Transformations on the Coordinate Plane: Rotations

A **rotation** is a type of transformation that turns a figure around a fixed point, called the *center of rotation*. It creates an image that is congruent to the preimage. The number of degrees a figure rotates is called the *angle of rotation*, and a positive angle of rotation turns a figure counterclockwise. Here are some rules to help you find the coordinates of a rotated image:

Counterclockwise Rotations Around the Origin	
Angle of Rotation	Rule
90°	$(x, y) \mapsto (-y, x)$
180°	$(x, y) \mapsto (-x, -y)$
270°	$(x, y) \mapsto (y, -x)$

Note: Rotating n° clockwise is the same as rotating $(360 - n)$° counterclockwise.

For example, rotating 270° clockwise is the same as rotating 90° counterclockwise.

Rotating a Figure: Rotate △*CDE* 90° around the origin. What are the coordinates of the image?

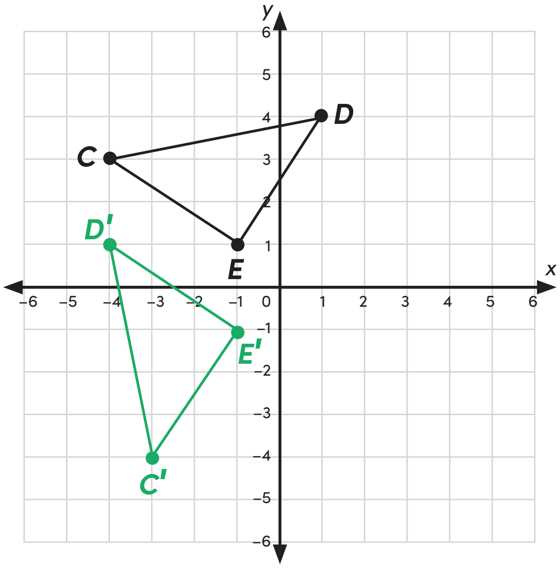
The rule for a 90° rotation is $(x, y) \mapsto (-y, x)$.

C(−4, 3) ↦ ***C'***(−3, −4)

D(1, 4) ↦ ***D'***(−4, 1)

E(−1, 1) ↦ ***E'***(−1, −1)

The coordinates of the image are *C'*(-3, -4), *D'*(-4, 1), and *E'*(-1, -1).



Describing a Rotation: Describe the rotation that maps △*STU* to △*S'T'U'*.

S(−3, −3) ↦ ***S'***(3, 3)

T(3, −1) ↦ ***T'***(−3, 1)

U(1, −5) ↦ ***U'***(−1, 5)

The signs of both the x-coordinates and *y*-coordinates changed, which corresponds to the rule for a 180° rotation: $(x, y) \mapsto (-x, -y)$.

△*STU* was rotated 180° around the origin.