) means “is parallel to”

Use the figure at the right to name an example of each term.

1. perpendicular lines ______________
2. ray ______________
3. line segment ______________
4. intersecting lines ______________
5. parallel lines ______________
6. line ______________

Draw and label a figure for each.

7. line FG
8. \( \overline{PQ} \parallel \overline{ST} \)
9. \( \overline{RS} \perp \overline{MN} \)
A map is a diagram that shows relationships among places, often including distance information.
This map shows some places near Bev’s house.
The map shows that Bev lives 4 miles from her school.

Use the map above to answer each question.

1. How many miles is Bev’s house from the library? _______
2. How many miles does Karl live from the mall? _______
3. Who lives closer to school, Bev or Karl? How much closer?

4. Bev goes from her house, to the library, and then to the post office. At that point, how far did she travel? _______
5. How many miles is a round trip from Karl’s house to school and back? _______
6. Who lives closer to the library, Bev or Karl? Explain.

CHALLENGE
What is the shortest route to the school from the library shown on the map?
What is the distance?
MAP AND DRAWING SCALES

A map is a diagram that shows distances between different locations. The map below shows some trails in a forest. It is 1 mile between each pair of circle markers shown on the map. So, it is 6 miles from the trailhead to the top of the Trail A.

Use the map above to answer each question.

1. How far is it from the trailhead to the top of Trail B? ______
2. How far is it from the trailhead to the top of Trail C? ______
3. Trail D connects Trails B and C. How long is Trail D? ______
4. Start at the trailhead and start to follow Trail B. Then go along Trail D to the top of Trail C. How far is it to the top? ______
5. What is the total roundtrip distance from the trailhead to the top of Trail A and back? ______
6. What is the shortest total distance of a hike that starts at Trail C, turns onto Trail D and then follows Trail B to the trailhead of Trail B? ______
7. How much longer is a roundtrip hike from the trailhead to the top of Trail C than a roundtrip hike to the top of Trail A? ______

CHALLENGE

Suppose the distance between each pair of markers on the map were 5 miles. How far would it be to the top of Trail A? Explain.
MAP AND DRAWING SCALES

A scale drawing is a drawing that shows a real object enlarged or reduced. The scale is a ratio that compares the size of the object in the drawing to the size of the actual object.

The map shows the location of 7 different sites an archaeologist is mapping.

What is the actual distance between Site A and Site B?
The map uses the scale 1 inch = 12 miles.

Use a ruler to measure the distance from Site A to Site B on the map. The distance on the map is $2\frac{1}{2}$ or 2.5 inches.

Find an equivalent ratio to find the actual distance.

\[
\frac{\text{actual distance}}{\text{map scale distance}} = \frac{12 \text{ mi}}{1 \text{ in.}} = \frac{2.5 \text{ in.}}{\text{actual distance}}
\]

Think: $2.5 \times 12 = 30$  \[\frac{12 \text{ mi}}{1 \text{ in.}} = \frac{30 \text{ mi}}{2.5 \text{ mi}}\]

The actual distance between the sites is 30 miles.

Use the above map and map scale to find each distance.

1. What is the actual distance between Site B and Site C? ______
2. What is the actual distance between Site C and Site D? ______
3. What is the actual distance between Site D and Site E? ______
4. What is the actual distance between Site E and Site F? ______
5. What is the actual distance between Site F and Site G? ______
SHAPE NAMES

Three-Dimensional Figures or Space Figures

Rectangular Prism

Cylinder

Cone

Sphere

Two-Dimensional Figures or Plane Figures

Square

Rectangle

Triangle

Circle

Name each shape.

1. [triangle]
2. [cone]
3. [square]
4. [sphere]
5. [rectangular prism]
6. [circle]
7. [cylinder]
8. [rectangle]

9. Which figures in the exercises are plane figures? [1, 3, 6, 8]
10. Which figures in the exercises are space figures? [2, 4, 5, 7]

CHALLENGE

Name a real-life example of a rectangular prism, a cylinder, a cone, and a sphere.

[Answers may vary. Possible answers: rectangular prism: cereal box; cylinder: can of soup; cone: ice cream cone; sphere: ball]
SHAPE NAMES

Three-Dimensional Figures
- cube
- rectangular prism
- square pyramid
- sphere
- cylinder
- cone

Polygons
- triangle
- rectangle
- square
- pentagon
- hexagon
- octagon

Name each figure.

1. [square pyramid]
2. [cylinder]
3. [pentagon]
4. [triangle]
5. [rectangle]
6. [sphere]
7. [hexagon]
8. [cone]

CHALLENGE

A polygon with four sides is called a quadrilateral. Draw a quadrilateral that is not a rectangle. Then draw another quadrilateral that is not a parallelogram and not a trapezoid. [Check students’ drawings.]
SHAPE NAMES

Polygons

<table>
<thead>
<tr>
<th>Shape</th>
<th>Sides</th>
<th>Angles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triangle</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Quadrilateral</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Pentagon</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Hexagon</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Octagon</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Special Quadrilaterals

<table>
<thead>
<tr>
<th>Shape</th>
<th>Special Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trapezoid</td>
<td>Only two parallel sides.</td>
</tr>
<tr>
<td>Parallelogram</td>
<td>Opposite sides parallel and the same length.</td>
</tr>
<tr>
<td>Rectangle</td>
<td>Parallelogram with 4 right angles.</td>
</tr>
<tr>
<td>Rhombus</td>
<td>Parallelogram with all sides the same length.</td>
</tr>
<tr>
<td>Square</td>
<td>Rectangle with all sides the same length.</td>
</tr>
</tbody>
</table>

Name each polygon.

1. [pentagon]
2. [octagon]
3. [triangle]
4. [hexagon]

Classify each quadrilateral. Some may have more than one name.

5. [parallelogram, rhombus]
6. [trapezoid]
7. [parallelogram, rectangle, rhombus, square]
PROPERTIES OF GEOMETRIC FIGURES

Angles

Right Angle
A right angle forms a square corner.

Acute Angle
An acute angle is less than a right angle.

Obtuse Angle
An obtuse angle is greater than a right angle.

Tell whether each angle is right, acute, or obtuse.

Tell whether the angle each arrow points to is right, acute, or obtuse.
5. [acute] [obtuse] [right]  6. [right] [acute]

CHALLENGE
Draw a triangle with an obtuse angle. [Check students’ drawings.]
PROPERTIES OF GEOMETRIC FIGURES

Angles

Right Angle
A right angle forms a square corner.

Acute Angle
An acute angle is less than a right angle.

Obtuse Angle
An obtuse angle is greater than a right angle.

An angle can be named in three ways.

$$\angle B$$ or $$\angle ABC$$ or $$\angle CBA$$

Read: angle B or angle ABC or angle CBA

Two rays meet at an endpoint to form an angle. The endpoint is always included in the angle name.

Tell whether each angle is right, acute, or obtuse.

1. [acute]  
2. [right]  
3. [obtuse]  
4. [acute]

For each figure, tell whether $$\angle ABC$$ is right, acute, or obtuse.

5. [right]  
6. [right]  
7. [obtuse]  
8. [obtuse]

CHALLENGE

Classify each of the angles of the parallelogram.

[angles A and C are acute and angles B and D are obtuse]
An angle is formed when two rays meet at the same endpoint, or vertex. The angle can be named by three letters or by its vertex:

\[ \angle B \text{ or } \angle ABC \text{ or } \angle CBA \]

Angles are measured in degrees (°).

**Right Angle**
A right angle measures 90°.

**Acute Angle**
An acute angle is greater than 0° and less than 90°.

**Obtuse Angle**
An obtuse angle is greater than 90° and less than 180°.

**Straight Angle**
A straight angle measures 180°.

Use the figure below. Tell whether each angle is right, acute, obtuse, or straight.

1. \( \angle DCG \) [right]
2. \( \angle GDE \) [straight]
3. \( \angle CDE \) [obtuse]
4. \( \angle CDG \) [acute]

Use the figure below. Name as many examples of each type of angle as possible.

5. acute \( [\angle QJK \text{ or } \angle KLS] \)
6. obtuse \( [\angle JKR \text{ or } \angle RKL] \)
7. right \( [\angle JQR \text{ or } \angle QRK \text{ or } \angle KRS \text{ or } \angle RSL] \)
8. straight \( [\angle QRS] \)
**ALTERING SHAPES**

Shapes can be combined to make different shapes.
Joining two squares makes a rectangle:

Shapes can be divided to make different shapes.
Dividing a rectangle along the diagonal makes two triangles:

**Name the shapes used to make each figure.**

1. [square and 2 triangles]

2. [rectangle and 2 triangles]

3. [square and triangle]

4. [2 rectangles and 4 triangles]

5. [6 triangles]

6. [3 rectangles]

**CHALLENGE**

Make a new shape by combining at least 3 different geometric shapes.

[Check students’ drawings.]
ALTERING SHAPES

Polygons can be combined to make different polygons.
Joining a square and two triangles makes a trapezoid:

Polygons can be divided to make different polygons.
Dividing a parallelogram along the diagonal makes two triangles:

Name the polygons used to make each figure. Then identify the figure.

1. [rectangle and 2 triangles; hexagon]
2. [triangle and trapezoid; parallelogram]
3. [4 triangles; pentagon]
4. [2 parallelograms; hexagon]
5. [2 trapezoids; hexagon]
6. [trapezoid, 2 rectangles, 2 triangles; octagon]

CHALLENGE
Make a new shape by combining at least 3 different polygons.
[Check students’ drawings.]
ALTERING SHAPES

Polygons can be combined to make different polygons.

Joining two parallelograms can make a hexagon:

Polygons can be divided to make different polygons.

A hexagon can be divided into two trapezoids:

Name the polygons used to make each figure. Then identify the figure.

1. [5 triangles; pentagon]

2. [trapezoid and 2 triangles; trapezoid]

3. [2 trapezoids and rectangle; octagon]

4. [triangle and trapezoid; pentagon]

5. [4 triangles; rhombus]

6. [4 triangles; parallelogram]

CHALLENGE [Check students’ drawings. Sample answers shown.]

Make a pentagon by joining together 4 triangles.

Make a hexagon by joining together 6 triangles.
CONGRUENT AND SIMILAR SHAPES

Congruent Figures

These rectangles are congruent. Congruent figures have the same shape and the same size.

Similar Figures

These rectangles are similar. Similar figures have the same shape but not the same size.

Are the figures congruent, similar, or neither?

1. [similar]

2. [congruent]

3. [congruent]

4. [similar]

5. [similar]

6. [neither]

7. [congruent]

8. [neither]
CONGRUENT AND SIMILAR SHAPES

Congruent Figures
Congruent figures have the same shape and the same size.

The rectangles are congruent.

Similar Figures
Similar figures have the same shape but not the same size.

The rectangles are similar.

Are the figures congruent, similar, or neither?

1. [congruent]
2. [similar]
3. [similar]
4. [congruent]
5. [congruent]
6. [neither]

CHALLENGE
Danny takes a photograph of his house. Then he has the photograph enlarged. Is the house in the enlargement congruent to the house in the original photograph? Is it similar? Explain.

[It is not congruent because the enlargement is larger than the original. It is similar since everything should be enlarged by the same ratio.]
CONGRUENT AND SIMILAR SHAPES

Similar Figures
Similar figures have the same shape but not the same size.

The triangles are similar. The corresponding angles of the triangles are equal. The ratios of corresponding sides are equal.

Congruent Figures
Congruent figures have the same shape and the same size.

The triangles are congruent. Since they are the same shape, the triangles are also similar. The ratios of corresponding sides of the triangles is 1:1.

Are the figures congruent, similar, neither, or both?

1. [similar]

2. [neither]

3. [both]

4. [neither]

CHALLENGE

Draw a rectangle on the grid. Then draw a rectangle that is similar but not congruent to your rectangle. [Check students’ drawings.]

Explain how you know the rectangles are similar.

[Answers may vary. Possible answer: I doubled both the length and the width of my original rectangle to draw the similar rectangle.]
Write translation, reflection, or rotation to describe how each figure was moved.

1. [reflection]
2. [translation]
3. [translation]
4. [rotation]

CHALLENGE

Is the reflection of a figure congruent to the original figure? Explain.

[Yes. The figure is still the same size and shape. Only its position has changed.]
**MOTION GEOMETRY**

**Translation**  
A translation slides a figure along a straight line left, right, up, or down.

**Reflection**  
A reflection flips a figure across a line. A reflection makes a mirror image.

**Rotation**  
A rotation is a turn that moves a figure around a point.

Write *translation, reflection, or rotation* to describe how each figure was moved.

1. 
   
   ![Figure 1](translation)  
   
   [translation]

2. 
   
   ![Figure 2](rotation)  
   
   [rotation]

3. 
   
   ![Figure 3](reflection)  
   
   [reflection]

4. 
   
   ![Figure 4](translation)  
   
   [translation]

5. 
   
   ![Figure 5](rotation)  
   
   [rotation]

6. 
   
   ![Figure 6](reflection)  
   
   [reflection]

**CHALLENGE**

Translations, reflections, and rotations are transformations of a figure. Do these transformations result in a figure congruent to the original figure? Explain.

[Yes. For these transformations, the transformed figure is still the same size and shape. Only its position has changed.]
A **transformation** moves a figure without changing its size or shape.

### Transformations

**Translation**
A translation moves a figure along a straight line.

**Reflection**
A reflection flips a figure across a line. A reflection makes a mirror image.

**Rotation**
A rotation moves a figure by turning it around a point. All the points on the figure move in a circle. Some points move farther than others, depending on how far from the center of rotation they are.

Write *translation, reflection, or rotation* to describe how each figure was moved.

1. [rotation]

2. [reflection]

3. [translation]

4. [reflection]

### CHALLENGE

Draw a translation, reflection, and rotation of the triangle shown on the grid. Label each transformation.

[Check students’ drawings.]
LINES AND ANGLES

Lines, line segments, and rays are straight paths.

**Line**
A line goes on without end in two directions.

**Line Segment**
A line segment has two endpoints.

**Ray**
A ray has one endpoint and goes on without end in one direction.

Special Types of Lines

**Intersecting**
Intersecting lines are lines that cross at one point.

**Perpendicular**
Perpendicular lines cross at right angles.

**Parallel**
Parallel lines are lines in one plane that never cross.

Name each figure.

1. [ray]
2. [perpendicular lines]
3. [parallel lines]
4. [line segment]

CHALLENGE
Which statement is always true? Explain.

(a) Intersecting lines are always perpendicular.

(b) Perpendicular lines always intersect.

[(b) is always true because perpendicular lines intersect at right angles. Intersecting lines do not always cross at right angles.]
LINES AND ANGLES

Lines, line segments, and rays are straight paths.

**Line**
A line is a straight path that goes on without end in two directions.

- **Line Segment**
A line segment is a part of a line. It has two endpoints.

- **Ray**
A ray is a part of a line. It has one endpoint and goes on without end in one direction.

**Intersecting Lines**
Intersecting lines are lines that cross at one point.

- **Perpendicular Lines**
Perpendicular lines intersect at right angles.

- **Parallel Lines**
Parallel lines are lines in one plane that never intersect.

Name each figure.

1. [ray PQ]
2. [perpendicular lines]
3. [parallel lines GH and JK]
4. [line XY]

**AB and CD**

**CHALLENGE**
Draw and label a diagram to illustrate each of the following: [Check students’ drawings.]

- line GH parallel to line LM
- line RS and line XZ intersecting at point P
**LINES AND ANGLES**

**Line**
A line is a straight path that goes on without end in two directions.

A \(\rightarrow\) B

- line \(\overline{AB}\) or \(\overline{BA}\)

**Line Segment**
A line segment is a part of a line. It has two endpoints.

C \(\rightarrow\) D

- line segment \(\overline{CD}\) or \(\overline{DC}\)

**Ray**
A ray is a part of a line. It has one endpoint and goes on without end in one direction.

J \(\rightarrow\) K

- ray \(\overrightarrow{JK}\) or \(\overrightarrow{JK}\)

**Intersecting Lines**
Intersecting lines are lines that cross at one point.

A \(\rightarrow\) C

- \(\overline{AB}\) and \(\overline{CD}\) intersect at point E

**Perpendicular Lines**
Perpendicular lines intersect at right angles.

E \(\perp\) H

- \(\overrightarrow{EF} \perp \overrightarrow{GH}\)
- \(\perp\) means “is perpendicular to”

**Parallel Lines**
Parallel lines are lines in one plane that never intersect.

M \(\rightarrow\) N

- \(\overline{MN} \parallel \overline{QR}\)
- \(\parallel\) means “is parallel to”

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**Use the figure at the right to name an example of each term.**

1. perpendicular lines \(\overline{AC} \perp \overline{BD}\)
2. ray \(\overrightarrow{DE}\)
3. line segment \(\overline{BC}\)
4. intersecting lines \(\overline{AC} \cap \overline{CF}\)
5. parallel lines \(\overline{AC} \parallel \overline{DF}\)
6. line \(\overline{CF}\)

**Draw and label a figure for each.**

7. line \(\overline{FG}\)
8. \(\overline{PQ} \parallel \overline{ST}\)
9. \(\overline{RS} \perp \overline{MN}\)
A map is a diagram that shows relationships among places, often including distance information. This map shows some places near Bev’s house. The map shows that Bev lives 4 miles from her school.

Use the map above to answer each question.

1. How many miles is Bev’s house from the library? _____ [6 miles]
2. How many miles does Karl live from the mall? _____ [2 miles]
3. Who lives closer to school, Bev or Karl? How much closer?
   [Bev lives 1 mile closer.]
4. Bev goes from her house, to the library, and then to the post office. At that point, how far did she travel? _____ [9 miles]
5. How many miles is a round trip from Karl’s house to school and back? _____ [10 miles]
6. Who lives closer to the library, Bev or Karl? Explain.
   [Karl lives closer. He can travel either 3 miles or 4 miles to the library.]
   Bev lives 6 miles from the library.]

CHALLENGE
What is the shortest route to the school from the library shown on the map?
What is the distance?
[Start at the library. Go 1 mile to the mall, 2 miles to Karl’s house, then 5 miles to the school. The distance is 8 miles.]
MAP AND DRAWING SCALES

Use the map above to answer each question.

1. How far is it from the trailhead to the top of Trail B? ______ [5 miles]
2. How far is it from the trailhead to the top of Trail C? ______ [7 miles]
3. Trail D connects Trails B and C. How long is Trail D? ______ [3 miles]
4. Start at the trailhead and start to follow Trail B. Then go along Trail D to
   the top of Trail C. How far is it to the top? ______ [7 miles]
5. What is the total roundtrip distance from the trailhead to the top of Trail
   A and back? ______ [12 miles]
6. What is the shortest total distance of a hike that starts at Trail C,
   turns onto Trail D and then follows Trail B to the trailhead of Trail B?
   ______ [10 miles]
7. How much longer is a roundtrip hike from the trailhead to the top of
   Trail C than a roundtrip hike to the top of Trail A? ______ [2 miles]

CHALLENGE

Suppose the distance between each pair of markers on the map were 5
miles. How far would it be to the top of Trail A? Explain.

[30 miles; Possible explanations: 6 × 5 = 30 or count by 5s between markers.]
MAP AND DRAWING SCALES

A scale drawing is a drawing that shows a real object enlarged or reduced. The scale is a ratio that compares the size of the object in the drawing to the size of the actual object.

The map shows the location of 7 different sites an archaeologist is mapping.

What is the actual distance between Site A and Site B? The map uses the scale 1 inch = 12 miles.

Use a ruler to measure the distance from Site A to Site B on the map. The distance on the map is 2\(\frac{1}{2}\) or 2.5 inches.

Find an equivalent ratio to find the actual distance.

\[
\frac{\text{actual distance}}{\text{map scale distance}} = \frac{12 \text{ mi}}{1 \text{ in.}} = \frac{?}{2.5} \quad \text{actual distance}
\]

Think: \(2.5 \times 12 = 30\)

\[
\frac{12 \text{ mi}}{1 \text{ in.}} = \frac{30 \text{ mi}}{2.5 \text{ mi}}
\]

The actual distance between the sites is 30 miles.

Use the above map and map scale to find each distance.

1. What is the actual distance between Site B and Site C? _____ [36 mi]
2. What is the actual distance between Site C and Site D? _____ [24 mi]
3. What is the actual distance between Site D and Site E? _____ [18 mi]
4. What is the actual distance between Site E and Site F? _____ [12 mi]
5. What is the actual distance between Site F and Site G? _____ [6 mi]