September 21, 2015

# Rotations

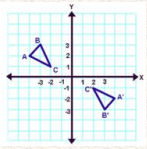
What does $R_{(origin, 90°)}$ mean?

G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
G.CO.4 Develop definitions of rotations, reflections, and translations.
G.CO.5 Given a figure and a transformation, draw the transformed figure. Specify a sequence of transformations that will carry a given figure onto another.

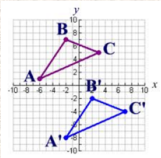
Mar 13-6:22 AM

## Warm-Up

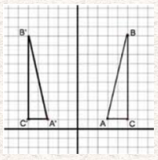
Determine the appropriate transformation for each picture. Write reflection, translation, or neither.



neither



translation



reflection

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## Symmetry

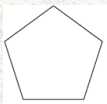
Line symmetry | Point symmetry | Rotational symmetry

A figure may have line symmetry. A simple test to determine if a figure has line symmetry is to fold the paper along a line to see if pre-image coincides with image.

Determine if the following images have line symmetry. Write yes or no.

yes


yes



yes

no

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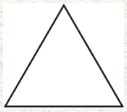
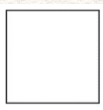
Rotational symmetry: a figure has rotational symmetry if it can be rotated less than 360° around a central point and still match the original. The most common rotations are 90°, 180°, and 270°.

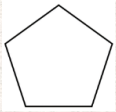


120° rotational symmetry



90° rotational symmetry

72° rotational symmetry



72 rotational symmetry

Rotational symmetry of exactly 180° is called point symmetry.

Determine and circle the following that have point symmetry.

NOON

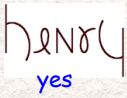
yes

no

yes

MATH

no




yes

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Determine if the picture has line symmetry and/or rotational symmetry. Make sure to specify if the rotational symmetry is point symmetry.

line

rotational; point

line; rotational; point

none

rotational 120°

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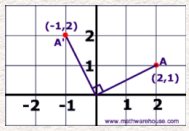
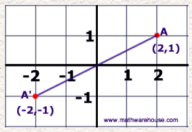
When we transform a figure by turning a pre-image about a fixed point (called the center) a specified number of degrees, we have performed a rotation. The direction of a rotation is understood to be counter-clockwise.
A rotation is denoted using $R_{(center\ ,\ degrees)}$.

## Examples

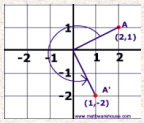
Rotation by 90° about the origin: $R_{(origin,\ 90°)}$
The general rule for a rotation by 90° about the origin is (x,y) ⟶ (-y, x).




Rotation by 180° about the origin: $R_{(origin,\ 180°)}$
The general rule for a rotation by 180° about the origin is (x,y) ⟶ (-x, -y).




Rotation by 270° about the origin: $R_{(origin,\ 270°)}$
The general rule for a rotation by 270° about the origin is (x,y) ⟶ (y, -x).

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## You Try!

1. $R_{(origin, 90^\circ)}$ A(2, 3) (-3,2)
   (-y,x)
2. $R_{(origin, 180^\circ)}$ A(2, 3) (-2,-3)
   (-x,-y)
3. $R_{(origin, 270^\circ)}$ A(2, 3) (3,-2)
   (y,-x)
4. $R_{(origin, 180^\circ)}$ B(0, -2) (0,2)
   (-x,-y)
5. $R_{(origin, 90^\circ)}$ C(4, 0) (0,4)
   (-y,x)
6. $R_{(origin, 270^\circ)}$ D(-1, 1) (1,1)
   (y,-x)

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Complete the worksheet.

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