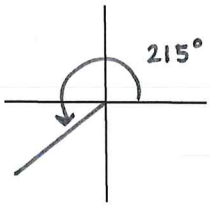
Name: _____

Assignment 4.1 – 4.3

1. Draw each angle in standard position. Find a **positive** and **negative coterminal angle**.

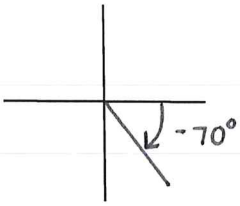
a) 215°



Positive Coterminal: 575°

Negative Coterminal: −145°

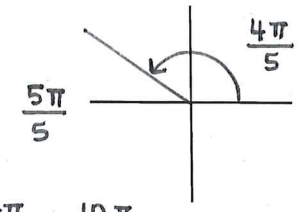
b) −70°



Positive Coterminal: 290°

Negative Coterminal: −430°

b) $\frac{4\pi}{5}$



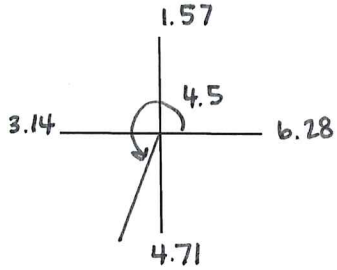
$\frac{4\pi}{5} + \frac{10\pi}{5}$

Positive Coterminal: $\frac{14\pi}{5}$

Negative Coterminal: $-\frac{6\pi}{5}$

$\frac{4\pi}{5} - \frac{10\pi}{5}$

d) 4.5



4.5 + 6.28

Positive Coterminal: 10.78

Negative Coterminal: −1.78

4.5 − 6.28

2. Change each radian measure into degrees. (Round to 2 decimal places).

a) $\frac{5\pi}{8}$

$\frac{5\cancel{\pi}}{8} \times \frac{180°}{\cancel{\pi}}$

$= \frac{900°}{8}$

$= 112.50°$

b) 2.7

$2.7 \times \frac{180°}{\pi}$

$= \frac{486°}{\pi}$

$= 154.70°$

3. Change each degree measure into radians. (Express answers as exact values)

a) 310°

$310° \times \frac{\pi}{180°}$

$= \frac{310\pi}{180}$

$= \frac{31\pi}{18}$

b) 540°

$540° \times \frac{\pi}{180°}$

$= \frac{540\pi}{180}$

$= \frac{54\pi}{18}$

$= 3\pi$

4. The radius of a circle is $7cm$, and the length of an arc on the circle is $10cm$. In **radians**, what is the **central angle** that subtends this arc length?

$r = 7cm$

$x = 10cm$

$\theta = ?$

$x = r\theta$

$\frac{10}{7} = \frac{7\theta}{7}$

$\theta = \frac{10}{7}$ rad exact

or

$\theta = 1.429$ rad. approx

5. A circle has a radius of 15 $units$ and a central angle of $\frac{7\pi}{10}$. Find the **arclength** of the sector.

$r = 15$ units

$\theta = \frac{7\pi}{10}$

$x = ?$

$x = r\theta$

$= 15\left(\frac{7\pi}{10}\right)$

$= \frac{105\pi}{10}$

$x = \frac{21\pi}{2}$ units exact

or

$x = 32.987$ units approx.

6. A circle as central angle of 35° and a radius of $7ft$. Find the **arclength** of the sector.

$\theta = 35°$

$r = 7ft$

$x = ?$

$x = r\theta \cdot \frac{\pi}{180°}$

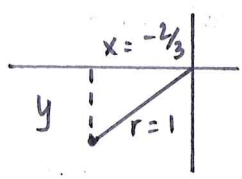
$= (7)(35°)\left(\frac{\pi}{180°}\right)$

$x = \frac{245\pi}{180}$ (÷5)

$x = \frac{49\pi}{36}$ ft exact or $x = 4.28$ ft approx.

7. The point $\left(-\frac{2}{3}, y\right)$ lies on the unit circle. Find the value of y if the point is in quadrant III.

x $\quad$ $r = 1$



$\left(-\frac{2}{3}\right)^2 + y^2 = 1$

$\frac{4}{9} + y^2 = 1$

$y^2 = \frac{9}{9} - \frac{4}{9}$

$\sqrt{y^2} = \sqrt{\frac{5}{9}}$

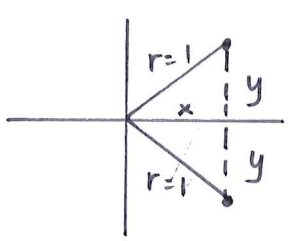
in quad III

$y = -\frac{\sqrt{5}}{3}$

8. Find all points on the unit circle that have an x-coordinate of $x = \frac{3}{7}$.

$r = 1$

positive → quad I and IV



$\left(\frac{3}{7}\right)^2 + y^2 = 1$

$\frac{9}{49} + y^2 = 1$

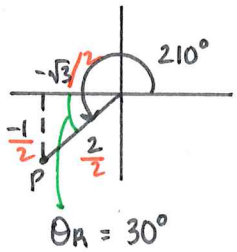
$y^2 = \frac{49}{49} - \frac{9}{49}$

$\sqrt{y^2} = \sqrt{\frac{40}{49}}$

$y = \pm\frac{\sqrt{40}}{7}$ or $\pm\frac{2\sqrt{10}}{7}$

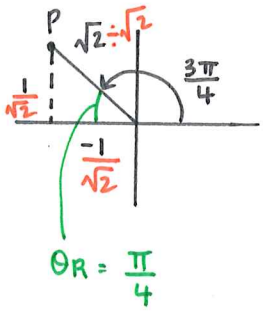
9. The point $P\ (x, y)$ is located where the terminal arm of angle θ and the **unit circle** intersect. Determine the coordinates of point P if :

a) $\theta = 210°$



$P(210°) = \left(-\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)$

b) $\theta = \frac{3\pi}{4}$

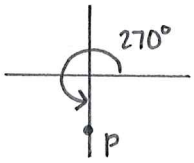


$P\left(\frac{3\pi}{4}\right) = \left(\frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

10. The point $P\ (x, y)$ is located on the terminal arm of angle θ. Determine the coordinates of point P if :

Not on unit circle

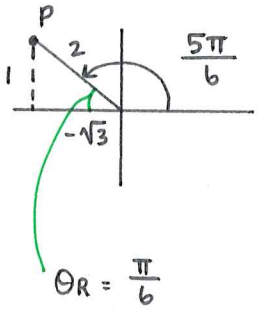
a) $\theta = 270°$



$P(270°) = (0, -2)$

can be any negative value

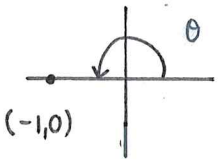
b) $\theta = \frac{5\pi}{6}$



$P\left(\frac{5\pi}{6}\right) = (-\sqrt{3}, 1)$

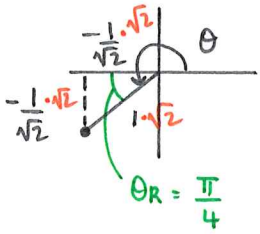
11. Identify a measure for θ in the interval $0 \leq \theta < 2\pi$ given the point:

a) $(-1,0)$



$\theta = \pi$

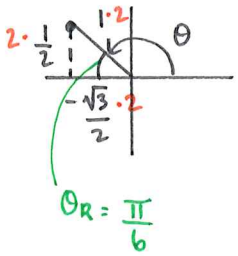
b) $\left(-\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$



$\theta = \frac{4\pi}{4} + \frac{\pi}{4}$

$\theta = \frac{5\pi}{4}$

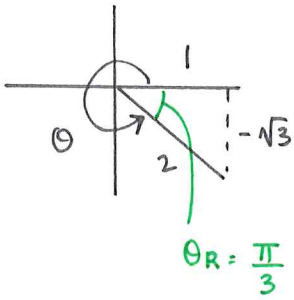
c) $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$



$\theta = \frac{6\pi}{6} - \frac{\pi}{6}$

$\theta = \frac{5\pi}{6}$

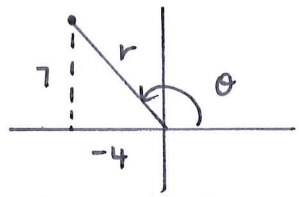
d) $(1, -\sqrt{3})$



$\theta = \frac{6\pi}{3} - \frac{\pi}{3}$

$\theta = \frac{5\pi}{3}$

12. The point $(-4,7)$ is on the terminal arm of angle θ. Draw the angle and find all six trig ratios for the angle. Express your answer as exact values (no decimals).



$(-4)^2 + (7)^2 = r^2$

$16 + 49 = r^2$

$65 = r^2$

$\sqrt{65} = r$

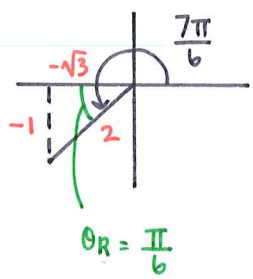
$\sin\theta = \frac{7}{\sqrt{65}}$ $\csc\theta = \frac{\sqrt{65}}{7}$

$\cos\theta = \frac{-4}{\sqrt{65}}$ $\sec\theta = -\frac{\sqrt{65}}{4}$

$\tan\theta = -\frac{7}{4}$ $\cot\theta = -\frac{4}{7}$

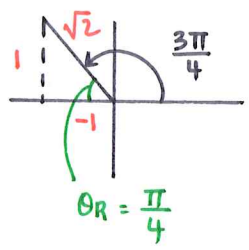
13. Determine the exact value of each of the following.

a) $\sin\frac{7\pi}{6}$



$\sin\frac{7\pi}{6} = -\frac{1}{2}$

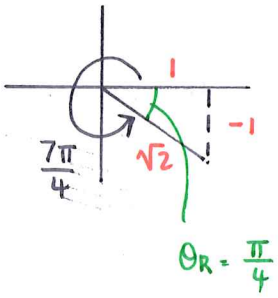
b) $\sec\frac{3\pi}{4}$ $\left(\cos\frac{3\pi}{4}\right)$



$\cos\frac{3\pi}{4} = \frac{-1}{\sqrt{2}}$

$\sec\frac{3\pi}{4} = -\sqrt{2}$

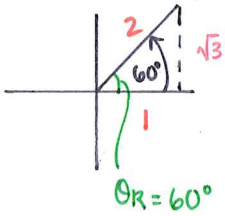
c) $\csc\frac{7\pi}{4}$ $\left(\sin\frac{7\pi}{4}\right)$



$\sin\frac{7\pi}{4} = \frac{-1}{\sqrt{2}}$

$\csc\frac{7\pi}{4} = -\sqrt{2}$

d) $\cot 60°$ $(\tan 60°)$



$\tan 60° = \frac{\sqrt{3}}{1}$

$\cot 60° = \frac{1}{\sqrt{3}}$