Transformations: Rotations on a Coordinate Plane

Meet TED. TED is going to help us learn about rotations.

First let's focus on TED's eyes.

What are the coordinates of his left eye? (6, 5)

Be careful here, a lot of students (as well as me the first time) mix up TED's left eye with their own left.

What are the coordinates of his right eye? (4, 5)

Good, now you will need to use those coordinates in order to help you discover to rules for rotations.
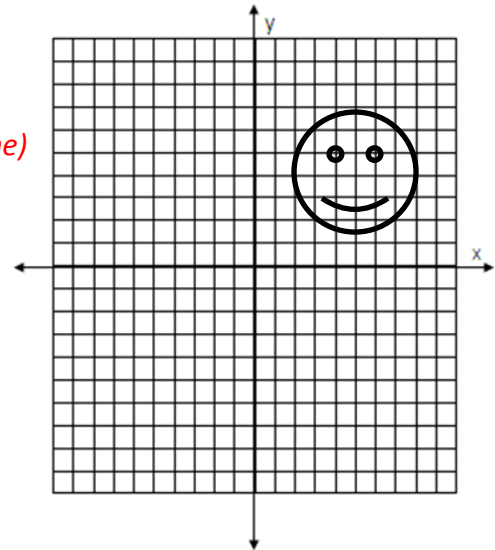
Before we go any further lets discuss the direction in which we rotate. Remember that our coordinate plane is broken into quadrants numbers 1 – 4.

When we rotate we always go in order of quadrant unless told otherwise.

A full rotation is 360° so if you rotate halfway around that would be a <u>180</u>° rotation.

A 90° rotation moves $\frac{1}{4}$ of the way around, which just means it moves one quadrant counter-clockwise. If you rotated a figure 90° from quadrant 4 it would then be in quadrant <u>I</u> .
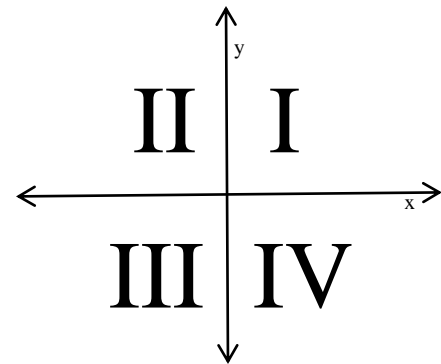
Let's start with the easy one. What happens when TED rotates 180°?
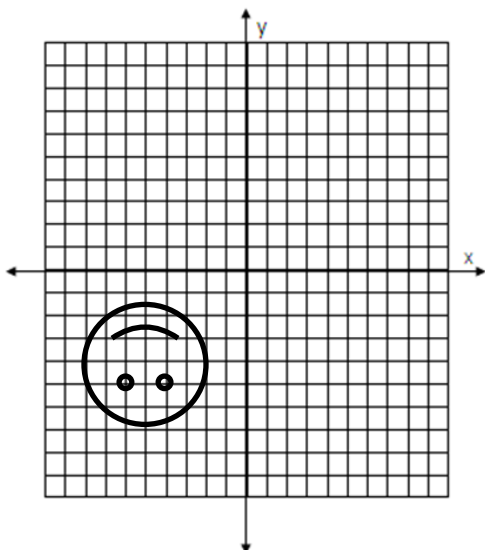
What are the new coordinates of TED's left eye?   (-6,-5)

What are the new coordinated of TED's right eye? (-4, -5)

What do you notice about the coordinates?
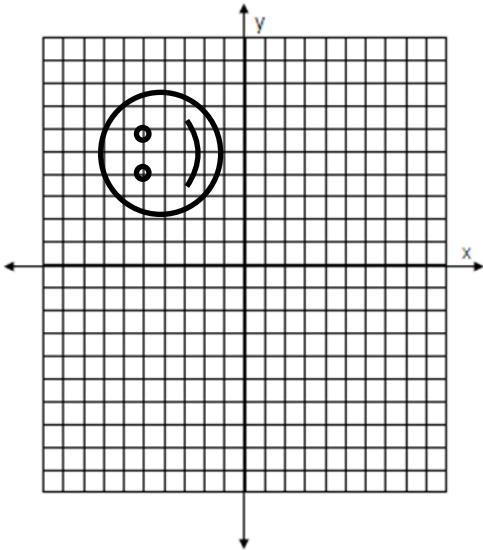x and y changed to their opposites

Write a rule for a 180° rotation.

(x, y) ⟶ (-x, -y)

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Now let's see what happens when we only rotate him 90°.

What are the new coordinates of TED's left eye?   (-5, 6)

What are the new coordinated of TED's right eye? (-5, 4)

What do you notice about the coordinates?
y became x and changed to its opposite
x became y

Write a rule for a 90° rotation.

(x, y) $\longmapsto$ (-y, x)

A 270° is like doing a 90° rotation 3 times. This means we will go $\frac{3}{4}$ of the way around.

What are the new coordinates of TED's left eye?   (5, -6)

What are the new coordinated of TED's right eye? (5, -4)
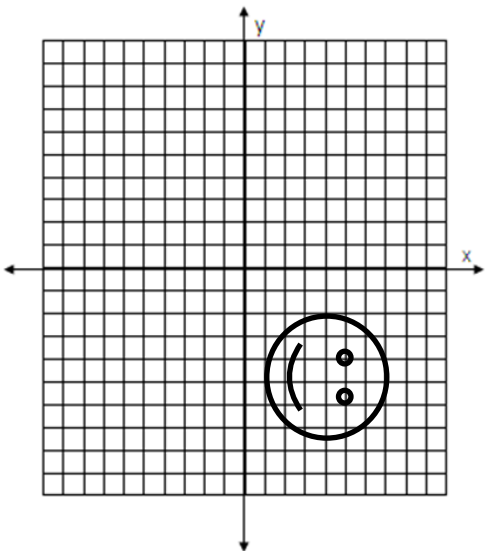
What do you notice about the coordinates?
x became y and changed to its opposite
y became x

Write a rule for a 270° rotation.

(x,y) $\longrightarrow$ (y, -x)

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Independent Practice

Directions: Tell where each point would end up if it rotated the given distance.

	Given Point	90° rotation	180° rotation	270° rotation
ex	(1, 7)	(-7,1)	(-1, -7)	(7, -1)
1.	(2, 9)	(-9, 1)	(-2, -9)	(9, -2)
2.	(3, -5)	(5, 3)	(-3, 5)	(-5, -3)
3.	(-8, 2)	(-2, -8)	(8, -2)	(2, 8)
4.	(-5, -8)	(8, -5)	(5, 8)	(-8, 5)
5.	(4, 4)	(-4, 4)	(-4, -4)	(4, -4)
6.	(3, 0)	(0, 3)	(-3, 0)	(0, -3)

Directions: Rotate each figure the given distance. Sketch the new shape and label the points.

Rotate the figure 180°

Rotate the figure 90°

Rotate the figure 270°

Rotate the figure 180°

Looks the same only the corners would move.