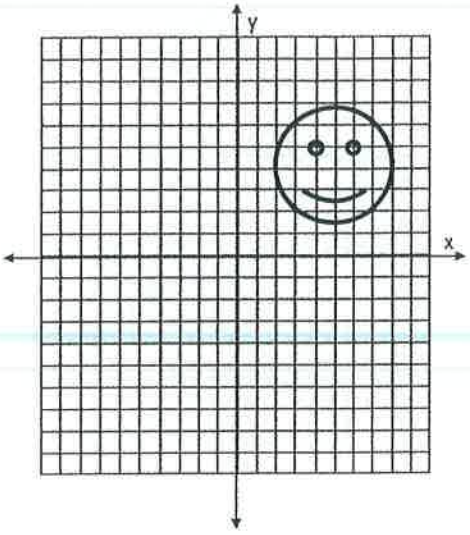
Name: KEY Date:

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.

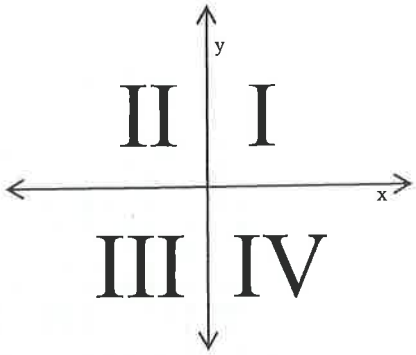


What are the coordinates of his left eye? (6,5)

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.

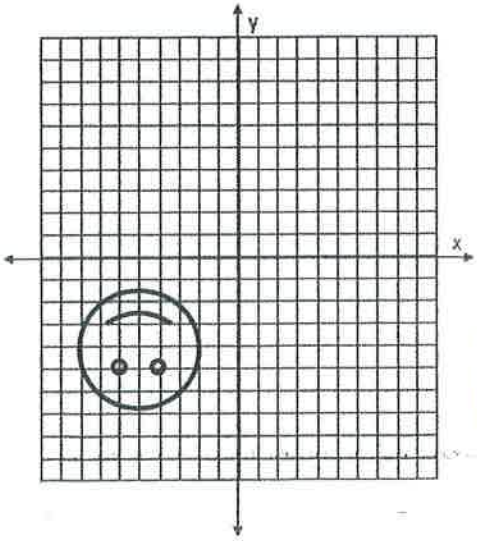


When we rotate we always go in order of quadrant unless told otherwise.

A full rotation is 360° so if you rotate halfway around that would be a 180 ° 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 I.

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 + y switched to their opposites

Write a rule for a 180° rotation.

(x, y) → (-x , -y)

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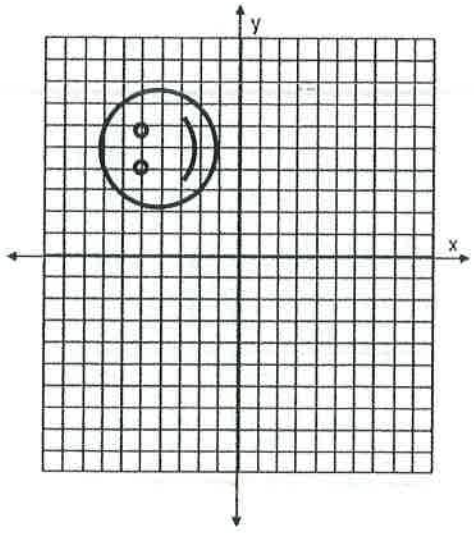
Now let's see what happens when we only rotate him 90°.



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

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

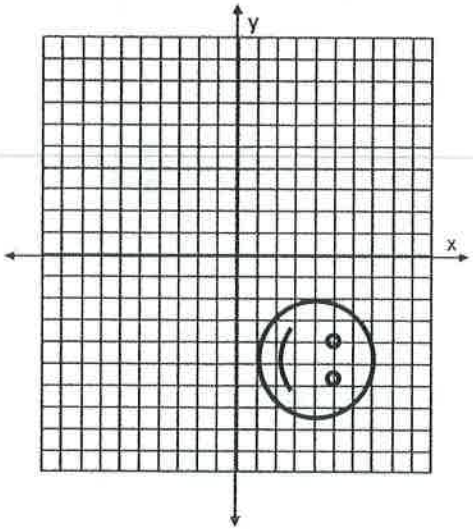
What do you notice about the coordinates?

X & y switched and y goes to its opposite

Write a rule for a 90° rotation.

(x,y) ⟶ (-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 & y switched and X goes to its opposite

Write a rule for a 270° rotation.

(x,y) ⟶ (y, -X)