Name:___________________________________ Date:__________________________

HW Pre Calculus 12 Section 4.1 Radians and Angles in Standard Position:

1. What does it mean when an angle is in standard position? Explain:

When an angle is in standard position, it will start on the positive side of the "x" axis, known as the initial arm. If the angle is positive, it will rotate CCW. If the angle is negative, it will rotate CW. When drawing an angle in standard position, make sure to draw the arc on which direction the terminal arm will rotate.

2. How do you draw an angle like 1000° in standard position? Which quadrant it be in?

3. What is a radian? Define it. Explain why radians are used instead of DEGREES?

Radians and degrees are both used for measuring angles. A radian is an arc length on the circumference of a circle that is equivalent in length to the radius of the circle. Radians are used because it is in ratio to the radius of hte circle. For instance, an angle of 1 radian means that your arc length is equal to the length of 1 radius. 2 radians is equal to an arc length of 2 radii.

4. How would you convert an angle from degrees to radians? Radians to degrees?

To convert from radians to degrees, multiple the angle in radians by $\frac{180^\circ}{\pi}$. [keep in mind that $180^o$is at the numerator.] Likewise, to convert from degrees to radians, multiply the angle in degrees by $\frac{\pi}{180^\circ}$ [the pi is in the numerator]

5. When converting an angle from degrees to radians, how do we determine if we can write it in radians as a fraction in terms of π? Explain:

If the angle in degrees has any common factors with 180^o, then it can be written as a fraction in terms of π. Just cancel out any common factors when you are multiplying the angle in degrees with $\frac{\pi}{180^\circ}$.

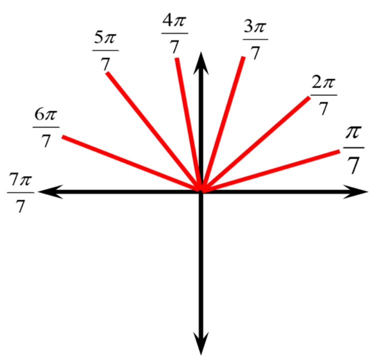
ie: $122^\circ \times \frac{\pi}{180^\circ} = \frac{61\pi}{90}$

6. What is the ratio of an arc length over the circumference versus the ratio of a sector over the area of a circle? Explain. What other ratios is this also equal to?

These ratios are the same.

7. How would you draw an angle like $\frac{\pi}{7} radians$ in standard position? How about the multiples of $\frac{\pi}{7}$? Like $\frac{3\pi}{7}$ or $\frac{11\pi}{7}$?

Cut the top half of the unit circle into 7 equal parts. Each part is equal to $\frac{\pi}{7}$, then label each line as a multiple of $\frac{\pi}{7}$



8. What are coterminal angles? How do you check if two angles are coterminal? Explain?

Coterminal angles are angles on the same spot within an unit circle. These angles have a difference of 360° OR multiple of 360°

9. What does it mean to find the general formula of a coterminal angle? 2

A general formula of a coterminal angle is an equation that can be used to represent all the coterminal angles in a single equation. Here's a sample of a general formula for all coterminal angles of 50°

$\theta_{Gen} = 50° \pm n(360°)$, where 'n" is a whole number.

10. Convert the following angles in degrees to radians to 3 decimal places:

For all these angles, multiply each of them by $\frac{\pi}{180°}$

a) 125° 2.182Radians	b) 237° 4.136Radians	c) 148° 2.583Radians	d) 217° 3.787Radians

11. Convert the following angles in Degrees to Radians. Write your answer as a fraction in terms of π:

a) 60° $\frac{\pi}{3}$	b) 30° $\frac{\pi}{6}$	c) 150° $\frac{5\pi}{6}$	d) 210° $\frac{7\pi}{6}$
e) 90° $\frac{\pi}{2}$	f) 135° $\frac{3\pi}{4}$	g) 225° $\frac{5\pi}{4}$	h) 240° $\frac{4\pi}{3}$
i) 315°	j) 360°	k) 330°	l) 1050°

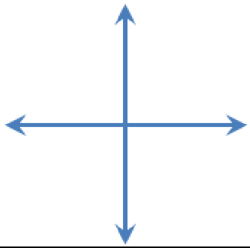
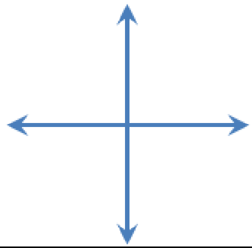
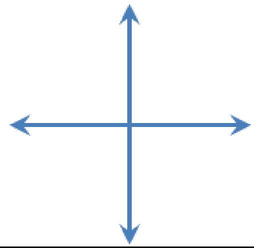
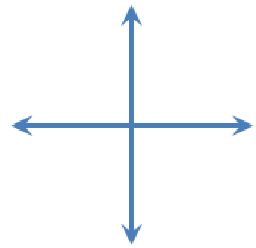
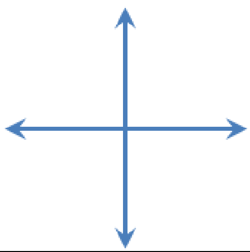
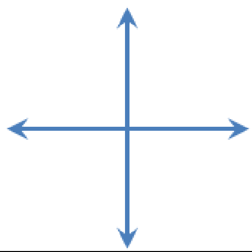
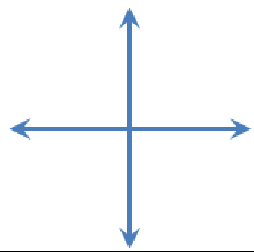
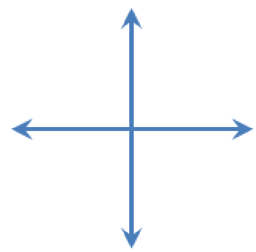
12. Convert the following angles in Radians to Degrees:

a) $\frac{2\pi}{3}$	b) $\frac{2\pi}{6}$	c) $\frac{2\pi}{4}$	d) $\frac{5\pi}{3}$
e) $\frac{16\pi}{12}$	f) $\frac{11\pi}{3}$	g) $\frac{7\pi}{6}$	h) $\frac{15\pi}{4}$
i) $\frac{\pi}{12}$	j) $\frac{5\pi}{6}$	k) $\frac{3\pi}{20}$	l) $\frac{22\pi}{9}$

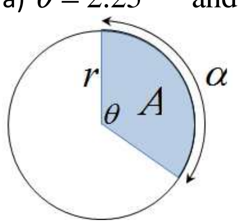
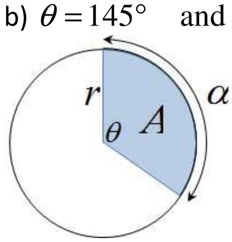
13. Convert the following angles in Radians to Degrees with 3 decimal palces:

a) 1.60^R	b) 20.5^R	c) $-1.3333....^R$	d) -18.25^R

14. Draw the following angles given in radians in standard position.

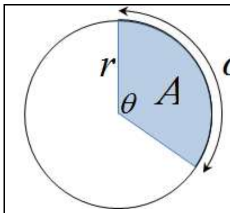
a) $\frac{2\pi}{3}$ 	b) $-\frac{10\pi}{6}$ 	c) $\frac{15\pi}{4}$ 	d) 14.25^R 
e) $-\frac{3\pi}{7}$ 	f) $\frac{18\pi}{5}$ 	g) $\frac{13\pi}{3}$ 	h) -22.56^R 

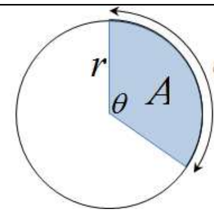
15. Given each circle with the central angle, find the arc length and area of the sector

a) $\theta = 2.25^R$ and $r = 2.5cm$ $A = ?$ $a = ?$  $\frac{2.25^R}{2\pi} = \frac{A}{\pi r^2} = \frac{a}{2\pi r}$ $\frac{2.25^R \times r^2}{2} = A$ $\frac{2.25^R \times r}{1} = a$ $7.03125cm^2 = A$ $5.625cm = a$	b) $\theta = 145°$ and $r = 4.5cm$ $A = ?$ $a = ?$ 

16. Given each circle with the arc length, find the central angle in both degrees and radians, and also the area of the sector

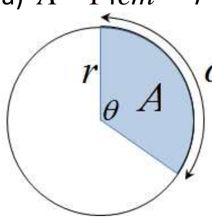
a) $\alpha = 20cm$ and $r = 10cm$ $A = ?$ $\theta = ?$	b) $\alpha = 15cm$ and $r = 15cm$ $A = ?$ $\theta = ?$



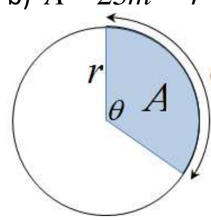


17. Given each circle with the area of the sector, find the central angle in both degrees and radians, and also the length of the arc:

a) $A = 14cm^2 \quad r = 8cm \quad \theta = ? \quad \alpha = ?$



b) $A = 25m^2 \quad r = 485cm \quad \theta = ? \quad \alpha = ?$



18. What is the angle of a terminal term that has rotates CCW, went past the initial arm 17 times, and is pointing up? Provide your answer in radians as a fraction in terms of π.

19. Determine whether if each pair of angles given are coterminal. Justify your answer. If the pair of angles are coterminal, find a general formula for all the other coterminal angles:

a) $65° \ \& \ 425°$	b) $\frac{4\pi}{3} \& \frac{10\pi}{3}$	c) $\frac{7\pi}{4} \ \& \ \frac{17\pi}{4}$
d) $\frac{18\pi}{5} \& \frac{78\pi}{5}$	e) $\frac{-12\pi}{7} \& \frac{196\pi}{7}$	f) $\frac{-1002\pi}{6} \& \frac{1000\pi}{3}$

20. Suppose angles “A” and “B” are coterminal, indicate which of the statements below are true. Explain:

a) $\sin A = \sin B$	b) $\tan A = \tan B$	c) $\sin A = \cos B$

d) $A = B + 90°$	e) $A = B \pm 360°(n)$	f) $A + B = 360°$
g) $\frac{A - B}{360°} = N;\quad N \in 1, 2, 3, ...$	h) $\frac{A + B}{360°} = N;\quad N \in 1, 2, 3, ...$	i) $\sin^2 A + \sin^2 B = 1$