Homework 7-5

Test next Thursday after break

Warmup w/ #6 from yesterday's notes

1. 4

2a. 7/25 b. -24/25 c. -7/24 d. 163.7°

3a. -5/13 b. -12/13 c. 5/12 d. 202.6°

4. sin(θ) = -3/5 cos(θ) = -4/5 tan(θ)=3/4

5. sin(θ) = 5/√29 cos(θ) = -2/√29 tan(θ)= -5/2

6. A 7. 3

Aug 13-7:55 PM

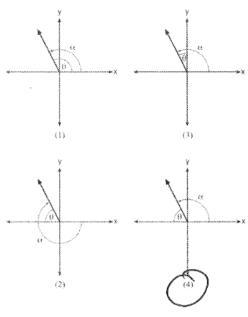
Name: Key

Period : ________

Algebra 2 Homework 7-5

1. Which diagram(right) represents an angle, α, measuring $\frac{13\pi}{20}$ radians drawn in standard position, and its reference angle, θ? **(Regents question)**

Here, α = whole ∡
θ = Ref ∡
(opposite of normal notation)

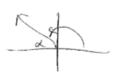


For #2 - 4:
a. What is sin(θ)?
b. What is cos(θ)?
c. What is tan(θ)?
d. Find angle θ to the nearest tenth.

2. The angle θ corresponds to the angle between the positive x-axis and the line between the origin and the point $\left(\frac{-24}{25}, \frac{7}{25}\right)$ on the unit circle. State your answers as an exact expressions.

c s

QII



a) 7/25
b) -24/25
c) $\frac{7/25}{-24/25} = -7/24$
d) $\alpha = \sin^{-1}(7/25) = 16.3°$
$\theta = 180 - 16.3 = 163.7°$

3. The angle θ corresponds to the angle between the positive x-axis and the line between the origin and the point $\left(\frac{-12}{13}, \frac{-5}{13}\right)$ on the unit circle. State your answers as an exact expressions.

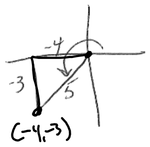
c s

QIII

a) -5/13
b) -12/13
c) $\frac{-5/13}{-12/13} = \frac{5}{12}$
d) $\alpha = \sin^{-1}\left(\frac{5}{13}\right) = 22.6°$
$\theta = 180 + 22.6 = 202.6°$

4. P(-4, -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).

(x, y)

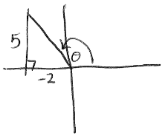


$\sin(\theta) = \frac{-3}{5}$

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

$\tan(\theta) = \frac{-3}{-4} = \frac{3}{4}$

5. P(-2, 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).



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

$4 + 25 = x^2$

$\sqrt{29} = \sqrt{x^2}$

$x = \sqrt{29}$

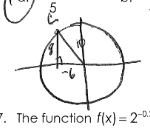
$\sin(\theta) = \frac{5}{\sqrt{29}}$

$\cos(\theta) = \frac{-2}{\sqrt{29}}$

$\tan(\theta) = \frac{5}{-2}$

6. A circle centered at the origin has a radius on 10 units. The terminal side of an angle, θ, intercepts the circle in Quadrant II at point C. The y-coordinate of point C is 8. What is the value of cos(θ)? **(Regents question)**

a. $-\frac{3}{5}$ b. $-\frac{3}{4}$ c. $\frac{3}{5}$ d. $\frac{4}{5}$



$\cos(\theta) = \frac{-6}{10} = \frac{-3}{5}$

7. The function $f(x) = 2^{-0.25x} \bullet \sin\left(\frac{\pi}{2}x\right)$ represents a damped sound wave function. What is the average rate of change for this function on the interval [−7, 7], to the *nearest hundredth*? **(Regents Question)**

radians

(1) -3.66
(2) -0.30
(3) -0.26
(4) 3.36

Slope

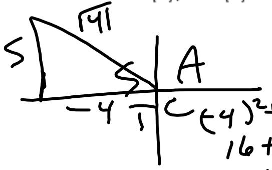
$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

$f(7) = 2^{-.25(7)} \sin\left(\frac{\pi}{2}(7)\right) = -.297$

$f(-7) = 2^{-.25(-7)} \sin\left(\frac{\pi}{2}(-7)\right) = 3.364$

$RofC = \frac{\Delta y}{\Delta x} = \frac{-.297 - 3.364}{7 - (-7)} = -.2615$

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).



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

$16 + 25 = c^2$

$41 = c^2$

$c = \sqrt{41}$

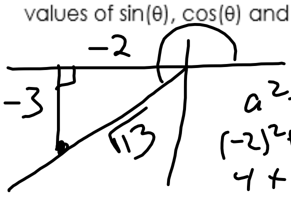
(+) $\sin\theta = \frac{O}{H} = \frac{5}{\sqrt{41}} \cdot \frac{\sqrt{41}}{\sqrt{41}} = \frac{5\sqrt{41}}{41}$

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

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

Warm-up #6 from yesterday's notes

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).



$a^2 + b^2 = c^2$

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

$4 + 9 = c^2$

$13 = c^2$

$c = \sqrt{13}$

S | A
T | C

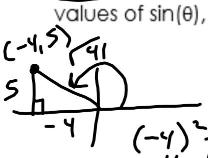
$\sin\theta = \frac{-3}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{-3\sqrt{13}}{13}$

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

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

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

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).



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

$16 + 25 = c^2$

$41 = c^2$

$c = \sqrt{41}$

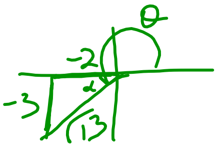
$\sin\theta = \frac{5}{\sqrt{41}} \cdot \frac{\sqrt{41}}{\sqrt{41}} = \frac{5\sqrt{41}}{41}$

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

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

$(\sqrt{41})^2$

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

Day 6: Pythagorean Identity

Aug 9-4:52 PM

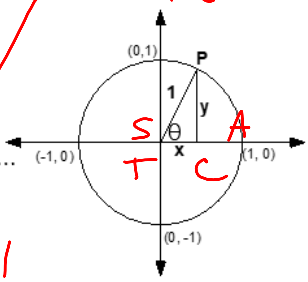
Pythagorean Theorem: $a^2+b^2=c^2$

On the unit circle: $r=1$

Remember: x = $\cos\theta$ and y = $\sin\theta$, so...

Pythagorean Identity: $\sin^2\theta+\cos^2\theta=1$

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



$(\sin\theta)^2+(\cos\theta)^2=1$

& $\cancel{\sin}\theta^2$

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Examples:

abs.value

1. Using the Pythagorean Identity, given sin(θ) = .6 find |cos(θ)| and |tan(θ)|.

$\sin^2\theta+\cos^2\theta=1$

$(.6)^2+\cos^2\theta=1$

$.36+\cos^2\theta=1$

$-.36 \qquad -.36$

$\sqrt{\cos^2\theta}=\sqrt{.64}$

$\cos\theta=\pm .8$

$|\cos\theta|=|\pm .8|$

$\cos\theta=.8$

$\tan\theta=\dfrac{\sin\theta}{\cos\theta}=\dfrac{.6}{.8}$

$\tan\theta=.75=\dfrac{3}{4}$

2. Using the Pythagorean Identity, given cos(θ) =5/13 , and angle θ is in quadrant IV, find sin(θ) and tan(θ).

$\sin^2\theta+\cos^2\theta=1$

$\sin^2\theta+\left(\frac{5}{13}\right)^2=1$

$\sin^2\theta+\frac{25}{169}=1$

$\sin^2\theta=(1)\frac{169}{169}-\frac{25}{169}$

$\sin^2\theta=\frac{169}{169}-\frac{25}{169}$

$\sqrt{\sin^2\theta}=\sqrt{\frac{144}{169}}$

$\sin\theta=\pm\frac{12}{13}$

IV → S | A, T | C +

sin −

$\sin\theta=-\frac{12}{13}$

$\tan\theta=\dfrac{-12/13}{5/13}=\dfrac{-12}{\cancel{13}}\cdot\dfrac{\cancel{13}}{5}=\dfrac{-12}{5}$

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3. Using the identity $\sin^2(\theta) + \cos^2(\theta) = 1$, if $\cos(\theta)$ is -0.7 and θ is in Quad II.

S | A
T | C

   a. Find $\sin(\theta)$ to the nearest tenth.

$\sin^2\theta + (-.7)^2 = 1$

$\sin^2\theta + .49 = 1$

$\sin^2\theta = 1 - .49$

$\sqrt{\sin^2\theta} = \sqrt{.51}$

$\sin\theta = \pm .7$

II → sin +

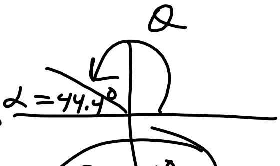
$\sin\theta = .7$

   b. Find $\tan(\theta)$ and $m\angle\theta$ to the nearest tenth.

$\tan\theta = \frac{+.7}{-.7} = -1$

α $\cancel{m\angle\theta} = \sin^{-1}(.7) = 44.4°$

180°



$\theta = 180 - 44.4 = 135.6°$

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$\sin^2\theta + \cos^2\theta = 1$

4. If $\sin^2(\cancel{32°}) + \cos^2(M) = 1$, then M equals
   a. 32° b. 58° c. 68° d. 72°

5. Using the Pythagorean Identity, given $\cos(\theta) = -0.5$, and angle θ is in quadrant III, find $\sin(\theta)$ and $\tan(\theta)$ to the nearest tenth.

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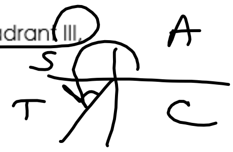
$\sin^2\theta + \cos^2\theta = 1$

4. If $\sin^2(32°)+\cos^2(M) = 1$, then M equals
   a. 32° b. 58° c. 68° d. 72°

5. Using the Pythagorean Identity, given $\cos(\theta) = -0.5$, and angle θ is in quadrant III, find $\sin(\theta)$ and $\tan(\theta)$ to the nearest tenth.



$\sin^2\theta + \cos^2\theta = 1$

$\sin^2\theta + (-.5)^2 = 1$

$\sin^2\theta = 1 - .25 = .75$

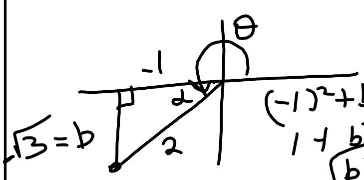
$\sqrt{\sin^2\theta} = \sqrt{.75}$

$\sin\theta = \pm .9$

III → sin −, $\sin\theta = -.9$

$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{-.9}{-.5} = 1.8$

6. Draw an angle in standard position given $\cos(\theta) = -1/2$, and angle θ is in quadrant III. Use the triangle to find $\sin(\theta)$ and $\tan(\theta)$ to the nearest tenth.



$(-1)^2 + b^2 = 2^2$

$1 + b^2 = 4$

$\sqrt{b^2} = \sqrt{3}$

$b = \sqrt{3}$

$\sin\theta = \frac{-\sqrt{3}}{2} \approx -.9$

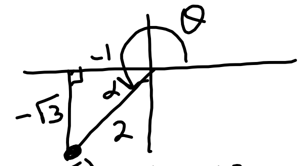
$\tan\theta = \frac{-\sqrt{3}}{-1} = \sqrt{3} \approx 1.7$

7. Using the Pythagorean Identity, given $\sin(\theta) = -7/10$, and angle θ is in quadrant IV, find the exact values of $\cos(\theta)$ and $\tan(\theta)$.

8. If $\sin^2(\theta)+\cos^2(\pi) = 1$, then θ equals
   a. -θ b. π/3 c. π d. π/2

$= \frac{A}{H}$

6. Draw an angle in standard position given cos(θ) = - 1/2, and angle θ is in quadrant III. Use the triangle to find sin(θ) and tan(θ) to the nearest tenth.



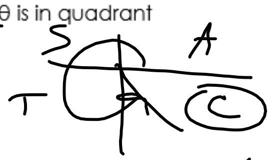
$\sin\theta = \frac{O}{H} = \frac{-\sqrt{3}}{2} \approx -.9$

$\tan\theta = \frac{-\sqrt{3}}{-1} = \sqrt{3} \approx 1.7$

$(-1)^2 + b^2 = 2^2$

$b^2 = 4 - 1 = 3 \rightarrow b = \pm\sqrt{3}$

7. Using the Pythagorean Identity, given sin(θ) = - 7/10, and angle θ is in quadrant IV, find the exact values of cos(θ) and tan(θ).



$\left(-\frac{7}{10}\right)^2 + \cos^2\theta = 1$

$\cos^2\theta = 1 - \frac{49}{100} = \frac{100}{100} - \frac{49}{100}$

$\sqrt{\cos^2\theta} = \sqrt{\frac{51}{100}}$

$\cos\theta = \pm\frac{\sqrt{51}}{10} \rightarrow \cos\theta = \frac{\sqrt{51}}{10}$

$\tan\theta = \frac{-7}{\cancel{10}} \cdot \frac{\cancel{10}}{\sqrt{51}}$

$\tan\theta = \frac{-7}{\sqrt{51}} = \frac{-7\sqrt{51}}{51}$

8. If $\sin^2(\theta)+\cos^2(\pi) = 1$, then θ equals

a. - θ b. π/3 c. π d. π/2

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yesterday's

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.

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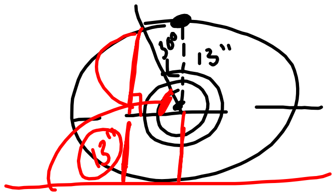
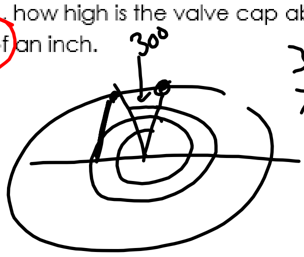
Application Word Problems: $r = 13''$

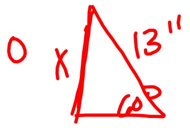
1. A bicycle wheel with a radius of 13" has a valve cap positioned at the highest point of the wheel. If the wheel is spun 750° in one direction, how high is the valve cap above the ground? Round your answer to the nearest tenth of an inch.





360
720
30

60°



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

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

$$+13$$

$$24.258$$

$$\approx 24.3''$$

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Jan 2-8:53 PM