Warm Up

Find the image point when the indicated transformation is applied to the given pre-image point.

1. \((x, y) \rightarrow (x + 3, y - 1); (2, 4)\)
2. \((x, y) \rightarrow (x, -y); (-2, 1)\)
3. \((x, y) \rightarrow (3x, 3y); (-5, 0)\)
4. \((x, y) \rightarrow \left(\frac{1}{3} x, \frac{1}{3} y\right); (3, -6)\)
5. \((x, y) \rightarrow \left(\frac{2}{5} x, \frac{2}{5} y\right); (-5, 10)\)
Similiarity and Transformations

Warm Up

Find the image point when the indicated transformation is applied to the given pre-image point.

1. \((x, y) \rightarrow (x + 3, y - 1); (2, 4) \rightarrow (5, 3)\)
2. \((x, y) \rightarrow (x, -y); (-2, 1) \rightarrow (-2, -1)\)
3. \((x, y) \rightarrow (3x, 3y); (-5, 0) \rightarrow (-15, 0)\)
4. \((x, y) \rightarrow \left(\frac{1}{3}x, \frac{1}{3}y\right); (3, -6) \rightarrow (1, -2)\)
5. \((x, y) \rightarrow \left(\frac{2}{5}x, \frac{2}{5}y\right); (-5, 10) \rightarrow (-2, 4)\)
Objective

Use properties of similarity transformations to determine whether polygons are similar

Calendar: Oct 24

• Similar Transformations
• HW: Day 7 ws, + E.C.

Unit 2D Day 7
Vocabulary

similarity transformation
A transformation that produces similar figures is a \textit{similarity transformation}. A \textit{similarity transformation} is a dilation or a composite of one or more dilations and one or more congruence transformations. Two figures are \textit{similar} if and only if there is a similarity transformation that maps one figure to the other figure.
Remember!

Translations, reflections, and rotations are congruence transformations.
Example 1

Apply the dilation $D : (x, y) \rightarrow \left( \frac{1}{4} x, \frac{1}{4} y \right)$ to the polygon with vertices: $D(-8, 0), E(-8, -4), \text{ and } F(-4, -8)$. Multiply $\frac{1}{4}$

Name the coordinates of the image points and describe the dilation.

$D'(-2, 0), E'(-2, -1), F'(-1, 2)$

Shrink!
Example 2: Drawing and Describing Dilations

A. Apply the dilation $D$ to the polygon with the given vertices. Describe the dilation.

$$D: (x, y) \rightarrow (3x, 3y)$$

$A(1, 1), B(3, 1), C(3, 2)$

$A'(3, 3) B'(9, 3) C'(9, 6)$

Image
Example 2: Continued

B. Apply the dilation $D$ to the polygon with the given vertices. Describe the dilation.

$D: (x, y) \rightarrow \left(\frac{3}{4}x, \frac{3}{4}y\right)$

$P(-8, 4), Q(-4, 8), R(4, 4)$

$P'(-6, 3), Q'(-3, 6), R'(3, 3)$

Scale Factor: $\frac{3}{4}$  Shrink
Example 3: Determining Whether Polygons are Similar

Determine whether the polygons with the given vertices are similar.

A. $A(-6, -6), B(-6, 3), C(3, 3), D(3, -6)$ and $H(-2, -2), J(-2, 1), K(1, 1), L(1, -2)$

A $\rightarrow$ J
Shrink
multiply by $\frac{1}{3}$

SF: $\frac{1}{3}$
Example 3: Continued

B. \( P(2, 0), \ Q(2, 4), \ R(4, 4), \ S(4, 0) \) and \( W(5, 0) \),
\( X(5, 10), \ Y(8, 10), \ Z(8, 0) \).

\[ P(2, 0) \times 2.5 \rightarrow W(5, 0) \]
\[ Q(2, 4) \times 2.5 \rightarrow X(5, 10) \]
\[ R(4, 4) \times 2 \times 2.5 \rightarrow Y(8, 10) \]

Not similar!
Example 3: Continued

C. \(A(1, 2), B(2, 2), C(1, 4)\) and 
\(D(4, -6), E(6, -6), F(4, -2)\)

Yes similar

SF: 2
Example 3: Continued

D. \(F(3, 3), G(3, 6), H(9, 3), J(9, -3)\) and \(S(-1, 1), T(-1, 2), U(-3, 1), V(-3, -1)\).

Graph!

yes, Similar!

1. Reflection
2. Dilation
Example 4: Proving Circles Similar

A. Circle A with center \((0, 0)\) and radius 1 is similar to circle B with center \((0, 6)\) and radius 3.

SF: 3
Example 4: Continued

B. Circle $C$ with center $(0, -3)$ and radius 2 is similar to circle $D$ with center $(5, 1)$ and radius 5.

Point $C$ to Point $D$

1. Up, 5 right
2. $(x+5, y+3)$ Translation
3. SF: 2.5 Dilation

$2 \cdot (2.5) = 5$
HW: Day 7 WS

E.C.: More Proofs in Parallelograms
Extra Example

Prove that circle $A$ with center $(2, 1)$ and radius 4 is similar to circle $B$ with center $(-1, -1)$ and radius 2.