**2.1 Congruent Figures**

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| **Standards**8.G.2 | **Learning Objectives (I can…)*** Name corresponding angles and corresponding sides of congruent figures.
* Identify congruent figures.
 |

**Key Idea**

**Congruent Figures**

Figures that have the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are called **congruent figures**. The triangles below are congruent.



**Example 1:** Naming Corresponding Parts

**The figures are congruent. Name the corresponding angles and the corresponding sides.**

***Corresponding Angles Corresponding Sides***

****

**On Your Own: The figures are congruent. Name the corresponding angles and the corresponding sides.**



**Key Idea**

**Identifying Congruent Figures**

Two figures are congruent when corresponding \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and corresponding \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are congruent.



Triangle *\_\_\_\_\_\_\_\_\_* is congruent to Triangle *\_\_\_\_\_\_\_\_\_\_*.

**Example 2:** Identifying Congruent Figures

**Which square is congruent to Square A?**

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**Example 3:** Using Congruent Figures

**Trapezoids *ABCD* and *JKLM* are congruent.**

1. **What is the length of side *JM*?**
2. **What is the perimeter of *JKLM*?**

**On Your Own:**

1. Which square in Example 2 is congruent to Square D?



1. In Example 3, which angle of *JKLM* corresponds to ∠*C* ? What is the length of side *KJ* ?

**2.2 Translations**

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| --- | --- |
| **Standards**8.G.18.G.28.G.3 | **Learning Objectives (I can…)*** Identify translations
* Translate figures in the coordinate plane
 |

**Key Idea**

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_changes a figure into another figure. The new figure

is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is a transformation in which a figure *\_\_\_\_\_\_\_\_\_\_\_\_\_\_* but does not turn. Every point of the figure moves the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and in the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Example 1:** Identifying a Translation

**Tell whether the blue figure is a translation of the red figure.**

1.  **b)** 

**On Your Own:**

**Tell whether the blue figure is a translation of the red figure. Explain.**

1.  2.  3.

**Key Idea**

**Translations in the Coordinate Plane**

To \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a figure *a* units horizontally and *b* units vertically in a coordinate plane, \_\_\_\_\_\_\_\_\_\_ *a* to the *x*-coordinates and *b* to the *y*-coordinates of the vertices. Positive values of *a* and *b* represent translations \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_. Negative values of *a* and *b* represent translations \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_.



**Algebra:**

In a translation, the original figure and its image are congruent.

**Example 2:** Translating a Figure in the Coordinate Plane

**Translate the red triangle 3 units right and 3 units down. What are the coordinates of the image?**



**On Your Own:**

1. **WHAT IF?** The red triangle is translated 4 units left and 2 units up. What are the coordinates of the image?



**Example 3:** Translating a Figure Using Coordinates

**The vertices of a square are *A*(1,** −**2), *B*(3,** −**2), *C*(3,** −**4), and *D*(1,** −**4). Draw the figure and its image after a translation 4 units left and 6 units up.**



|  |  |  |
| --- | --- | --- |
| Vertices of ABCD | ( x , y ) | Vertices of A’B’C’D’ |
|  |  |  |

**On Your Own:**

1. The vertices of a triangle are *A*(−2, −2), *B*(0, 2), and *C*(3, 0). Draw the figure and its image after a translation 1 unit left and 2 units up.



**2.3 Reflections**

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| --- | --- |
| **Standards**8.G.18.G.28.G.3 | **Learning Objectives (I can…)*** Identify reflections.
* Reflect figures in the x-axis or the y-axis of the coordinate plane.
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**Key Idea**

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or *\_\_\_\_\_\_\_\_\_\_\_\_\_*, is a transformation in which a figure is reflected in a line called the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.** A reflection creates a mirror image of the \_\_\_\_\_\_\_\_\_\_\_\_\_ figure.

**Example 1:** Identifying a Reflection

**Tell whether the blue figure is a reflection of the red figure.**

1.  b. 

**On Your Own:**

**Tell whether the blue figure is a reflection of the red figure. Explain.**

1. 2.  3. 

**Key Idea**

To reflect a figure in the *x*-axis, take the \_\_\_\_\_\_\_\_\_\_ of the *y*-coordinate.

To reflect a figure in the *y*-axis, take the \_\_\_\_\_\_\_\_\_\_ of the *x*-coordinate.



**Algebra:** To reflect a figure in the *x*-axis:

 To reflect a figure in the *y*-axis:

In a reflection, the original figure and its image are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Example 2:** Reflecting a Figure in the x-axis

**The vertices of a triangle are *A*(**−**1, 1), *B*(**−**1, 3), and *C*(6, 3). Draw the figure and its reflection in the *x*-axis. What are the coordinates of the image?**

|  |  |  |
| --- | --- | --- |
| Vertices of ABC | ( x, **-y** ) | Vertices of A’B’C’ |
|  |  |  |



**Example 3:** Reflecting a Figure in the y-axis

**The vertices of a quadrilateral are *P*(**−**2, 5), *Q*(**−**1,** −**1), *R*(**−**4, 2), and *S*(**−**4, 4). Draw the figure and its reflection in the *y*-axis.**

|  |  |  |
| --- | --- | --- |
| Vertices of PQRS | ( **-x** , y ) | Vertices of P’Q’R’S’ |
|  |  |  |



**On Your Own:**

4. The vertices of a rectangle are *A*(−4, −3), *B*(−4, −1), *C*(−1, −1), and *D*(−1, −3).

**a.** Draw the figure and its reflection in the *x*-axis.

**b.** Draw the figure and its reflection in the *y*-axis.

**c.** Are the images in parts (a) and (b) congruent? Explain.

**2.4 Rotations**

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| --- | --- |
| **Standards**8.G.18.G.28.G.3 | **Learning Objectives (I can…)*** Identify rotations.
* Rotate figures in the coordinate plane.
* Use more than one transformation to find images of figures.
 |

**Key Idea**

**Rotations**

A **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, or *\_\_\_\_\_\_\_\_\_\_\_\_*, is a transformation in which a figure is rotated about a point called the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. The number of degrees a figure rotates is the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

In a rotation, the original figure and its image are \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Example 1:** Identifying a Rotation

**You must rotate the puzzle piece 270**°**clockwise about point *P* to fit it into a puzzle. Which piece fits in the puzzle as shown?**



Rotate the puzzle piece 270°clockwise about point *P*.

**On Your Own:**

1. Which piece is a 90° counterclockwise rotation about point *P* ?
2. Is Choice D a rotation of the original puzzle piece? If not, what kind of transformation does the image show?

**Example 2:** Rotating a Figure

**The vertices of a trapezoid are *W*(**−**4, 2), *X*(**−**3, 4), *Y*(**−**1, 4), and *Z*(**−**1, 2). Rotate the trapezoid 180° about the origin. What are the coordinates of the image?**



**Example 3:** Rotating a Figure

**The vertices of a triangle are *J*(1, 2), *K*(4, 2), and *L*(1,** −**3). Rotate the triangle 90**° **counterclockwise about vertex *L*. What are the coordinates of the image?**



**On Your Own:**

3. A triangle has vertices *Q*(4, 5), *R*(4, 0), and *S*(1, 0).

 **a)** Rotate the triangle 90° counterclockwise about the origin.

 **b)** Rotate the triangle 180° about vertex *S*.

c) Are the images in parts (a) and (b) congruent? Explain.



**Example 4:** Using More than One Transformation

**The vertices of a rectangle are *A*(**−**3,** −**3), *B*(1,** −**3), *C*(1,** −**5), and *D*(**−**3,** −**5). Rotate the rectangle 90° clockwise about the origin, and then reflect it in the *y*-axis. What are the coordinates of the image?**



**Example 5:** Describing a Sequence of Transformations

**The red figure is congruent to the blue figure. Describe a sequence of transformations in which the blue figure is the image of the red figure.**



**2.5 Similar Figures**

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| --- | --- |
| **Standards**8.G.4 | **Learning Objectives (I can…)*** Name corresponding angles and corresponding sides of similar figures.
* Identify similar figures
* Find unknown measures of similar figures.
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**Key Idea**

Figures that have the same shape but \_\_\_\_\_\_ necessarily the same size are called \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_.



Two figures are similar when

* Corresponding sides lengths are proportional
* Corresponding angles are congruent.

**Symbols** ***Side Lengths Angles Figures***

**Example 1:** Identifying Similar Figures

**Which rectangle is similar to Rectangle A?**



**On Your Own:**

1. Rectangle D is 3 units long and 1 unit wide. Which rectangle is similar to Rectangle D?

**Example 2:** Finding an Unknown Measure in Similar Figures

**The triangles are similar. Find *x*.**

Because the triangles are similar, corresponding side lengths are

proportional. So, write and solve a proportion to find *x*.

**On Your Own:**

**The figures are similar. Find *x*.**

1.  **3.**

**Example 3:** Real-Life Application

**An artist draws a replica of a painting that is on the Berlin Wall. The painting includes a red trapezoid. The shorter base of the similar trapezoid in the replica is 3.75 inches. What is the height *h* of the trapezoid in the replica?**



**On Your Own:**

1. **WHAT IF?** The longer base in the replica is 4.5 inches. What is the length of the longer base in the painting?

**2.6 Perimeters and Areas of Similar Figures**

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| --- | --- |
| **Standards**8.G.4 | **Learning Objectives (I can…)*** Understand the relationship between perimeters and similar figures.
* Understand the relationship between areas and similar figures.
 |

**Key Idea**

**Perimeters of Similar Figures**

When two figures are similar, the ratio of their perimeters is equal to the ratio of their corresponding side lengths.





**Example 1:** Finding Ratios of Perimeters

**Find the ratio (red to blue) of the perimeters of the similar rectangles.**



**On Your Own:**

1. The height of Figure A is 9 feet. The height of a similar Figure B is 15 feet. What is the ratio of the perimeter of A to the perimeter of B ?

**Key Idea**

**Areas of Similar Figures**

When two figures are similar, the ratio of their \_\_\_\_\_\_\_\_\_\_\_\_\_ is equal to the *square* of the ratio of their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ side lengths.



**Example 2:** Finding Ratios of Areas

**Find the ratio (red to blue) of the areas of the similar triangles.**



**On Your Own:**

1. The base of Triangle P is 8 meters. The base of a similar Triangle Q is 7 meters. What is the ratio of the area of P to the area of Q?

**Example 3:** Using Proportions to Find Perimeters and Areas

**A swimming pool is similar in shape to a volleyball court. Find the perimeter *P* and the area *A* of the pool.**

The rectangular pool and the court are similar. So, use the ratio of corresponding side lengths to write and solve proportions to find the perimeter and the area of the pool.



 ***Perimeter Area***

**On Your Own:**

1. **WHAT IF?** The width of the pool is 16 yards. Find the perimeter *P* and the area *A* of the pool.

**2.7 Dilations**

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| --- | --- |
| **Standards**8.G.38.G.4 | **Learning Objectives (I can…)*** Identify dilations.
* Dilate figures in the coordinate plane.
* Use more than one transformation to find images of figures.
 |

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is a transformation in which a figure is made larger or smaller with respect to a point called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Example 1:** Identifying a Dilation

**Tell whether the blue figure is a dilation of the red figure.**

1.  **b.**

**On Your Own:**

**Tell whether the blue figure is a dilation of the red figure. Explain.**

1.  2.

In a dilation, the original figure and its image are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The ratio of the side lengths of the image to the corresponding side lengths of the original figure is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of the dilation.

**Key Idea**

**Dilations in the Coordinate Plane**

To dilate a figure with respect to the origin, multiply the coordinates of each vertex by the scale factor *k*.

**Algebra:**

When *k* > 1, the dilation is an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

When *k* > 0 and *k* < 1, the dilation is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Example 2:** Dilating a Figure

**Draw the image of Triangle *ABC* after a dilation with a scale factor of 3. Identify the type of dilation.**

|  |  |  |
| --- | --- | --- |
| Vertices of ABC | ( , ) | Vertices of A’B’C’ |
|  |  |  |



**Example 3:** Dilating a Figure

**Draw the image of Rectangle *WXYZ* after a dilation with a scale factor of 0.5. Identify the type of dilation.**

|  |  |  |
| --- | --- | --- |
| Vertices of WXYZ | ( , ) | Vertices of W’X’Y’Z’ |
|  |  |  |



**On Your Own:**

1. **WHAT IF?** Triangle *ABC* in Example 2 is dilated by a scale factor of 2. What are the coordinates of the image?