



$$\theta = 30$$
$$\frac{\text{opp}}{\text{hyp}} = \sin$$

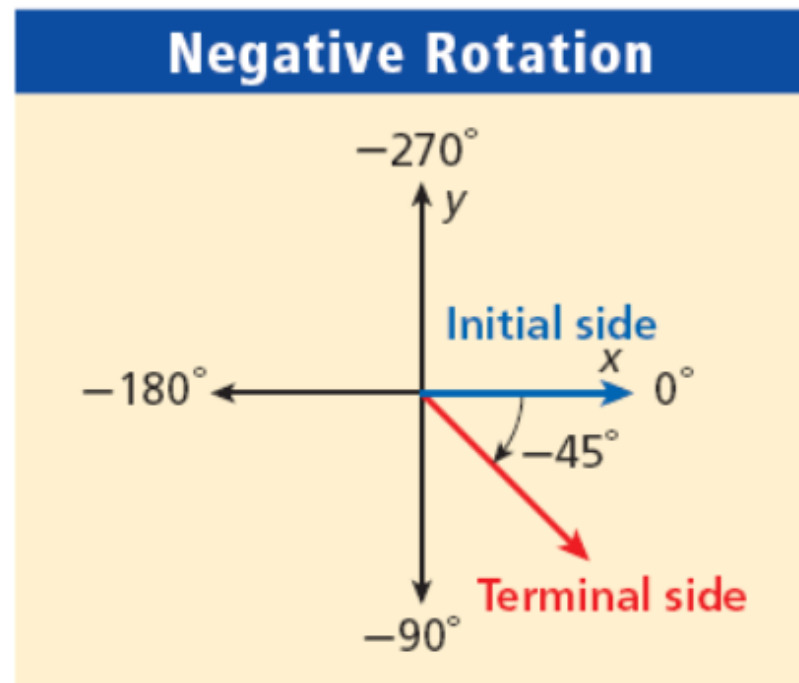
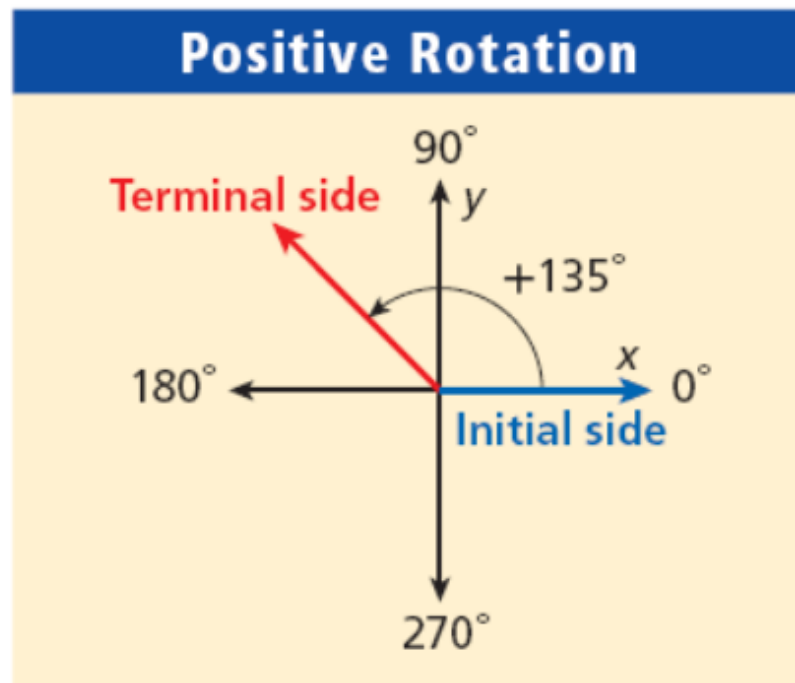
$$\sin 30 = \frac{22}{x}$$

$$\frac{x \sin 30}{\cancel{\sin 30}} = \frac{22}{\cancel{\sin 30}}$$

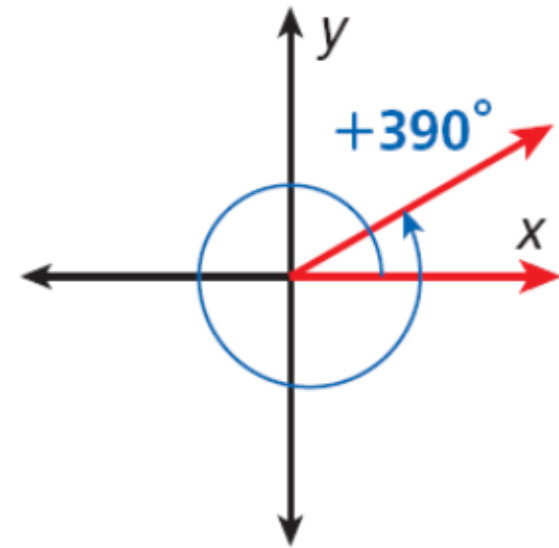
$$x = 44$$

## 10.2 Angles of rotation

An angle is in **standard position** when its vertex is at the origin and one ray is on the positive  $x$ -axis. The **initial side** of the angle is the ray on the  $x$ -axis. The other ray is called the **terminal side** of the angle.

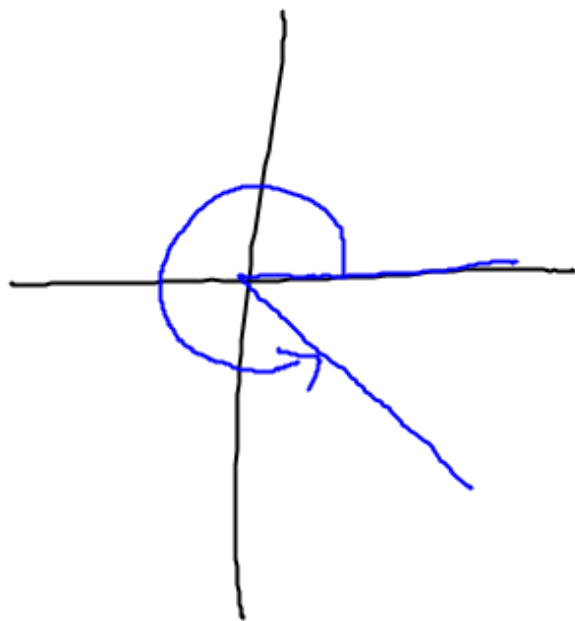


An **angle of rotation** is formed by rotating the terminal side and keeping the initial side in place. If the terminal side is rotated counterclockwise, the angle of rotation is positive. If the terminal side is rotated clockwise, the angle of rotation is negative. The terminal side can be rotated more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

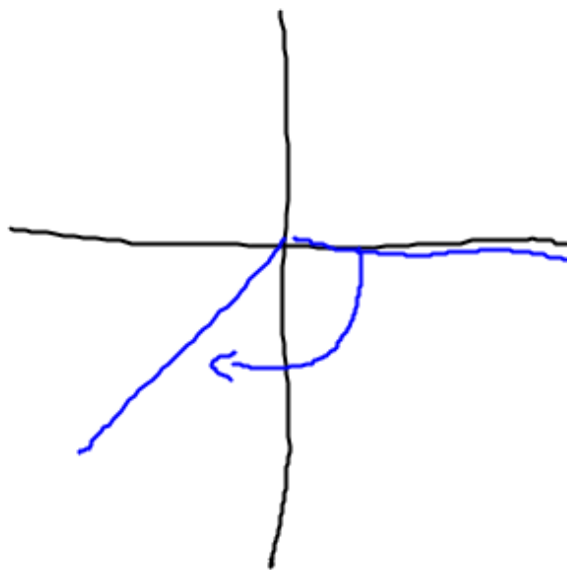


**Draw an angle with the given measure in standard position.**

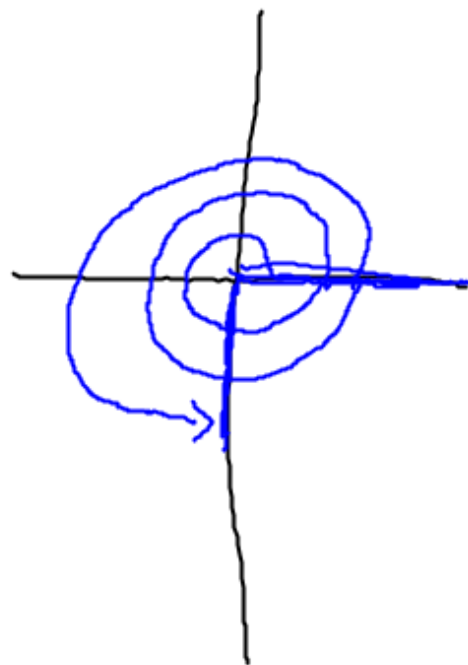
**A.  $320^\circ$**



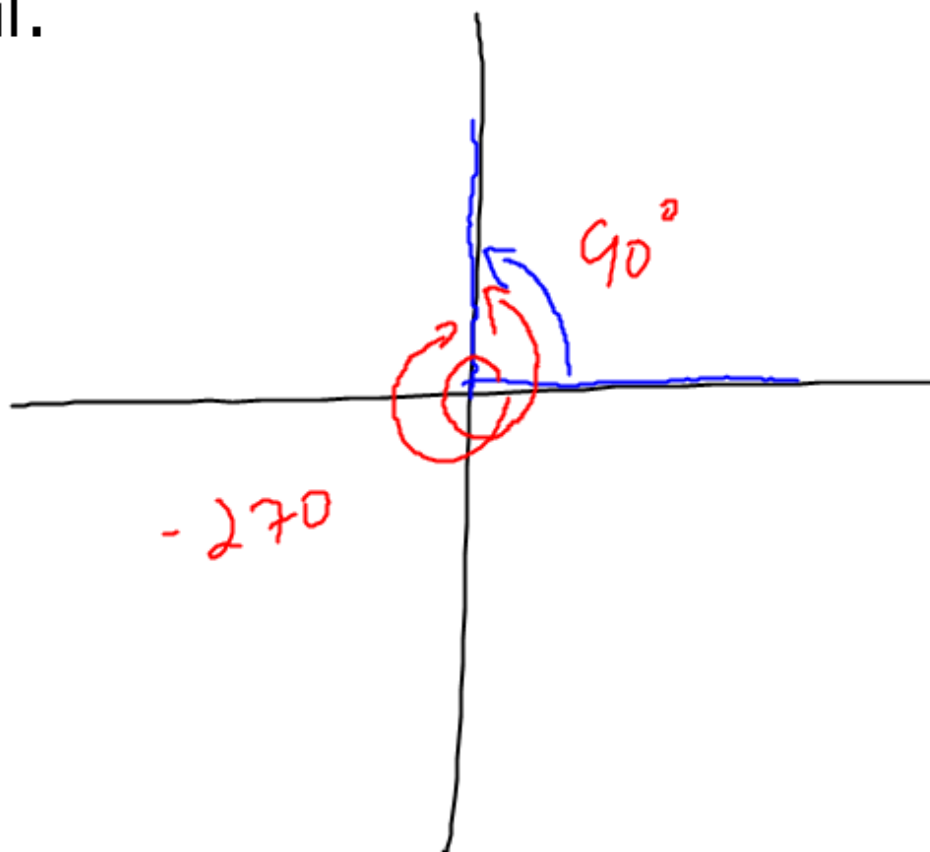
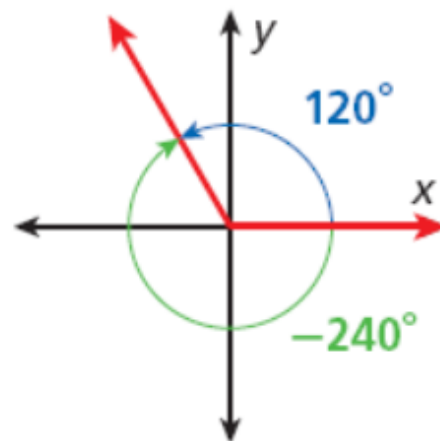
**B.  $-110^\circ$**



**C.  $990^\circ$**

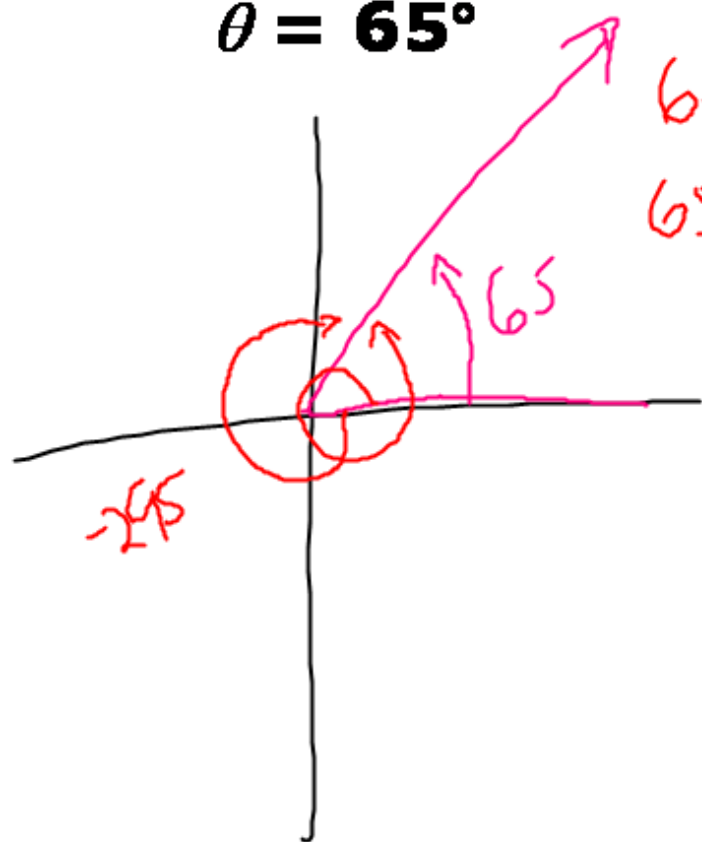


**Coterminal angles** are angles in standard position with the same terminal side. For example, angles measuring  $120^\circ$  and  $-240^\circ$  are coterminal.



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

$\theta = 65^\circ$



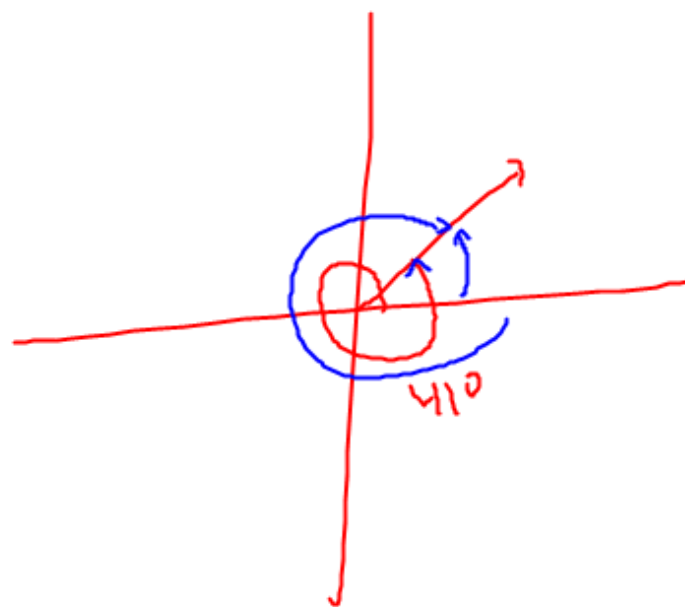
$65 - 360 = -295$

$65 + 360 = 425$

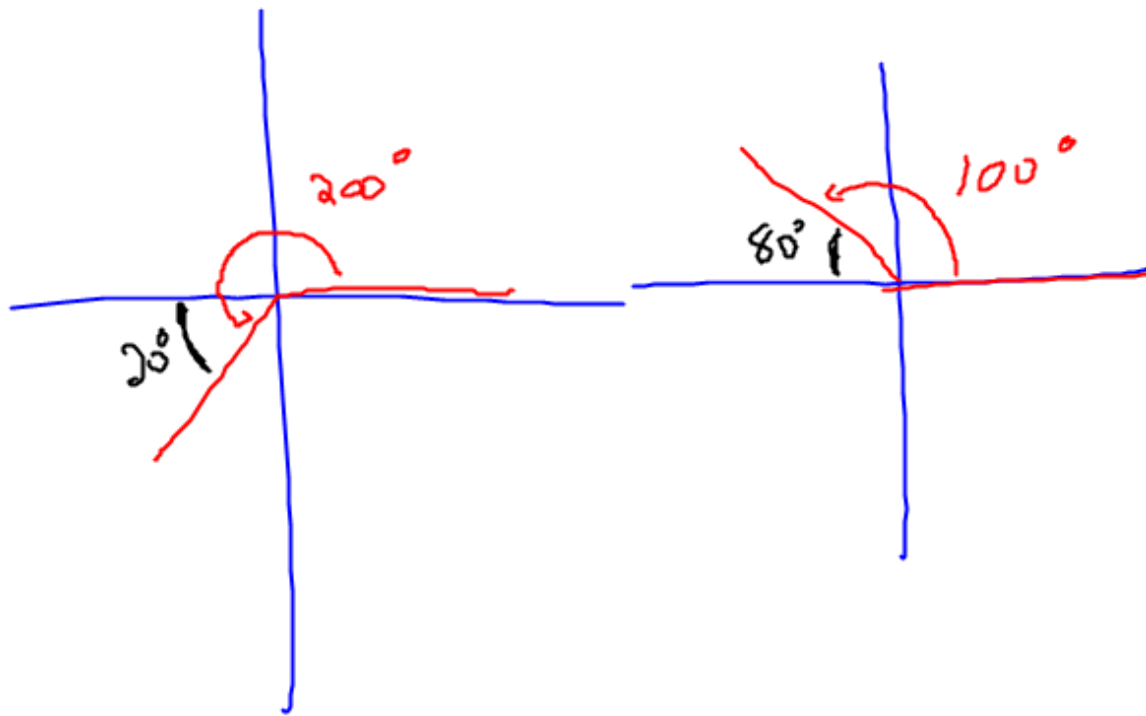
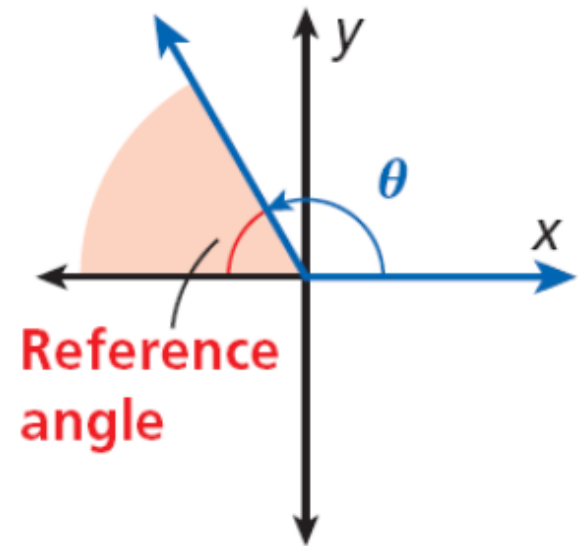
$\theta = 410^\circ$

$410 - 360 = 50$

$50 - 360 = -310$

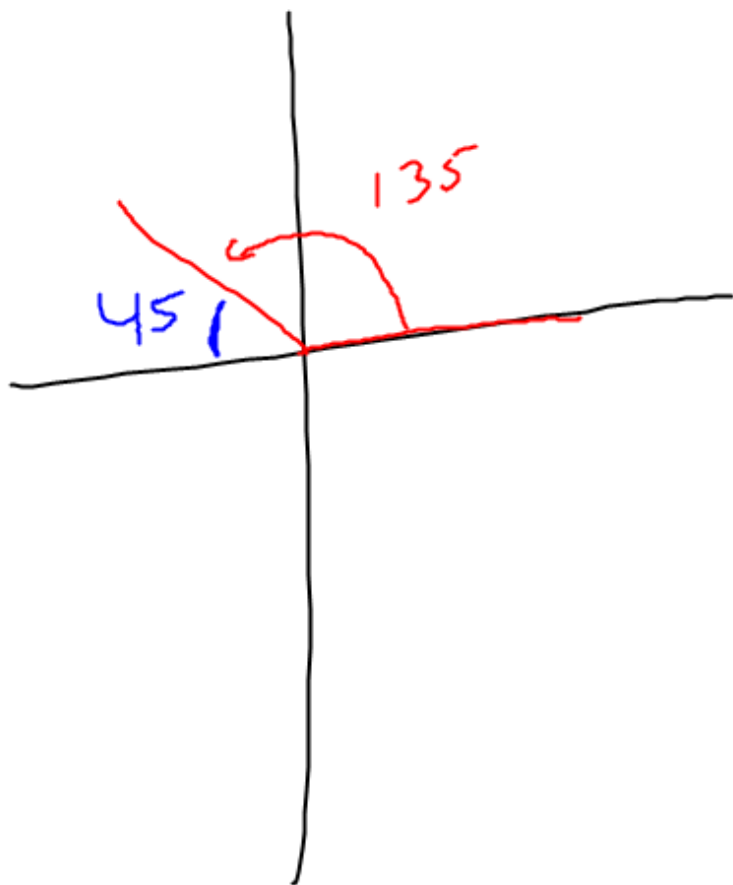


For an angle  $\theta$  in standard position, the **reference angle** is the positive acute angle formed by the terminal side of  $\theta$  and the  $x$ -axis. In Lesson 13-3, you will learn how to use reference angles to find trigonometric values of angles measuring greater than  $90^\circ$  or less than  $0^\circ$ .

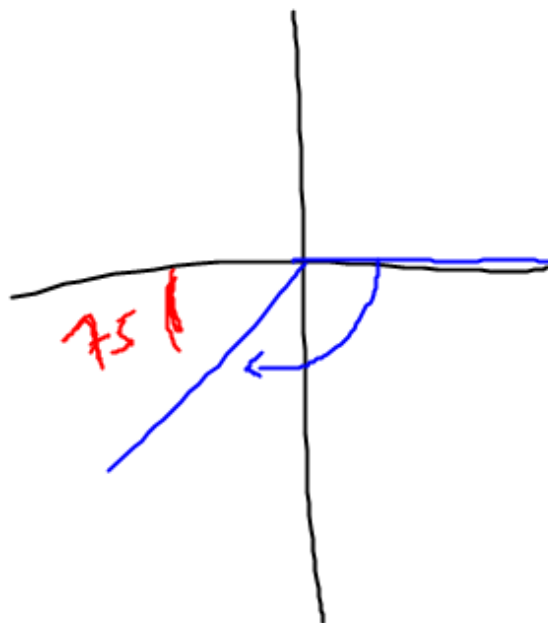


Find the measure of the reference angle for each given angle.

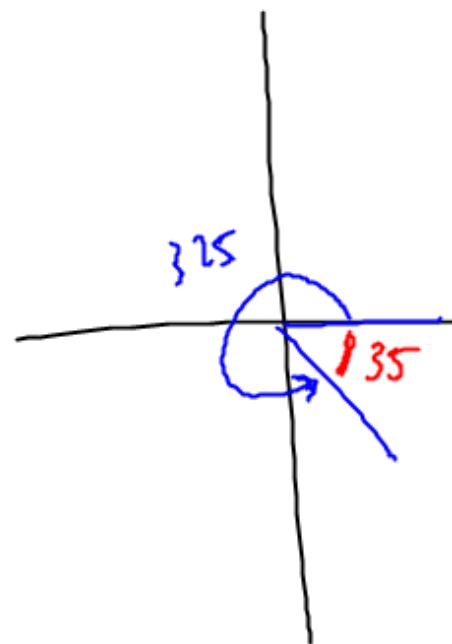
**A.  $\theta = 135^\circ$**



**B.  $\theta = -105^\circ$**



**C.  $\theta = 325^\circ$**





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

