

**Angles of Rotation**

An angle is in \_\_\_\_\_ when its vertex is at the origin and one ray is on the positive  $x$ -axis. The \_\_\_\_\_ of the angle is the ray on the  $x$ -axis. The other ray is called the \_\_\_\_\_ of the angle.

Positive Rotation

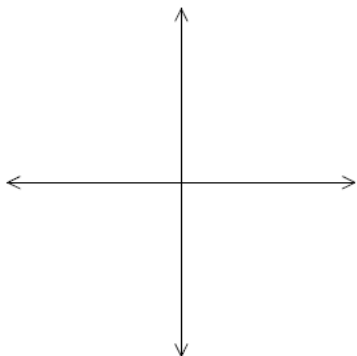
An \_\_\_\_\_ is formed by rotating the terminal side and keeping the initial side in place. If the terminal side is rotated **counterclockwise**, the angle of rotation is positive. If the terminal side is rotated **clockwise**, the angle of rotation is negative. The terminal side can be rotated more than  $360^\circ$ .

Negative Rotation

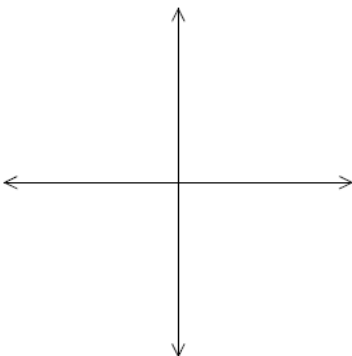
**Example 1: Drawing Angles in Standard Position**

Draw an angle with the given measure in standard position.

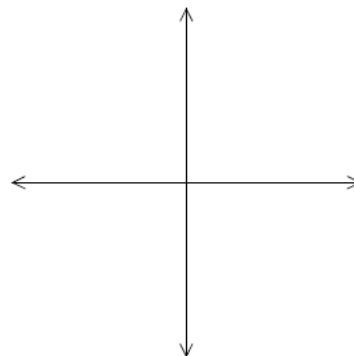
a.  $320^\circ$



b.  $-110^\circ$



c.  $990^\circ$

**Coterminal Angles**

\_\_\_\_\_ angles are angles in standard position with the same terminal side. One way to find the measure of an angle that is coterminal with an angle  $\theta$  is to add or subtract integer multiples of  $360^\circ$ .

**Example 2: Finding Coterminal Angles**

Find the measures of a positive angle and a negative angle that are coterminal with each given angle.

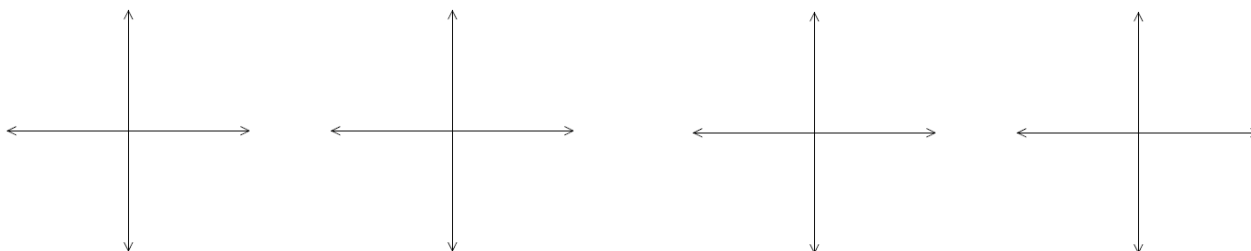
a.  $65^\circ$

b.  $410^\circ$

c.  $-88^\circ$

## Reference Angles

For an angle  $\theta$  in standard position, the reference angle is the \_\_\_\_\_  
formed by the \_\_\_\_\_.



### **Example 3: Finding Reference Angles**

Find the measure of the reference angle for each given angle.

a.  $135^\circ$

b.  $-105^\circ$

c.  $325^\circ$

## Evaluating Trigonometric Functions of Any Angle

### **Trigonometric Functions**

For a point  $P(x, y)$  on the terminal side of  $\theta$  in standard position and  $r = \sqrt{x^2 + y^2}$ ,

SINE	COSINE	TANGENT
$\sin \theta = \frac{y}{r}$	$\cos \theta = \frac{x}{r}$	$\tan \theta = \frac{y}{x}, x \neq 0$

### **Example 4: Finding Values of Trigonometric Functions**

$P(-6, 9)$  is a point on the terminal side of  $\theta$  in standard position. Find the exact value of the six trigonometric functions for  $\theta$ .

$P(-3, 6)$  is a point on the terminal side of  $\theta$  in standard position. Find the exact value of the six trigonometric functions for  $\theta$ .