Homework 7-4

Do warm-up at top of Day 5 notes and find the angle measure in degrees to the nearest tenth.

#1 - 8 a) see next slide for sketches

#1 - 8 b) 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

Yesterday reference angles were introduced, but we did not practice any with radian measures.So for HW 7-4: you should have been able to do 1ab, 2-8 a part only, 9 and 10.

Completed notes were posted as an fyi.

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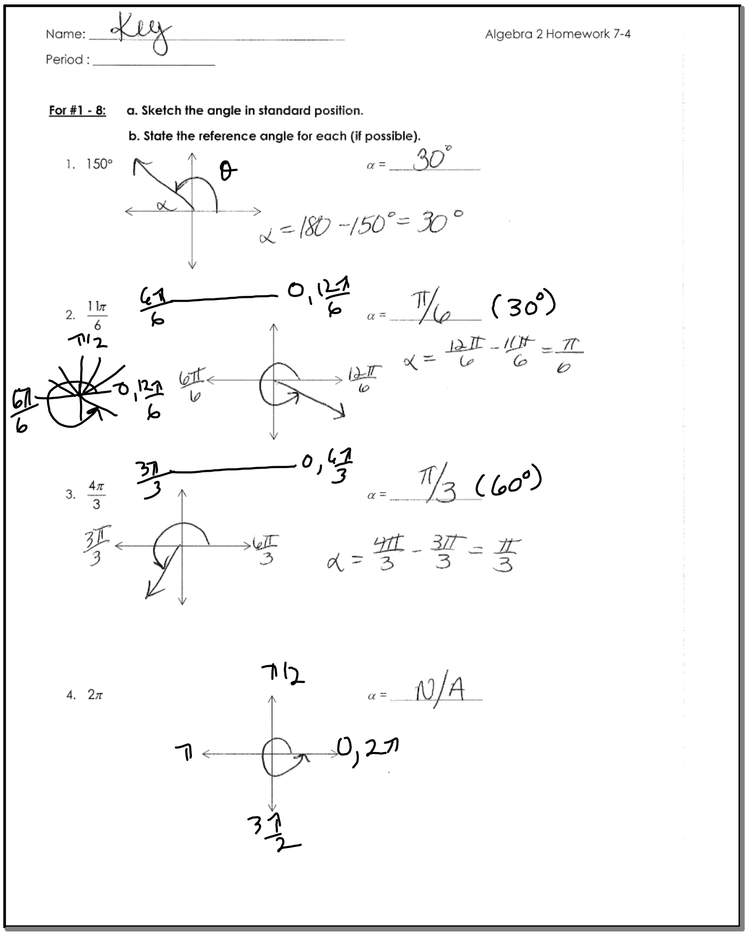

Name: Key

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. $\frac{11\pi}{6}$ $\alpha =$ π/6 (30°)

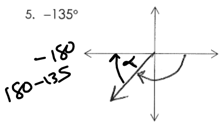
$\alpha = \frac{12\pi}{6} - \frac{11\pi}{6} = \frac{\pi}{6}$

3. $\frac{4\pi}{3}$ $\alpha =$ π/3 (60°)

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

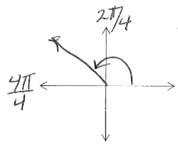
4. 2π $\alpha =$ N/A

5. $-135°$ $\alpha =$ $45°$



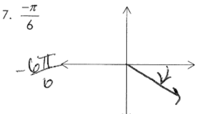
$\alpha = 180-135 = 45°$

6. $\frac{3\pi}{4}$ $\alpha =$ $\pi/4$ $(45°)$

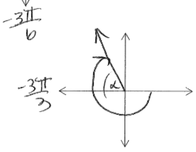


$\alpha = \frac{4\pi}{4} - \frac{3\pi}{4} = \pi/4$

7. $\frac{-\pi}{6}$ $\alpha =$ $\pi/6$ $(30°)$



8. $\frac{-4\pi}{3}$ $\alpha =$ $\pi/3$ $(60°)$



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

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

III sin(−) cos(−)

S A
T C

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?

c s

a. $\sin(\theta) = -b$ b. $\tan(\theta) < 0$ $\tan = \frac{s}{c} = \frac{-b}{c}$

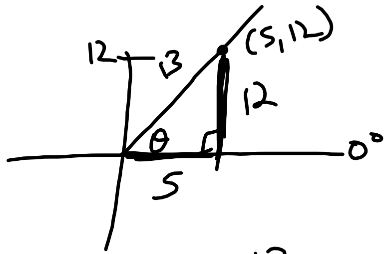
c. $\cos(\theta) = a$ d. $\frac{\sin(\theta)}{\cos(\theta)} > 0$

SOH CAH TOA

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).

Also find the measure of angle θ to the nearest tenth of a degree.



$\sin\theta = \frac{O}{H} = \frac{12}{13}$

$\cos\theta = \frac{A}{H} = \frac{5}{13}$

$\tan\theta = \frac{O}{A} = \frac{12}{5}$

$\theta = \sin^{-1}\left(\frac{12}{13}\right) \approx 67.4°$

5−12−13

$5^2 + 12^2 = c^2$

$169 = c^2$

$c = 13$

Day 5 Goal:
Determine trig values in various quadrants given a point on a unit circle vs not on a unit circle.

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Finding Trig Values Given a Point:

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

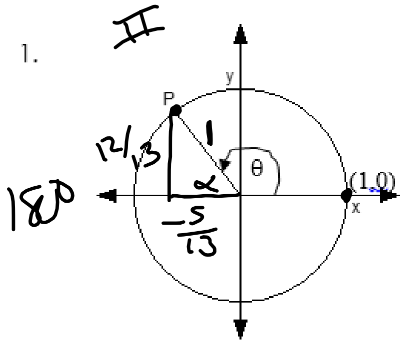
* Remember that ~~if a point is~~ **on the unit circle**,
the x-coordinate = $\cos\theta$, the y-coordinate = $\sin\theta$
and tan(θ) = $\sin\theta / \cos\theta$. To find ∠θ, we find the reference angle first using the positive lengths of the triangle sides, and then put that angle into the correct quadrant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

S	A
T	C

Examples:

$(\cos\theta, \sin\theta)$

1. II



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

$+$ sin(θ) = $\frac{12}{13}$

$-$ cos(θ)= $-5/13$

$-$ tan(θ) = $\frac{12}{13} / -5/13 = \frac{12}{\cancel{13}} \cdot -\frac{\cancel{13}}{5} = \frac{-12}{5}$

m ∠θ =

$\alpha = \sin^{-1}(12/13) = 67^\circ$

$\theta = 180 - \alpha = 180 - 67^\circ = 113^\circ$

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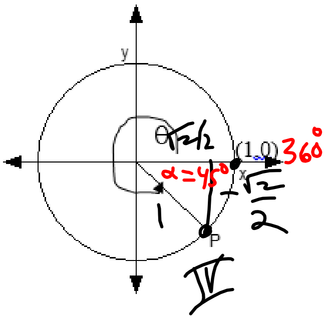
$(\cos\theta, \sin\theta)$
$(+ \quad -)$

2.



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

$-$ (y) sin(θ) = $(-)\sqrt{2}/2$

$+$ (x) cos(θ) = $\sqrt{2}/2$

$-$ tan(θ) = $(-)\frac{\sqrt{2}}{2} \cdot \frac{2}{\sqrt{2}} = -1$

m∠θ =

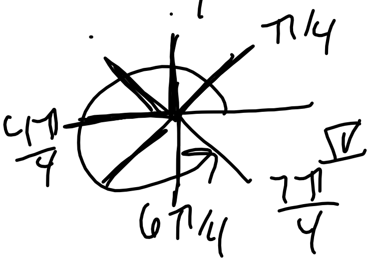
$\alpha = \cos^{-1}\left(\frac{\sqrt{2}}{2}\right) = 45°$

S | A
T | C

$\theta = 360 - \alpha = 360 - 45°$

$\theta = 315°$

radians $\rightarrow 315 \cdot \frac{\pi}{180} = \frac{315\pi}{180} = \frac{7\pi}{4}$



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$(\cos\theta, \sin\theta) \rightarrow (+, -)$

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. sin(θ) $= -\sqrt{3}/2$

b. cos(θ) $= 1/2$

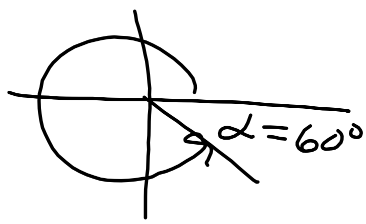
c. tan(θ) $= -\frac{\sqrt{3}}{2} \cdot \frac{2}{1} = -\sqrt{3}$

d. m∠θ

$\alpha = \cos^{-1}\left(\frac{1}{2}\right) = 60°$

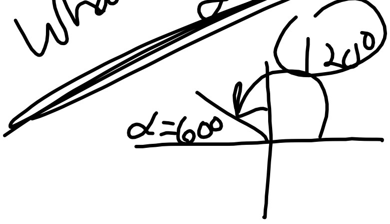
S | A
T | C

IV

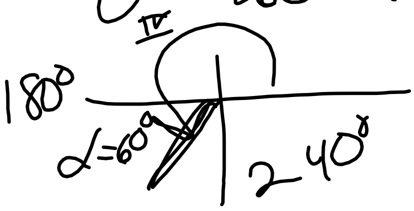


ref ∠

~~What is QII $\alpha = 60°$~~



$\theta = 360 - \alpha = 300°$



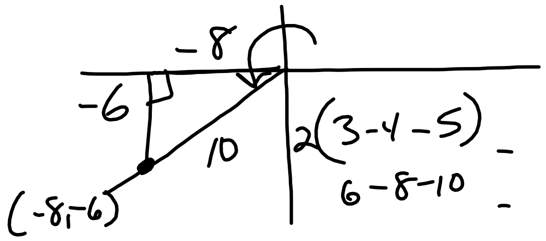
Aug 9-4:51 PM

(−, −)

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 a Unit Circle

$(x, y) \neq (\cos\theta, \sin\theta)$



2(3-4-5)

6-8-10

$- \sin\theta = \frac{-6}{10} = \frac{-3}{5}$

$- \cos\theta = \frac{-8}{10} = \frac{-4}{5}$

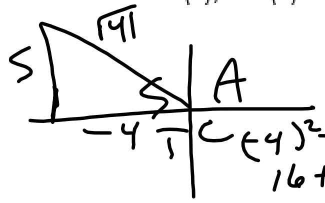
$+ \tan\theta = \frac{-6}{-8} = \frac{3}{4}$

$(-6)^2 + (-8)^2 = c^2$

$100 = c^2$

$c = 10$

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).



$(-4)^2 + 5^2 = c^2$

$16 + 25 = c^2$

$41 = c^2$

$c = \sqrt{41}$

$+ \sin\theta = \frac{O}{H} = \frac{5}{\sqrt{41}} \cdot \frac{\sqrt{41}}{\sqrt{41}} = \frac{5\sqrt{41}}{41}$

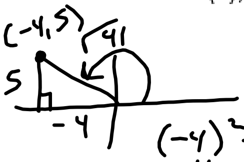
$\cos\theta = \frac{A}{H} = \frac{-4}{\sqrt{41}} \cdot \frac{\sqrt{41}}{\sqrt{41}} = \frac{-4\sqrt{41}}{41}$

$\tan\theta = \frac{O}{A} = \frac{-4}{5}$

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).

$(-,+) = \mathrm{II}$

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).



$(-4)^2 + 5^2 = c^2$

$16 + 25 = c^2$

$41 = c^2$

$c = \sqrt{41}$

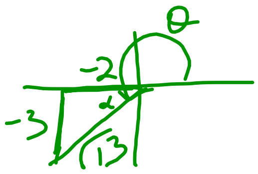
$\sin\theta = \frac{5}{\sqrt{41}} \cdot \frac{\sqrt{41}}{\sqrt{41}} = \frac{5\sqrt{41}}{41}$

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

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

$(\sqrt{41})^2$

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).



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

$\cos\theta = \frac{-2}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$

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

$(-2)^2 + (-3)^2 = c^2$

$4 + 9 = c^2$

$13 = c^2$

$c = \sqrt{13}$

Aug 9-4:51 PM

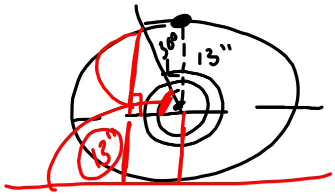
Application Word Problems:

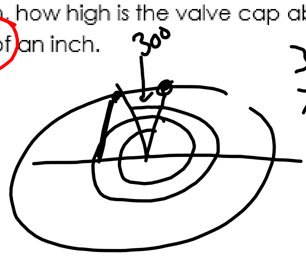
1. A bicycle wheel with a radius of 13" has a valve cap positioned at the highest point of the wheel. If the wheel is spun 750° in one direction, how high is the valve cap above the ground? Round your answer to the nearest tenth of an inch.

Aug 9-4:52 PM

Application Word Problems: $r = 13''$

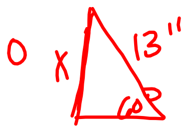
1. A bicycle wheel with a radius of 13" has a valve cap positioned at the highest point of the wheel. If the wheel is spun 750° in one direction, how high is the valve cap above the ground? Round your answer to the nearest tenth of an inch.





360
720
30

60°



$$\sin 60^\circ = \frac{x}{13}$$

$$x = 13 \sin 60^\circ = 11.258$$

$$+13$$

$$24.258$$

$$\approx 24.3''$$

Aug 9-4:52 PM

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