

Directions: Complete #17 - 24 all

Sketch each angle. Then find its reference angle. (Example 3)

17. 135°

18. 210°

19. $\frac{7\pi}{12}$

20. $\frac{11\pi}{3}$

21. -405°

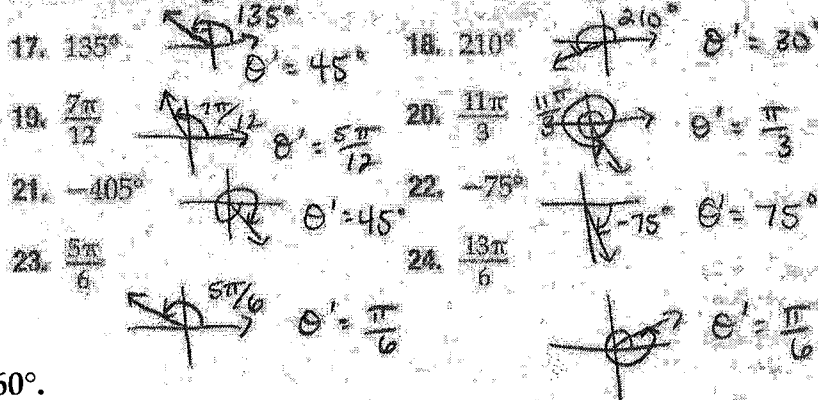
22. -75°

23. $\frac{5\pi}{6}$

24. $\frac{13\pi}{6}$

Directions: Complete #17 - 24 all

Sketch each angle. Then find its reference angle. (Example 3)



1.09 Coterminal and Reference Angles

Find a coterminal angle between 0° and 360° .

1) 885°

$$\begin{array}{r} 885 \\ - 720 \\ \hline 165^\circ \end{array}$$

2) -435°

$$\begin{array}{r} -435 \\ + 720 \\ \hline 285^\circ \end{array}$$

0 and 2π

Find a coterminal angle between 0 and 2π for each given angle.

3) $\frac{17\pi}{6}$

$$\frac{17\pi}{6} - \frac{12\pi}{6} = \frac{5\pi}{6}$$

4) $-\frac{\pi}{4}$

$$-\frac{\pi}{4} + \frac{8\pi}{4} = \frac{7\pi}{4}$$

Find a positive and a negative coterminal angle for each given angle.

5) 240°

$$\begin{array}{l} 240 + 360 = 600^\circ \\ 240 - 360 = -120^\circ \end{array}$$

6) -166°

$$\begin{array}{l} -166 + 360 = 194^\circ \\ -166 - 360 = -526^\circ \end{array}$$

7) $-\frac{5\pi}{2}$

$$-\frac{5\pi}{2} + \frac{4\pi}{2} = -\frac{\pi}{2}$$

8) $\frac{17\pi}{12}$

$$\frac{17\pi}{12} - \frac{24\pi}{12} = -\frac{7\pi}{12}$$

$$-\frac{5\pi}{2} + \frac{4\pi}{2} + \frac{4\pi}{2} = \frac{3\pi}{2}$$

$$\frac{17\pi}{12} + \frac{24\pi}{12} = \frac{41\pi}{12}$$

or $-\frac{5\pi}{2} - \frac{4\pi}{2} = -\frac{9\pi}{2}$

State if the given angles are coterminal.

9) $115^\circ, 475^\circ$

$$\begin{array}{r} 475 \\ -360 \\ \hline 115^\circ \checkmark \end{array}$$

Yes

10) $\frac{5\pi}{6}, \frac{23\pi}{6}$

$$\frac{23\pi}{6} - \frac{12\pi}{6} = \frac{11\pi}{6}$$

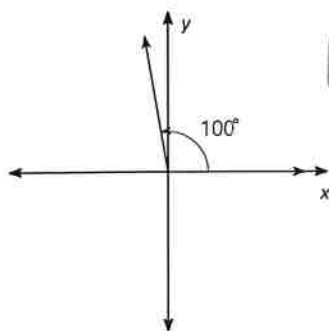
No

$$\frac{11\pi}{6} - \frac{12\pi}{6} = \frac{-\pi}{6}$$

find the reference angle.

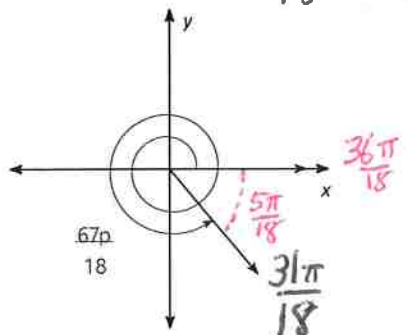
$$0 < \theta' < 90^\circ \text{ or } 0 < \theta' < \frac{\pi}{2}$$

11)



$$\theta' = 80^\circ$$

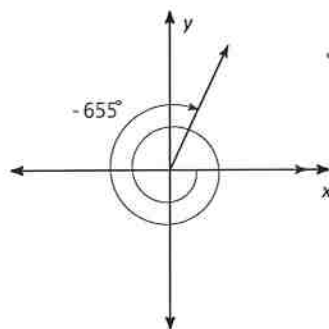
12)



$$\frac{67\pi}{18} - \frac{36\pi}{18} = \frac{31\pi}{18}$$

$$\theta' = \frac{5\pi}{18}$$

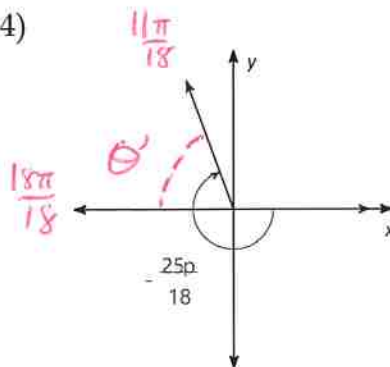
13)



$$-655 + 720 = 65$$

$$\theta' = 65^\circ$$

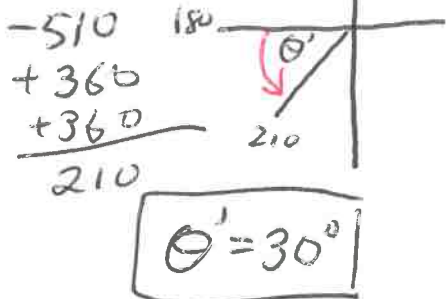
14)



$$-\frac{25\pi}{18} + \frac{36\pi}{18} = \frac{11\pi}{18}$$

$$\theta' = \frac{7\pi}{18}$$

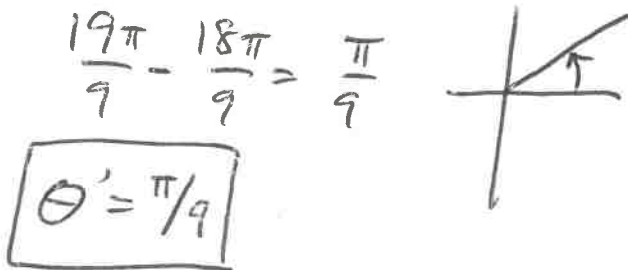
15) -510°



$$-510 + 360 + 360 = 210$$

$$\theta' = 30^\circ$$

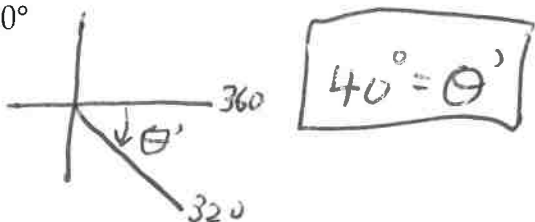
16) $\frac{19\pi}{9}$



$$\frac{19\pi}{9} - \frac{18\pi}{9} = \frac{\pi}{9}$$

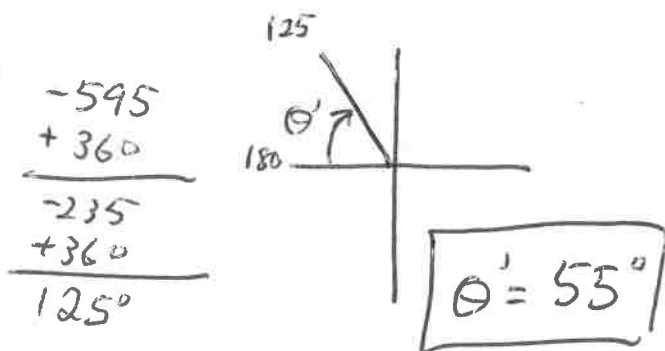
$$\theta' = \frac{\pi}{9}$$

17) 320°



$$40^\circ = \theta'$$

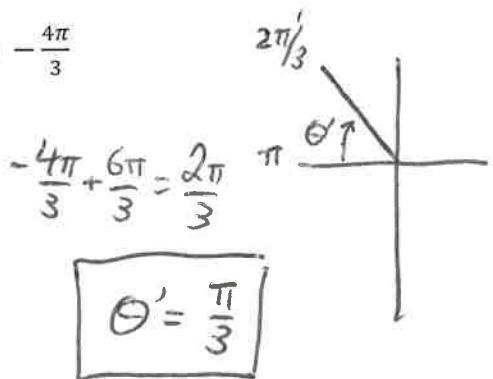
18) -595°



$$-595 + 360 + 360 = 125$$

$$\theta' = 55^\circ$$

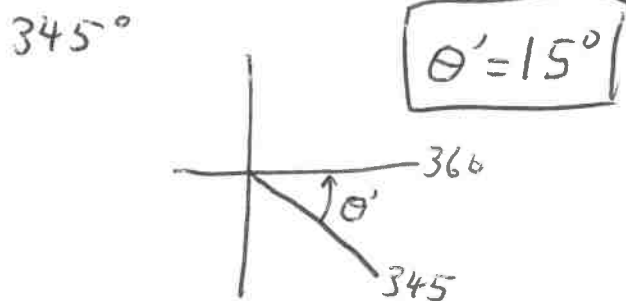
19) $-\frac{4\pi}{3}$



$$-\frac{4\pi}{3} + \frac{6\pi}{3} = \frac{2\pi}{3}$$

$$\theta' = \frac{\pi}{3}$$

20) 345°



$$\theta' = 15^\circ$$