DO NOW

The image of the rabbit face, A, has been transformed each time into image B. Match the transformation with its proper name.

Reflection   **Dilation**   **Translation**   **Rotation**

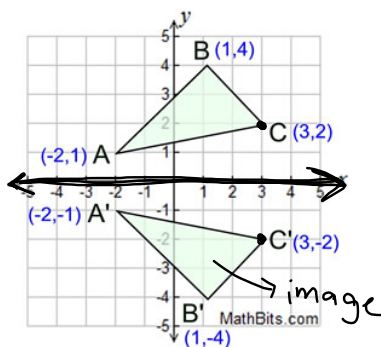(flip)   (changes size)   (slide)   (turn)

Nov 15-10:14 AM

A **rigid motion** (also called an **isometry**) is a transformation of the plane that preserves ___length___
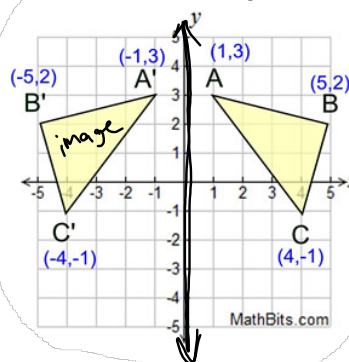
A **line reflection** "flips" every point of a figure over the same line

- figure does not change size (it is an isometry)

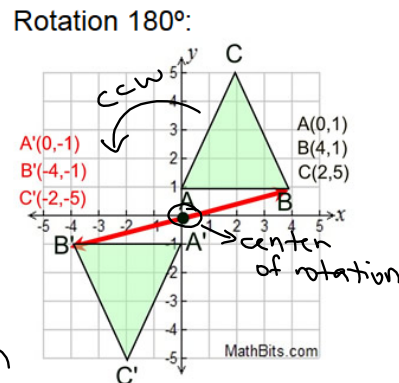- the orientation (lettering of the diagram) is reversed.
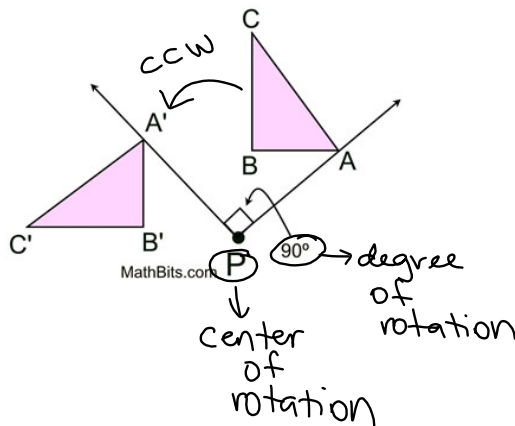
Reflect over the x-axis:

B (1,4)
C (3,2)
(-2,1) A
(-2,-1) A'
C'(3,-2)
image
B' MathBits.com
(1,-4)

Reflect over the y-axis:

(-1,3)   (1,3)
(-5,2) A'   A   (5,2)
B'
image
C'   C
(-4,-1)   (4,-1)
MathBits.com

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1

A **rotation** "turns" a figure through an angle about a fixed point called the center.

- center of rotation is the origin, unless stated otherwise

- positive angle of rotation turns the figure counterclockwise, negative angle of rotation turns the figure clockwise
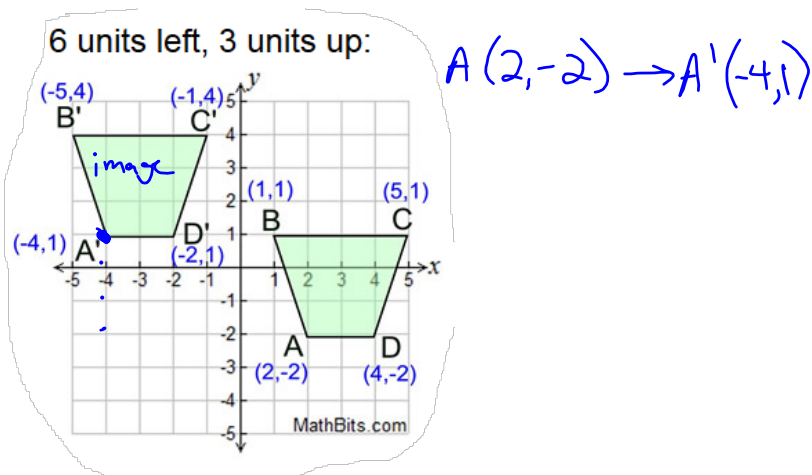
- figure does not change size (it is an isometry)

Rotation 180°:

ccw

A'(0,-1)
B'(-4,-1)
C'(-2,-5)

A(0,1)
B(4,1)
C(2,5)

center of rotation

ccw

90° → degree of rotation

P → center of rotation

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Oct 13-10:58 AM

A **translation** "slides" an object a fixed distance in a given direction

- objects have the same shape and size (isometry)

EX: Translation 6 units left and 3 units up

$$\star \quad (x, y) \rightarrow (x - 6, y + 3) \quad \star$$

6 units left, 3 units up:

$A(2,-2) \rightarrow A'(-4,1)$

(-5,4) B'   (-1,4) C'

image

(-4,1) A'   D' (-2,1)

(1,1) B   (5,1) C

A (2,-2)   D (4,-2)

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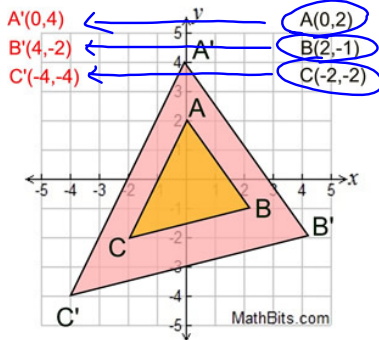**2**

A **dilation** "shrinks" or "stretches" a figure (it is NOT an isometry)

   - must include the scale factor and the center of the dilation
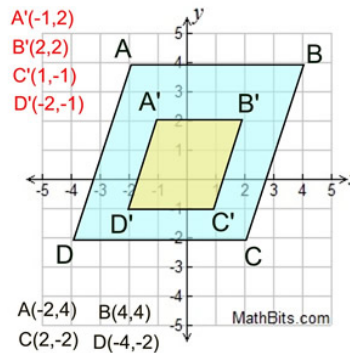
                                          (origin)

    EX: Dilation with scale factor 2, center at the origin.

$$(x, y) \to (2x, 2y)$$

Dilation scale factor 2:

A'(0,4)   A(0,2)
B'(4,-2)   B(2,-1)
C'(-4,-4)   C(-2,-2)

Dilation scale factor ½:

A'(-1,2)
B'(2,2)
C'(1,-1)
D'(-2,-1)

A(-2,4) B(4,4)
C(2,-2) D(-4,-2)

$$(x, y) \to \left(\tfrac{1}{2}x, \tfrac{1}{2}y\right)$$

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Transformations that are RIGID MOTIONS

Line reflection, rotation & translation

1) The function rule $(x,y) \to (y,x)$ is applied to the line segment with endpoints $A(5,2)$ and $B(-3,4)$. What are the coordinates of the image points, A' and B'?

$$A(5,2) \to A'(2,5)$$
$$B(-3,4) \to B'(4,-3)$$

2) Which of the following transformation function rules will **not** produce a rigid transformation?

      translation
(1) $(x,y) \to (x + 9, y - 12)$ (3) $(x,y) \to (x + 3.5, y + 1.5)$

(2) $(x,y) \to (-y, x)$ (4) $(x,y) \to (3x, 3y)$

            Dilation

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3

3) A translation function is given to be $(x,y) \rightarrow (x - 5, y + 8)$.

a) If $A(-1,-5)$, what are are the coordinates of A' under this translation?

$A'(-1-5, -5+8)$

$\boxed{A'(-6,3)}$

b) If $B'(6,-2)$, what are the coordinates of B under this translation?

$\boxed{B(11,-10)} \longrightarrow B'(6,-2)$

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