1.09 Quiz Review (Co-Terminal Angles, Reference Angles) WS #2

Key

1. Convert 320° to radian measure. (in exact form)

$320 \cdot \frac{\pi}{180} \rightarrow \boxed{\frac{16}{9}\pi \text{ radians}}$

2. Convert $\frac{4\pi}{19}$ radians to degree measure. (3 decimal places)

$\frac{4\pi}{19} \cdot \frac{180}{\pi} \rightarrow \boxed{37.895°}$

Round answers to the nearest thousandth.

3. Find the measure of the central angle (in both radians and in degrees) that has an 15 cm arc length and a 6 cm radius.

$s = r\theta$

$s = 15$

$r = 6$

$\theta = \_$

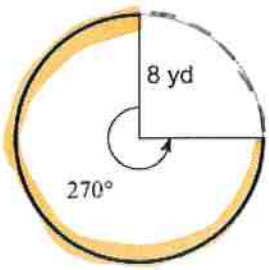
$15 = 6\theta$

$\frac{15}{6} = \theta$

$\theta = \boxed{\frac{5}{2} \text{ radians}}$

$\theta = \frac{5}{2} \cdot \frac{180}{\pi} \rightarrow \boxed{143.239°}$

4. Find the length of arc below.



$s = r\theta$

$s = \_$

$r = 8$

$\theta = 270 \cdot \frac{\pi}{180} = \frac{3\pi}{2}$ rad

$s = r\theta$

$s = (8)\left(\frac{3\pi}{2}\right)$

$\boxed{s = 12\pi \text{ or } 37.699 \text{ yds}}$

5) Find the length of arc below:

$r = 12$ in, $\theta = \frac{3\pi}{4}$

$s = r\theta$

$\boxed{s = 12\left(\frac{3\pi}{4}\right) \rightarrow 9\pi \text{ or } 28.274 \text{ inches}}$

6. State if the given angles are coterminal. (show work)

a) 285°, 645°

$645 - 360 = 285°$ ✓

yes, angles are coterminal

b) $\frac{17\pi}{9}, -\frac{10\pi}{9}$

$-\frac{10\pi}{9} + 2\pi \rightarrow \frac{8}{9}\pi + 2\pi \rightarrow \frac{26\pi}{9}$

No, angles are not coterminal

7) Find a coterminal angle between 0° and 360° for the angle below.

–435°

$-435 + 360 = -75°$ (negative angle)

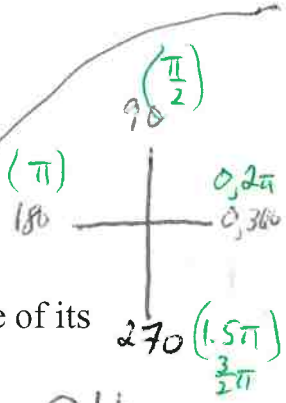
$-75 + 360 = 285°$ (positive angle)

8) Find a coterminal angle between 0 and 2 π for given angle below.

$-\frac{35\pi}{18}$

$-\frac{35\pi}{18} + 2\pi \rightarrow \frac{\pi}{18}$ (positive angle)

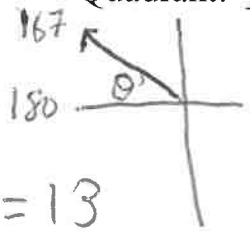
$-\frac{35\pi}{18} - 2\pi \rightarrow -\frac{71\pi}{18}$ (negative angle)



9. State the quadrant for the terminal side of each angle. Then, find the measure of its reference angle (θ')

a) 167° Quadrant: Q2

θ' = 13°



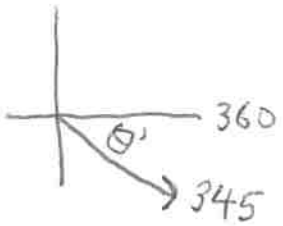
$\theta' = 180 - 167 = 13$

b) -375° Quadrant: Q4

θ' = 15°

$-375 + 360 \rightarrow -15$

$-15 + 360 \rightarrow 345°$

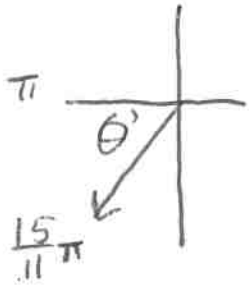


$\theta' = 360 - 345 = 15$

c) $\frac{15\pi}{11}$ Quadrant: Q3

$\theta' = \frac{4\pi}{11}$

$\frac{15}{11}\pi \simeq 1.363\pi$

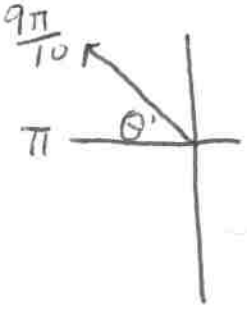


$\theta' = \frac{15\pi}{11} - \pi = \frac{4\pi}{11}$

d) $-\frac{11\pi}{10}$ Quadrant: Q2

$\theta' = \frac{\pi}{10}$

$-\frac{11}{10}\pi + 2\pi \rightarrow \frac{9\pi}{10}$



$\theta' = \pi - \frac{9\pi}{10} = \frac{\pi}{10}$

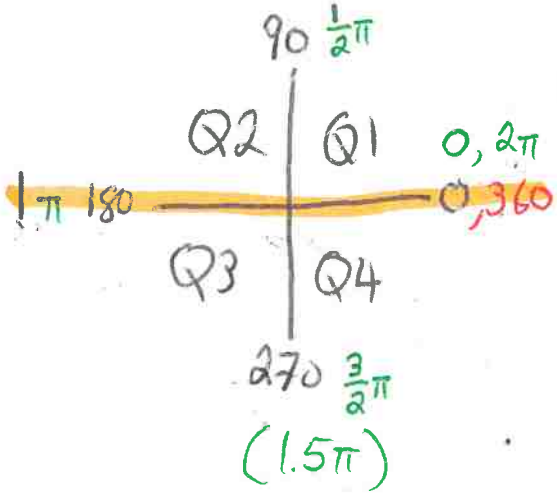
To find coterminal angle:

(Degrees) * Add/subtract $360°$

(Radians) * Add/subtract 2π

To find Reference Angle: (θ')

1) Find first the coterminal angle in the easy range: ($0 < \theta < 2\pi$ or $0 < \theta < 360°$)
2) Identify Quadrant location of angle
3) If Q1: no changes needed ($\theta' = \theta$)
   If Q2: $\theta' = 180 - \theta$ or $\pi - \theta$
   If Q3: $\theta' = \theta - 180$ or $\theta - \pi$
   If Q4: $\theta' = 360 - \theta$ or $2\pi - \theta$



Reference Angle: ($\pi/2$)

Radian: $0 < \theta' < 0.5\pi$

Degree: $0 < \theta' < 90°$