

# Rotations in the Coordinate Plane

The contents of this content module were developed by special educator Bethany Smith, PhD and validated by content expert Drew Polly, PhD at University of North Carolina at Charlotte under a grant from the Department of Education (PR/Award #: H373X100002, Project Officer, [Susan.Weigert@Ed.gov](mailto:Susan.Weigert@Ed.gov)). However, the contents do not necessarily represent the policy of the Department of Education and no assumption of endorsement by the Federal government should be made

# What is a rotation?

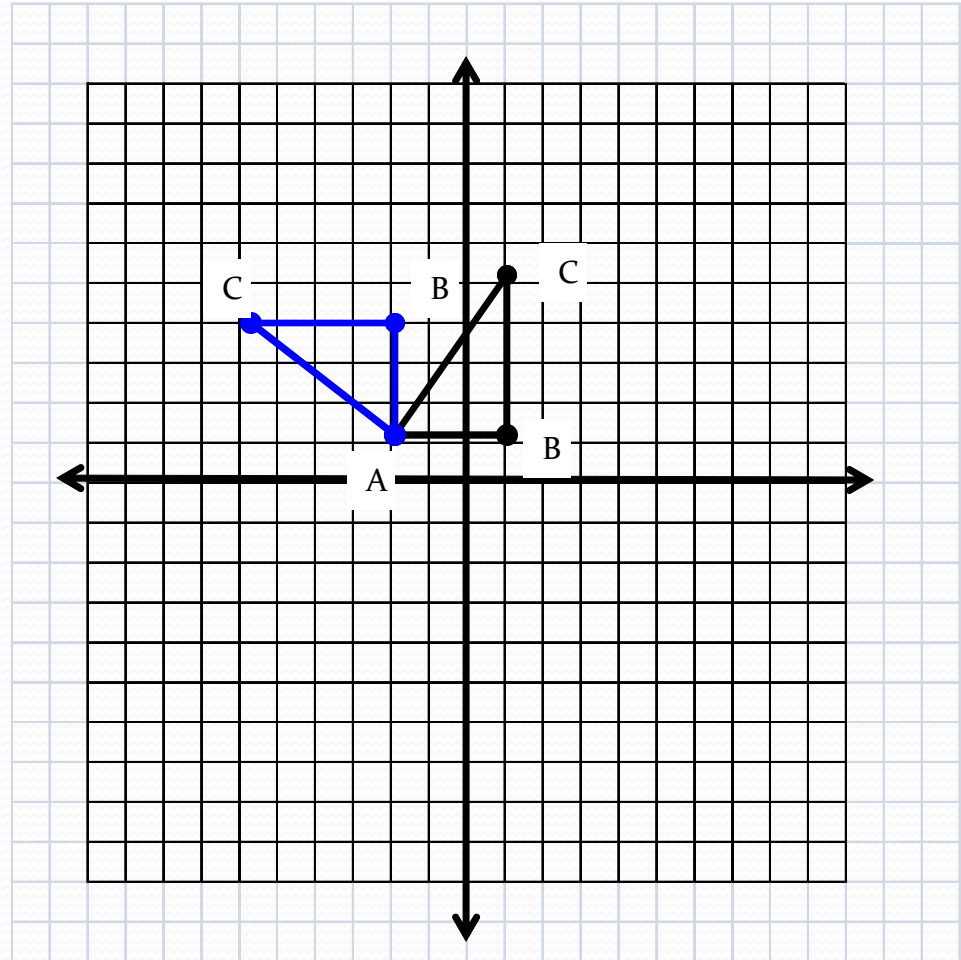
- A rotation occurs when a figure is turned about a point
- That point is called the center of rotation

# Working through an example

Rotate the triangle  $90^\circ$  around  
A

Original coordinates A(-2,1),  
B(1,1), and C(1,5)

Once rotated, new coordinates  
are A(-2,1), B(-2,4), and  
C(-6,4)



# If rotated about the origin

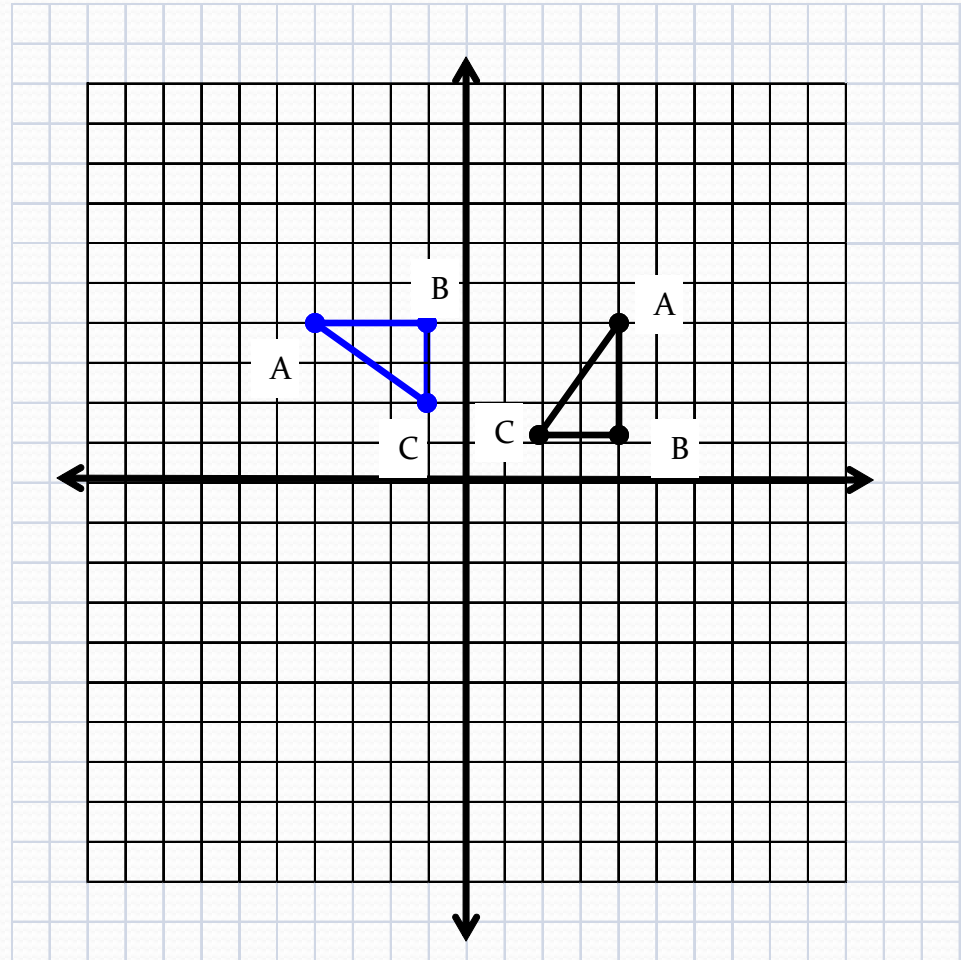
- If a figure is rotated  $180^\circ$ 
  - Multiply both coordinates by -1
    - $(x,y) \longrightarrow (-x,y)$  for example  $(3, 5) \longrightarrow (-3, -5)$
- If a figure is rotated  $90^\circ$  clockwise
  - Multiply x-coordinates by -1
  - Switch x and y coordinates
    - $(x,y) \longrightarrow (-y,x)$  for example  $(3, 5) \longrightarrow (5, -3)$
- If a figure is rotated  $90^\circ$  counter clockwise
  - Multiply y-coordinates by -1
  - Switch x and y coordinates
    - $(x,y) \longrightarrow (-y,x)$  for example  $(3, 5) \longrightarrow (-5, 3)$

# Another example (rotated across origin)

Rotated  $90^\circ$  counter clockwise around the origin

Original coordinates A(4,4), B(4,1), and C(2,1)

Once rotated, new coordinates are A(-4,4), B(-1,4), and C(-1,2)



# Ideas for application

- Using construction and tissue paper, make a mock quilt using reflections, rotations, and transformation of different shapes (have a different quilts for different polygons)
- Use amalgamations to make an art project
- Cut a picture of a preferable object in half. Use the second half to demonstrate a reflection (putting the two sides together) and a rotation (put the pictures together with one side upside down)

# Making Connections

- Exploring rotations in the coordinate plane address the following 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grade Core Content Connectors
  - 6.GM.1c4 Locate points on a graph
  - 6.GM.1c5 Use order pairs to graph given points
  - 6.GM.1c6 Find coordinate values of points in the context of a situation
  - 6.GM.1c7 Use coordinate points to draw polygons
  - 6.NO.1d5 find given points between -10 and 10 on both axis of a coordinate plane
  - 6.NO.1d6 Label points between -10 and 10 on both axis of coordinate plane
  - 7.GM.1e1 Construct or draw plane figures using properties
  - 8.GM.1f1 Recognize a rotation, reflection, or translation of a figure
  - 8.GM.1f2 Identify a rotation, reflection, or translation of a plane figure when given coordinates