Math 623 Trigonometry Review **Name** _____

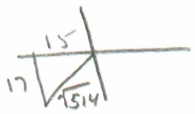
Show all work in a neat orderly fashion.

1. If $\tan\theta = \frac{17}{15}$ and $\pi < \theta < \frac{3\pi}{2}$, find the ***exact values*** (no decimals) of

Q III

$\sin\theta =$ _____ $\frac{-17}{\sqrt{514}}$

$\cos\theta =$ _____ $\frac{-15}{\sqrt{514}}$



2. Convert 65° 25′ to radian measure. *(Round the answer to the nearest hundredth of a radian.)*

$65 + \frac{25}{60}$

$65.41\overline{6} \cdot \frac{\pi}{180} = 1.1417 \Rightarrow 1.142$

3. Convert 225° to radian measure. *(Answer must be exact and in terms of π.)*

$225 \cdot \frac{\pi}{180} = \frac{5\pi}{4}$

4. Convert $\frac{13\pi}{6}$ radians to degrees.

$\frac{13\pi}{6} \cdot \frac{180}{\pi} = 390°$

5. Find two angles between 0° and 360·° such that $\sin\theta = -\frac{1}{2}$.

210° 330°

6. The sine and tangent functions are both negative in quadrant(s) IV.

7. The range of the sine function is $-1 \le \sin\theta \le 1$.

Part II.

1. If θ is a third quadrant angle and $\cos\theta = -\frac{4}{5}$, find $\tan\theta$. Make a sketch to help you.

$\tan\theta = 3/4$

3. A sector of a circle has radius 5 and central angle 2.5 radians. Find the arc length of the sector.

L.O.A = $r\theta$ $5 \cdot 2.5 = 12.5$ units

4. A sector of a circle has radius 6 and central angle 3 radians. Find the area of the sector.

A.O.S = $\frac{1}{2}r^2\theta$ or $\frac{\theta}{2\pi} \cdot \pi r^2$ $= \frac{1}{2}(6)^2 \cdot 3$

$= 54$ units^2

5. a.) Find the reference angle of 229'

$229 - 180 = 49°$

b.) Find two angles coterminal with 130°.

$130 \pm 360 = 490$

$-230°$

c.) Find the exact value of $\sin\frac{5\pi}{3}$

$= -\frac{\sqrt{3}}{2}$

d.) Find two solutions between 0° and 360° such that $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$.

135° 215°

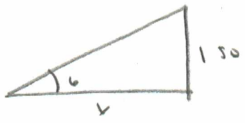
6. Use a calculator to find the value of each expression to the nearest 10th of a degree or radian, as indicated.

a. $\text{Tan}^{-1}\ 0.43 =$ 23.27 / 23.3° ° b. $\text{Cos}^{-1}\ 0.8 =$ .64 / .6 radians

c. $\text{Sin}^{-1}\left(\frac{9}{10}\right) =$ 1.12 / 1.1 radians

7. Teri McMacintosh is walking towards her office building which she knows is 150 feet tall. The angle of elevation to the top of her building from her current location is 6°. How much further does she need to walk?

Degree mode



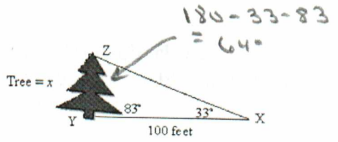
$\tan 6 = \frac{150}{x}$

$x = \frac{150}{\tan 6}$

$x = 1427$ ft

8. John wants to measure the height of a tree. He walks exactly 100 feet from the base of the tree and looks up. The angle from the ground to the top of the tree is 33°. This particular tree grows at an angle of 83° with respect to the ground (rather than vertically at 90°). How tall is the tree? Make certain that you understand the diagram before solving.

degree mode

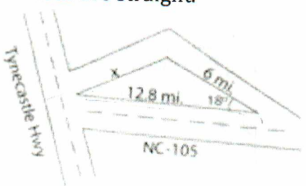


$\frac{\sin 64}{100} = \frac{\sin 33}{x}$

$\frac{100 \sin 33}{\sin 64} = \frac{x \sin 64}{\sin 64}$

$x = 60.6$ ft

9. You are heading to Beach Mountain for a ski trip. Unfortunately, the state road NC-105 is blocked off due to a chemical spill. You have to get to Tynecastle Highway which leads to the mountain. The detour begins with an 18° veer off onto a road that runs through the city. After 6 miles, there is another turn that leads to Tynecastle Highway. Assume that both roads on the detour are straight.



a.) How many extra miles do you need to travel to reach your destination?

$x^2 = 12.8^2 + 6^2 - 2(12.8)(6)\cos 18°$

$x^2 = 199.84 - 146.08$

$x^2 = 53.76$

$x = 7.33$ mi

$6 + 7.33 = 13.33$

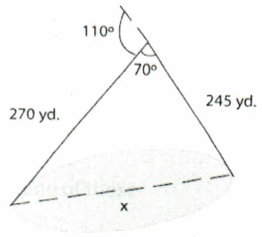
$13.33 - 12.8 = .53$ extra miles

b.) What is the area of the triangular region enclosed by the detour?

$A = \frac{1}{2}(6)(12.8)\sin 18°$

$= 11.91$

10. To approximate the length of a lake, a surveyor starts at one end of the lake and walks 245 yards. He then turns 110° and walks 270 yards until he arrives at the other end of the lake. Approximately how long is the lake?



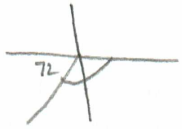
$x^2 = 270^2 + 245^2 - 2(270)(245)\cos 70°$

$= 297.66$ yd

Part 3: Multiple choice..

1. Express cos(-108°) in terms of its reference angle.

(a) cos (-18°)
(b) - cos 18°
(c) - cos 72°
(d) cos 252°
(e) none of these



2. A sector of a circle has central angle 60° and an arc length of 4.2. What is the area to the nearest tenth?

(a) 8.4
(b) 7.7
(c) 1.5
(d) 1.0
(e) none of these

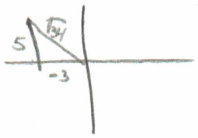
$4.2 = \frac{60}{360} \cdot 2\pi r$

$r = 4.01$

$= \frac{60}{360} \cdot \pi \cdot 4.01^2$

$= 8.4$

3. If the terminal ray of θ passes through (-3,5), find cos θ.



(a) $\frac{4}{5}$
(b) $-\frac{5}{\sqrt{34}}$
(c) $-\frac{3}{5}$
(d) $-\frac{3}{\sqrt{34}}$
(e) none of these

4. Convert 34° 57' to radians.

(a) 34.57
(b) 34.95
(c) 0.61
(d) 2002.49
(e) none of these

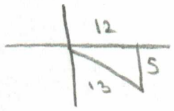
$34 + \frac{57}{60}$

5. A circular sector has a radius of 9 and a central angle of 2 radians. Find the arc length.

L.O.A = rθ

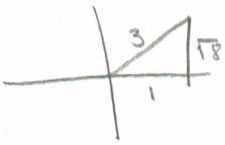
(a) 18
(b) $\frac{\pi}{10}$
(c) 9π
(d) 18π
(e) none of these

6. If θ is a fourth-quadrant angle, and $\sin\theta = -\frac{5}{13}$, then $\cos\theta = ?$



(a) $\frac{12}{13}$
(b) $-\frac{12}{13}$
(c) $\frac{13}{12}$
(d) $-\frac{13}{12}$
(e) none of these

7. Given $\cos(\vartheta) = \frac{1}{3}, 0 < \vartheta < \frac{\pi}{2}$. Find the ***exact value*** (no decimals) for each of the following. (You may want to sketch the angle to help you.)



a.) $\sin\vartheta = \frac{\sqrt{8}}{3} = \frac{2\sqrt{2}}{3}$

b.) $\cos(-\vartheta) = \frac{1}{3}$

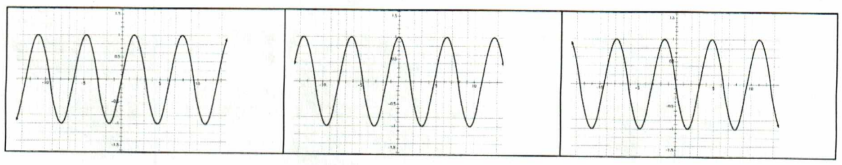
b.) $\cos(\pi - \vartheta)$ QII = $-\frac{1}{3}$

d.) $\tan(\vartheta)$ $\sqrt{8}$

8. Match each graph with its equation. Place the roman numeral beside each equation.

a.) y = cosx II b.) y = sinx I c.) y = −sinx II

I II III.



What is the domain of y = cosx? The range? The period?