

I. For each angle θ below, do the following:

- a. Draw your angle with a colored marker. Include direction of angle given angle.
b. If your angle is more than 360° , then indicate that in your drawing with "swirls".

1.) $\theta = 310^\circ$	2.) $\theta = -125^\circ$	3.) $\theta = 510^\circ$	4.) $\theta = -700^\circ$	5.) $\theta = -1350^\circ$
6.) $\theta = \frac{5\pi}{4}$ 225°	7.) $\theta = -\frac{\pi}{2}$ -90°	8.) $\theta = \frac{23\pi}{6}$ 390°	9.) $\theta = \frac{10\pi}{3}$ 600°	10.) $\theta = 7\pi$ 1260°

II. Complete the chart below about converting angle measures. Show work on line!

Degree Measure \rightarrow Radian Measure	Radian Measure \rightarrow Degree Measure
11.) $\theta = 155^\circ \rightarrow 155 \times \frac{\pi}{180} = \boxed{\frac{31\pi}{36}}$	15.) $\theta = \frac{7\pi}{6} \rightarrow \frac{7\pi}{6} \times \frac{180}{\pi} = \boxed{210^\circ}$
12.) $\theta = -330^\circ \rightarrow -330 \times \frac{\pi}{180} = \boxed{-\frac{11\pi}{6}}$	16.) $\theta = \frac{\pi}{3} \rightarrow \frac{\pi}{3} \times \frac{180}{\pi} = \boxed{60^\circ}$
13.) $\theta = 720^\circ \rightarrow 720 \times \frac{\pi}{180} = \boxed{4\pi}$	17.) $\theta = \frac{26\pi}{15} \rightarrow \frac{26\pi}{15} \times \frac{180}{\pi} = \boxed{312^\circ}$
14.) $\theta = 246^\circ \rightarrow 246 \times \frac{\pi}{180} = \boxed{\frac{41\pi}{30}}$	18.) $\theta = -\frac{11\pi}{4} \rightarrow -\frac{11\pi}{4} \times \frac{180}{\pi} = \boxed{-495^\circ}$

III. Find a positive and a negative coterminal angle for each given angle. Show work!

- 19.) $114^\circ \rightarrow$ positive coterminal angle = $114 + 360 = \boxed{474^\circ}$
negative coterminal angle = $114 - 360 = \boxed{-246^\circ}$
20.) $-\frac{4\pi}{9} \rightarrow$ positive coterminal angle = $-\frac{4\pi}{9} + 2\pi = \boxed{\frac{14\pi}{9}}$
negative coterminal angle = $-\frac{4\pi}{9} - 2\pi = \boxed{-\frac{22\pi}{9}}$

IV. Determine the measure of each angle. Keep units consistent.

21.)	22.)	23.)	24.)
$360 + 100 = \boxed{460^\circ}$	$360 + 360 + 180 + 60 = \boxed{900^\circ}$	$-360 - 370 - 35 = \boxed{-765^\circ}$	$-360 - 360 + 180 - 45 = \boxed{-540^\circ}$

V. Use the Arc Length Formula: $s = r \cdot \theta$ or the Sector Area Formula: $A = \frac{1}{2} \cdot r^2 \cdot \theta$ for the problems below. Round to nearest tenth and include units. Show your work!!

25.)	a.) Arc Length $s = 14 \left(\frac{5\pi}{3} \right) = \boxed{73.3 \text{ m}}$ b.) Sector Area $A = \frac{1}{2} (14)^2 \left(\frac{5\pi}{3} \right) = \boxed{513.1 \text{ m}^2}$
26.)	a.) Arc Length $s = 10 \left(\frac{5\pi}{4} \right) = \boxed{39.3 \text{ m}}$ b.) Sector Area $A = \frac{1}{2} (10)^2 \left(\frac{5\pi}{4} \right) = \boxed{196.3 \text{ m}^2}$

- 27.) Find the central angle θ (in degrees) if the arc length is 18 cm and the diameter is 6 cm.

$$s = r\theta \rightarrow 18 = \frac{3}{2} \theta$$

$$\theta = \frac{18 \times 2}{3} = \boxed{120^\circ}$$

- 28.) If the sector area is 126.7 ft^2 and the central angle θ is 120° , find the length of the radius.

$$A = \frac{1}{2} r^2 \theta$$

$$126.7 = \frac{1}{2} r^2 \left(\frac{2\pi}{3} \right)$$

$$253.4 = r^2 \left(\frac{2\pi}{3} \right)$$

$$r^2 = \frac{253.4 \times 3}{2\pi} = 24.1$$

$$r = \sqrt{24.1} = \boxed{4.9 \text{ ft}}$$

- 29.) Pittsburgh, PA and Miami, FL, lie approximately on the same meridian. Pittsburgh has a latitude of 40.5° N and Miami has a latitude of 25.5° N. The radius of the earth is approximately 3,960 miles. What is the distance between the two cities?

$$\theta = 40.5 - 25.5 = 15^\circ$$

$$s = 3960 \left(\frac{\pi}{12} \right) = \boxed{1036.7 \text{ mi}}$$

- 30.) A wheel is connected to a box by a cable. What is the radius of the wheel if the box moved 7.8 feet with a 135° angle counter-clockwise?

$$s = r\theta$$

$$7.8 = r \left(\frac{3\pi}{4} \right)$$

$$r = \frac{7.8 \times 4}{3\pi} = \boxed{3.3 \text{ ft}}$$

- 31.) Anthony's little brother gets on a carousel that is 8 meters in diameter. As the start of the ride, his brother is 3 meters from the ride entrance in the fence. How far will his brother be from the entrance after the carousel rotates $\frac{7\pi}{9}$?

$$x^2 = 4^2 + 3^2 - 2(4)(3)\cos(150^\circ)$$

$$x^2 = 16 + 9 - 24\cos(150^\circ)$$

$$x = \boxed{10.7 \text{ m}}$$

- 32.) Using the figure below, find the following:

a.) Find the perimeter of shaded region. $s = 10 \left(\frac{2\pi}{5} \right) = \boxed{12.6}$

b.) Find the area of the shaded region. $A = \frac{1}{2} (10)^2 \left(\frac{2\pi}{5} \right) = \boxed{62.8}$