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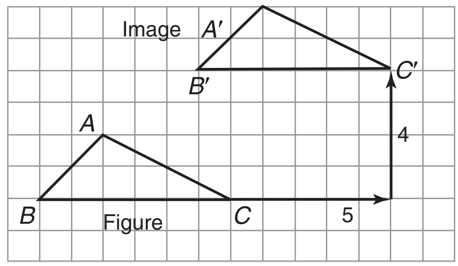
Reteaching 8-1

Translations

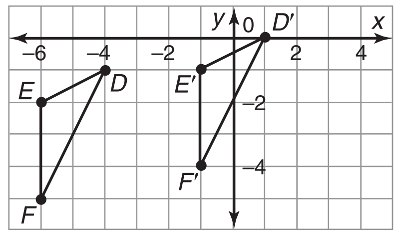
A *translation* moves every point of a figure the same distance in the same direction.

Triangle ABC is translated 5 units to the right and 4 units up. The *image* of $\triangle ABC$ is $\triangle A'B'C'$.



You can write a rule to describe a translation in the coordinate plane.

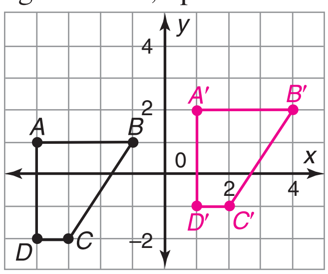
To get the translation of $\triangle DEF$, you have to add 5 to each x-coordinate and add 1 to each y-coordinate.



$D(-4, -1)$	$\rightarrow$	$D'(1, 0)$
$E(-6, -2)$	$\rightarrow$	$E'(-1, -1)$
$F(-6, -5)$	$\rightarrow$	$F'(-1, -4)$
(x, y)	$\rightarrow$	$(x + 5, y + 1)$

Copy each figure. Then graph the image after the given translation. Name the coordinates of the image.

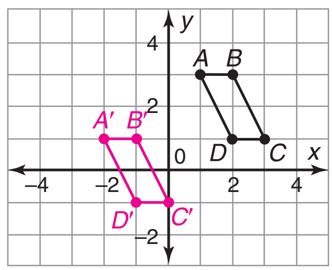
1. right 5 units, up 1 unit



$A'(1, 2)$, $B'(4, 2)$

$C'(2, -1)$, $D'(1, -1)$

2. left 3 units, down 2 units

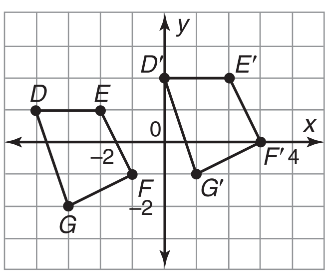


$A'(-2, 1)$, $B'(-1, 1)$

$C'(0, -1)$, $D'(-1, -1)$

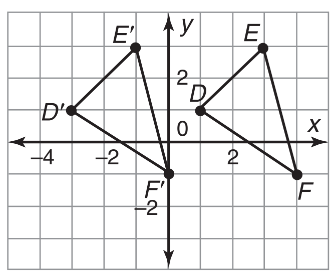
Use arrow notation to write a rule that describes the translation shown on each graph.

3.



$(x, y) \rightarrow (x + 4, y + 1)$

4.



$(x, y) \rightarrow (x - 4, y)$

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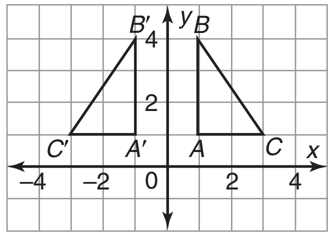
Reteaching 8-2

Reflections and Symmetry

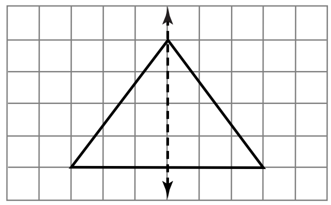
A *reflection* flips a figure over a line (the *line of reflection*). Figure $A'B'C'$ is the image of figure ABC after a reflection over the y-axis.



Each point of the image is the same distance from the line of reflection as the corresponding point of the original figure.

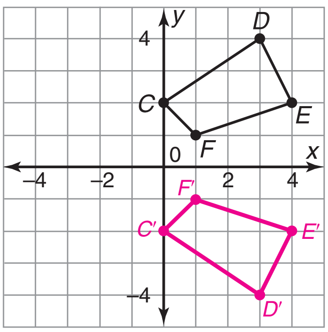
Since A is 1 unit to the right of the y-axis, locate A' 1 unit to the left of the y-axis.

If the image is identical to the original figure, then the figure has *reflectional symmetry* and has a *line of symmetry.*

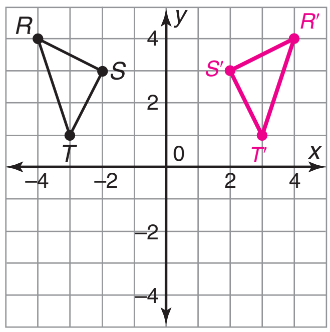


Copy each figure.

1. Reflect the figure over the x-axis.

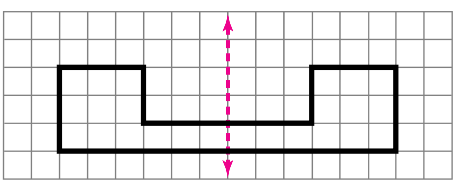


2. Reflect the figure over the y-axis.



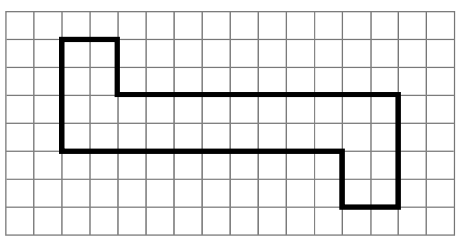
Copy each figure. Does the figure have reflectional symmetry? If it does, draw all the lines of symmetry.

3.



yes

4.



no

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Reteaching 8-3

Rotations

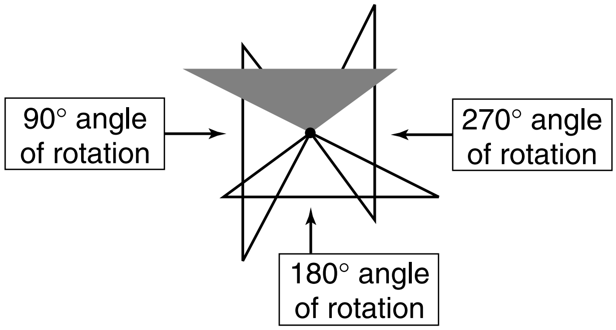
A *rotation* is a turn of a figure about a center point, the *center of rotation.*

A figure can be rotated up to 360° counterclockwise.

A figure has *rotational symmetry* if an image matches the original figure after a rotation of 180° or less.

The angle measure the figure rotates is the *angle of rotation.*

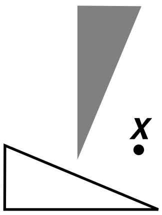
The shaded triangle is rotated about its lower vertex.



The triangle does not have rotational symmetry.

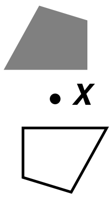
The shaded figure is rotated 90°, 180°, or 270° about point *X*. The unshaded figure is its image. What is the angle of rotation?

1.



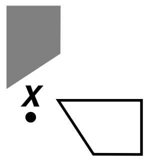
90°

2.



180°

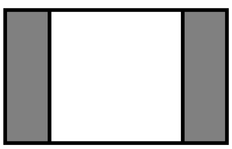
3.



270°

Judging by appearance, determine whether each figure has rotational symmetry. If it does, find the angle of rotation.

4.

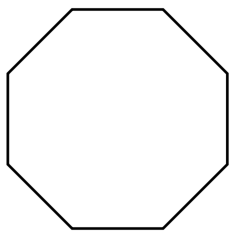


yes; 180°

5.

no

6.



yes; 45°

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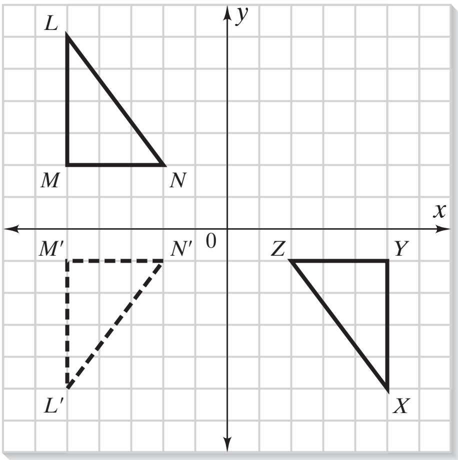
Reteaching 8-4

Transformations and Congruence

You can use transformations to determine congruence.

Determine whether the two triangles are congruent. If so, write a congruence statement.

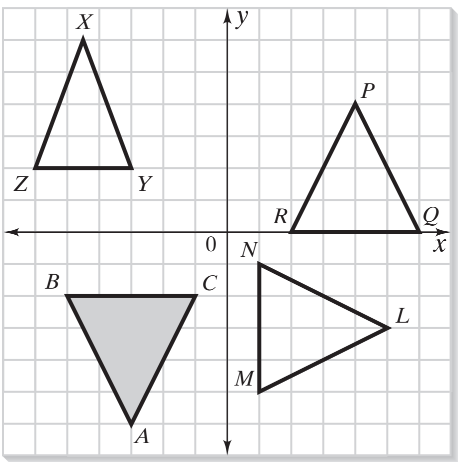


Sample method:
The triangles are on opposite sides of the x-axis. Start by reflecting ΔLMN over the x-axis to get $\Delta L'M'N'$.

$\Delta L'M'N'$ and ΔXYZ are on opposite sides of the y-axis. Reflect $\Delta L'M'N'$ over the x-axis to get ΔXYZ.

A reflection over the x-axis followed by a reflection over the y-axis maps ΔLMN onto ΔXYZ. So $\Delta LMN \cong \Delta XYZ$.

Determine which triangles, if any, are congruent to ΔABC.



1. ΔPQR Yes ● No ○

2. ΔXYZ Yes ○ No ●

3. ΔPQR Yes ● No ○

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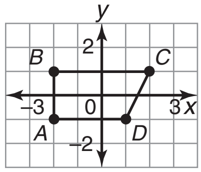
Reteaching 8-5

Similarity Transformations

Draw the image of quadrilateral *ABCD* for the *dilation* with *scale factor* 2. Then graph the image.



Example:

① Write the coordinates of each point.

② Multiply the *x*- and *y*-coordinates of each point by the scale factor, 2.

③ Graph the image $A'B'C'D'$.

$A(-2, -1) \longrightarrow A'(-4, -2)$
$B(-2, 1) \longrightarrow B'(-4, 2)$
$C(2, 1) \longrightarrow C'(4, 2)$
$D(1, -1) \longrightarrow D'(2, -2)$

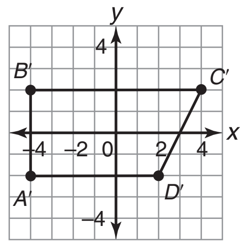
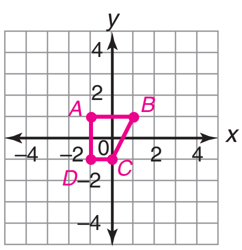


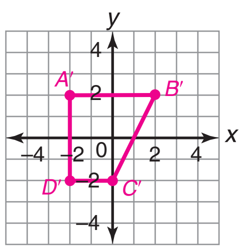
Image $A'B'C'D'$ is an *enlargement* of *ABCD* because the scale factor is greater than 1. If the scale factor had been less than 1, then the dilation of *ABCD* would be a *reduction.*

Graph quadrilateral *ABCD* and its image $A'B'C'D'$ after a dilation with the given scale factor. Classify each dilation as an enlargement or a reduction.

1. $A(-1, 1), B(1, 1), C(0, -1), D(-1, -1)$; scale factor 2

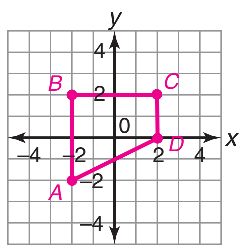
enlargement

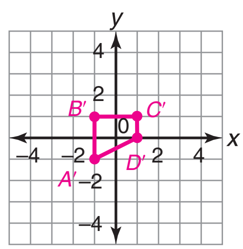




2. $A(-2, -2), B(-2, 2), C(2, 2), D(2, 0)$; scale factor $\frac{1}{2}$

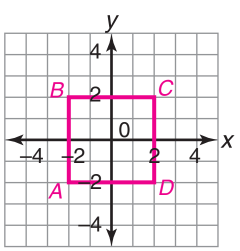
reduction

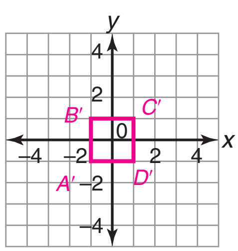




3. $A(-2, -2), B(-2, 2), C(2, 2), D(2, -2)$; scale factor $\frac{1}{2}$

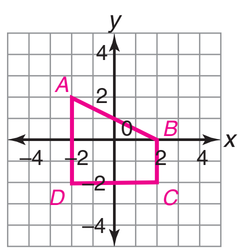
reduction

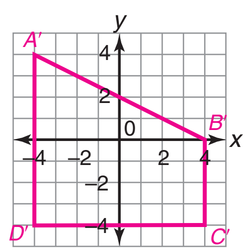




4. $A(-2, 2), B(2, 0), C(2, -2), D(-2, -2)$; scale factor 2

enlargement





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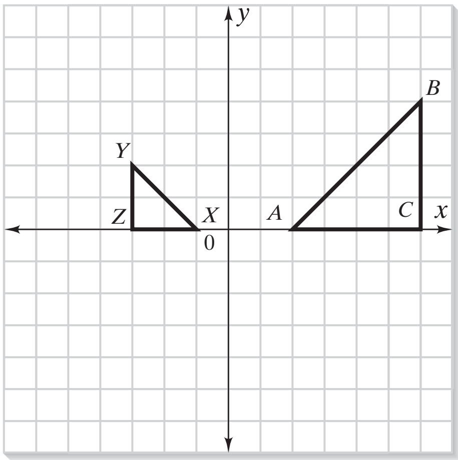
Reteaching 8-6

Transformations and Similarity



You can use a sequence of transformations to decide if two triangles are similar.

Reflect ΔABC over the y-axis. The vertices of $\Delta A'B'C'$ are at $A'(-2, 0)$, $B'(-6, 4)$, and $C'(-6, 0)$.

Then dilate $\Delta A'B'C'$ by a scale factor of $\frac{1}{2}$. The vertices of ΔXYZ are at $X(-1, 0)$, $Y(-3, 2)$, and $Z(-3, 0)$.

You can use the SAS Similarity Theorem to decide if two triangles are similar.

$\angle C \cong \angle Z$ because they are right angles.

$\frac{YZ}{XZ} = \frac{2}{2} = 1$ and $\frac{BC}{AC} = \frac{4}{4} = 1$

Determine whether the two figures are similar. If they are similar, describe a sequence of transformations that can be used to map one figure onto the other figure. If they are not similar, explain why.

1. ΔABC with vertices $A(2, -1)$, $B(4, -1)$, and $C(3, -5)$; ΔPQR with vertices $P(4, 2)$, $Q(4, 1)$, and $R(6, 5)$

   The triangles are not similar. No series of transformations maps ΔABC onto ΔPQR.

2. Quadrilateral $ABCD$ with vertices $A(2, 2)$, $B(2, 8)$, $C(8, 8)$, and $D(8, 2)$; Quadrilateral $JKLM$ with vertices $J(-1, 1)$, $K(-1, 4)$, $L(-4, 4)$, and $M(-4, 1)$.

   The quadrilaterals are similar. Quadrilateral $ABCD$ is first reflected over the y-axis and then dilated by a scale factor of $\frac{1}{2}$.