Homework 7-5

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. $\sin(\theta) = -3/5$ $\cos(\theta) = -4/5$ $\tan(\theta)=3/4$

5. $\sin(\theta) = 5/\sqrt{29}$ $\cos(\theta) = -2/\sqrt{29}$ $\tan(\theta)= -5/2$

6. A 7. 3

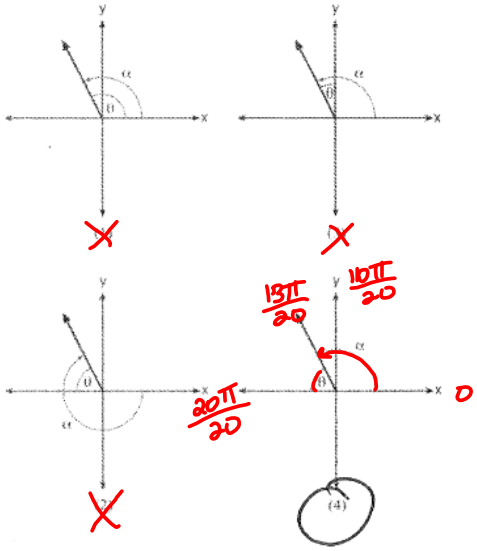
Name: Key

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 $\sin(\theta)$?
b. What is $\cos(\theta)$?
c. What is $\tan(\theta)$?
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

Q II

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

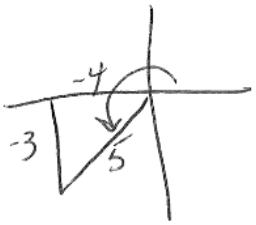
3. The angle θ corresponds to the angle between the positive x-axis and the line between the origin and the point $\left(\frac{-12}{13}, \frac{-5}{13}\right)$ on the unit circle. State your answers as an exact expressions.

c s

Q III

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).

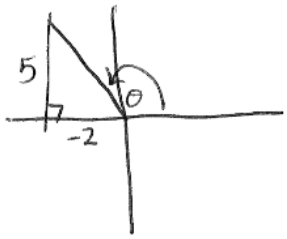


$\sin(\theta) = \frac{-3}{5}$

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

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

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).



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

$4 + 25 = x^2$

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

$x = \sqrt{29}$

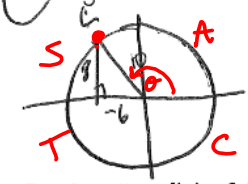
$\sin(\theta) = \frac{5}{\sqrt{29}}$

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

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

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 $f(x) = 2^{-0.25x} \cdot \sin\left(\frac{\pi}{2}x\right)$ (radians) 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)

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

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

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

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

Day 6: Pythagorean Identity

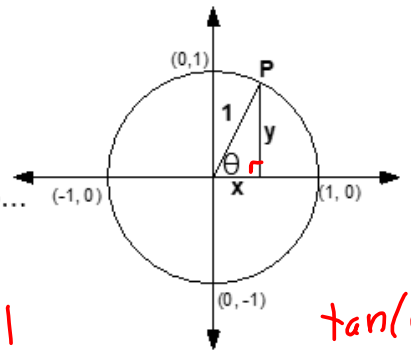
Pythagorean Theorem: $a^2+b^2=c^2$

On the unit circle: $x^2+y^2=1$

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

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

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



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

$\sin^2(\theta)=(\sin(\theta))^2$

↳ In calculator

Examples:

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

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

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

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

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

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

$\cos(\theta) = \pm .8$

$|\cos(\theta)| = .8$

$|\tan(\theta)| = \frac{\sin(\theta)}{|\cos(\theta)|} = \frac{.6}{.8} = \frac{3}{4}$ or .75

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

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

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

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

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

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

S | A

T | C

in Quad III:

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

$\tan(\theta) = \frac{-12/13}{5/13} = \frac{-12}{5}$

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

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

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

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

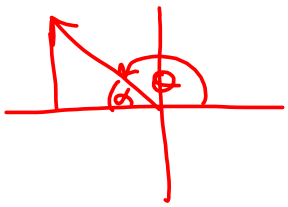
$\sqrt{\sin^2(\theta)} = \sqrt{.51}$

$\sin(\theta) = \pm .7$

QII: $\sin(\theta) = +.7$

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

$\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)} = \frac{.7}{-.7} = -1$



$\alpha = \tan^{-1}(1) = 45°$

$\theta = 180° - 45° = 135°$

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

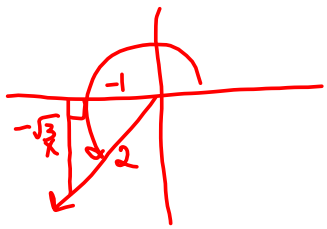
5. Using the Pythagorean Identity, given cos(θ) = - 0.5, and angle θ is in quadrant III, find sin(θ) and tan(θ) to the nearest tenth.

$\sin^2(\theta)+\cos^2(\theta)=1$
$\sin^2(\theta)+(-.5)^2=1$
$\sin^2(\theta)+.25=1$
$\sqrt{\sin^2(\theta)}=\sqrt{.75}$
$\sin(\theta)=\pm.866=\pm.9$
QIII $\sin(\theta)=-.9$

S | A
T | C

$\tan(\theta)=\frac{-.9}{-.5}=1.4$

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.



$1^2 + x^2 = 2^2$

$1 + x^2 = 4$

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

$x = \sqrt{3}$

$\sin(\theta) = -\sqrt{3}/2$

$\tan(\theta) = -\sqrt{3}/-1 = \sqrt{3}$

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).

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

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

$\frac{49}{100} + \cos^2(\theta) = 1 \cdot \frac{100}{100}$

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

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

QIV (+) $\rightarrow \cos(\theta) = \frac{\sqrt{51}}{10}$

$\tan(\theta) = \frac{-7/10}{\sqrt{51}/10} = \frac{-7}{\sqrt{51}}$

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

a. - θ b. π/3 c. π d. π/2