Homework 7-4

#1 - 8 see next slide for sketches

#1 - 8 reference angles:

1. 30° 2. π/6 3. π/3 4. None
5. 45° 6. π/4 7. π/6 8. π/3

9. III

10. D

Name: Key

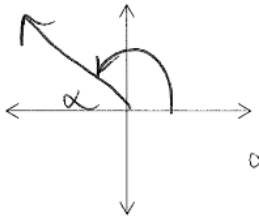
Period : _____

Algebra 2 Homework 7-4

For #1 - 8: **a. Sketch the angle in standard position.**

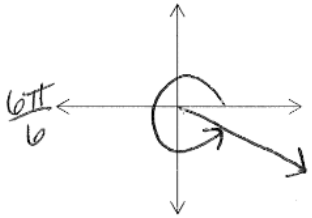
b. State the reference angle for each (if possible).

1. 150° $\alpha =$ 30°



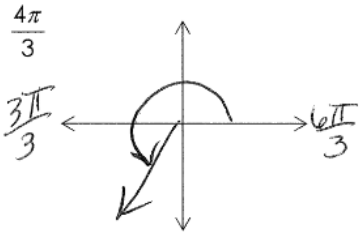
$\alpha = 180 - 150° = 30°$

2. $\frac{11\pi}{6}$ $\alpha =$ $\pi/6$



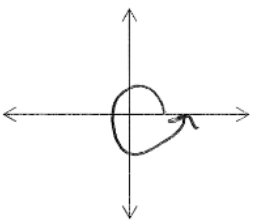
$\alpha = \frac{12\pi}{6} - \frac{11\pi}{6} = \frac{\pi}{6}$

3. $\frac{4\pi}{3}$ $\alpha =$ $\pi/3$

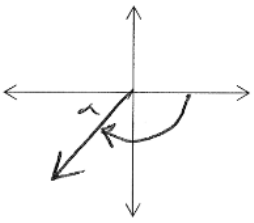


$\alpha = \frac{4\pi}{3} - \frac{3\pi}{3} = \frac{\pi}{3}$

4. 2π $\alpha =$ N/A



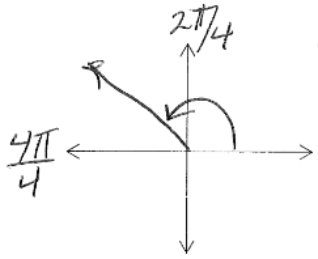
5. $-135°$



$\alpha =$ 45°

$\alpha = 180 - 135 = 45°$

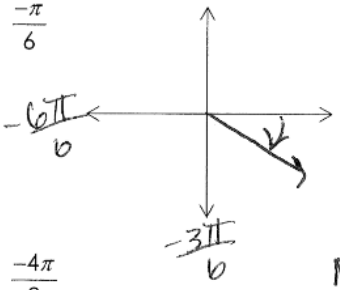
6. $\frac{3\pi}{4}$



$\alpha =$ π/4

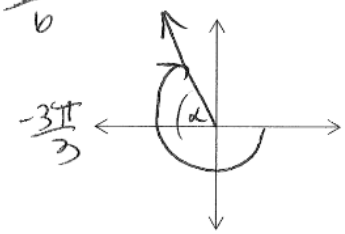
$\alpha = \frac{4\pi}{4} - \frac{3\pi}{4} = \pi/4$

7. $\frac{-\pi}{6}$



$\alpha =$ π/6

8. $\frac{-4\pi}{3}$



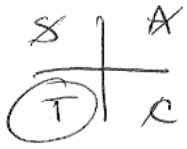
$\alpha =$ π/3

$\alpha = \frac{4\pi}{3} - \frac{3\pi}{3} = \frac{\pi}{3}$

9. What quadrant is angle θ in if $\sin(\theta) = -.5$ and $\cos(\theta) < 0$?

III

sin(-) cos(-)



10. On the unit circle, the terminal side of an angle θ passes through the point $(a, -b)$.

Both a and b are positive. Which is *not* true?

a. $\sin(\theta) = -b$

b. $\tan(\theta) < 0$

c. $\cos(\theta) = a$

d. $\frac{\sin(\theta)}{\cos(\theta)} > 0$

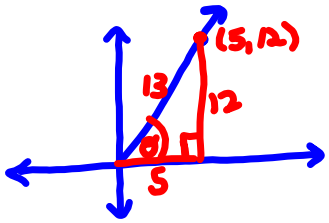
C S

$\tan = \frac{S}{C} = \frac{-b}{a}$

Day 5: Finding Trig Values

Warm-Up:

P(5, 12) is a point on the terminal side of θ in standard position. Find the exact values of sin(θ), cos(θ), and tan(θ).



$\sin(\theta) = 12/13$

$\cos(\theta) = 5/13$

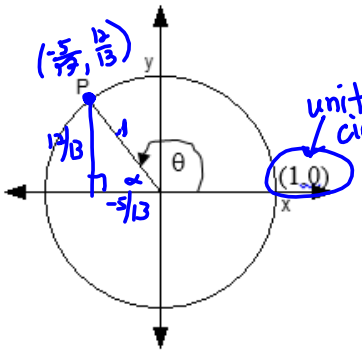
$\tan(\theta) = 12/5$

Finding Trig Values Given a Point:

* Remember that if a point is **on the unit circle**,
the x-coordinate = $\cos(\theta)$, the y-coordinate = $\sin(\theta)$
and $\tan(\theta) = \frac{y}{x} = \frac{\sin(\theta)}{\cos(\theta)}$. To find $\angle\theta$, we find the reference angle first using the positive lengths of the triangle sides, and then put that angle into the correct quadrant to find $\angle\theta$.

Examples:

1. $P\left(\frac{-5}{13}, \frac{12}{13}\right)$



unit circle

$y \quad \sin(\theta) = 12/13$

$x \quad \cos(\theta) = -5/13$

$\frac{y}{x} \quad \tan(\theta) = \frac{12/13}{-5/13} = \frac{12}{12} \cdot \frac{13}{-5} = \frac{12}{-5}$ or $-\frac{12}{5}$

$m\angle\theta =$

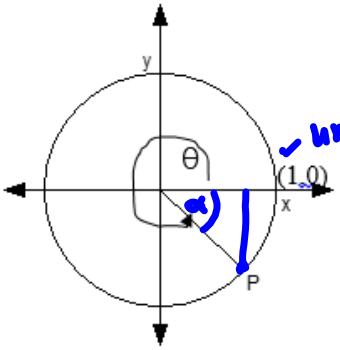
$\alpha = \sin^{-1}\left(\frac{12}{13}\right) = 67°$

or $\cos^{-1}\left(\frac{5}{13}\right)$

or $\tan^{-1}(12/5)$

$\theta = 180° - 67° = 113°$

2.



unit circle

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

y $\sin(\theta) = -\sqrt{2}/2$

x $\cos(\theta) = \sqrt{2}/2$

$\frac{y}{x}$ $\tan(\theta) = \frac{-\sqrt{2}/2}{\sqrt{2}/2} = -1$

$m\angle\theta =$

$\alpha = \sin^{-1}(\sqrt{2}/2) = 45°$

or $\cos^{-1}(\sqrt{2}/2)$

or $\tan^{-1}(\sqrt{2}/2)$

$\theta = 360° - 45° = 315°$

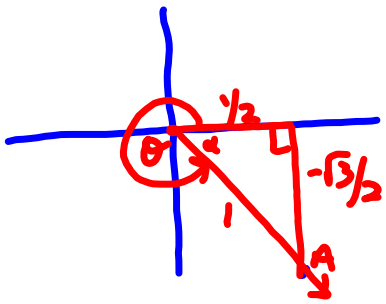
3. Point $A\left(\frac{1}{2},-\frac{\sqrt{3}}{2}\right)$ is on a unit circle with a center of the origin. If θ is an angle in standard position whose terminal side passes through A, find:

a. y $\sin(\theta)$ $-\sqrt{3}/2$

b. x $\cos(\theta)$ $1/2$

c. $\frac{y}{x}$ $\tan(\theta)$ $\frac{-\sqrt{3}}{2} \div \frac{1}{2} = \frac{-\sqrt{3}}{2} \cdot \frac{2}{1} = -\sqrt{3}$

d. $m\angle\theta$

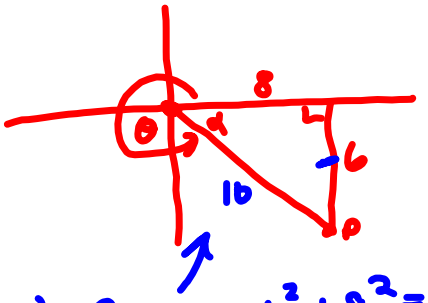


$\alpha = \sin^{-1}\left(\sqrt{3}/2\right) = 60^\circ$

$\theta = 360^\circ - 60^\circ = 300^\circ$

4. P(8, -6) is a point on the terminal side of θ in standard position. Find the exact values of sin(θ), cos(θ) and tan(θ).

Why is this example different? not on the unit ⊙



hyp. is always (+)

$6^2 + 8^2 = x^2$

$36 + 64 = x^2$

$100 = x^2$

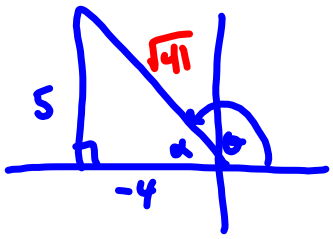
$10 = x$

$\sin(\theta) = \frac{o}{h} = \frac{-6}{10} = \frac{-3}{5}$

$\cos(\theta) = \frac{a}{h} = \frac{8}{10} = \frac{4}{5}$

$\tan(\theta) = \frac{o}{a} = \frac{-6}{8} = \frac{-3}{4}$

5. P(-4, 5) is a point on the terminal side of θ in standard position. Find the exact values of sin(θ), cos(θ) and tan(θ).



$4^2+5^2=x^2$

$16+25=x^2$

$\sqrt{41}=\sqrt{x^2}$

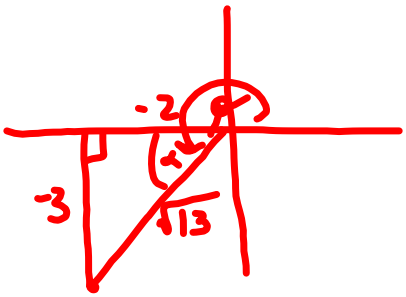
$\sqrt{41}=x$

$\sin(\theta)=\frac{5}{\sqrt{41}}$

$\cos(\theta)=\frac{-4}{\sqrt{41}}$

$\tan(\theta)=\frac{5}{-4}$

6. P(-2, -3) is a point on the terminal side of θ in standard position. Find the exact values of sin(θ), cos(θ) and tan(θ).



$2^2+3^2=x^2$

$\sqrt{13}=\sqrt{x^2}$

$\sqrt{13}=x$

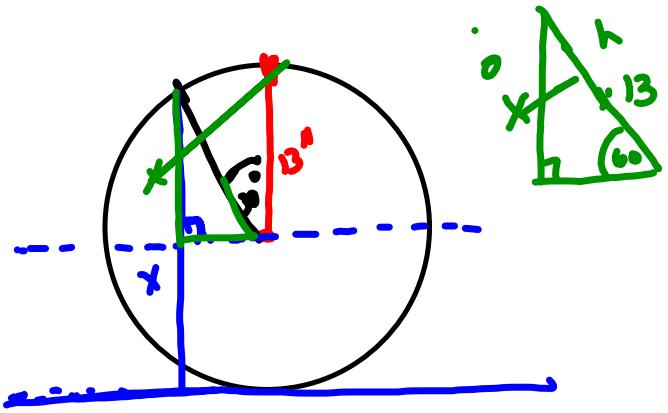
$\sin(\theta)=\frac{-3}{\sqrt{13}}$

$\cos(\theta)=-2/\sqrt{13}$

$\tan(\theta)=\frac{-3}{-2}=\frac{3}{2}$

Application Word Problems:

1. A bicycle wheel with a radius of 13" has a valve cap positioned at the highest point of the wheel. If the wheel is spun 750° in one direction, how high is the valve cap above the ground? Round your answer to the nearest tenth of an inch.



$\frac{\sin(60°)}{1} = \frac{x}{13}$

$x = 13 \sin 60° = 11.3"$

$+ 13"$

$24.3"$