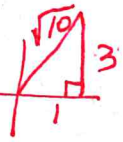
Sections 4.1-4.3 Precalculus/Trig Name KEY
Review 2 Period _____

You need to be able to do questions #1-16 without using a calculator.

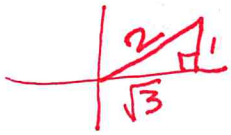
1. Use the given function value and the trig identities to find the values of the other 5 trig functions given that θ is in Quadrant 1: $\tan\theta = 3$



$\frac{y}{x} = \frac{3}{1}$

$\sin\theta = \frac{3}{\sqrt{10}} = \frac{3\sqrt{10}}{10}$ $\cos\theta = \frac{1}{\sqrt{10}} = \frac{\sqrt{10}}{10}$ $\tan\theta = 3$ $\csc\theta = \frac{\sqrt{10}}{3}$ $\cot\theta = \frac{1}{3}$

2. Use the given function value and the trig identities to find the values of the other 4 trig functions: $\csc\theta = 2$ $\sec\theta = \frac{2\sqrt{3}}{3}$

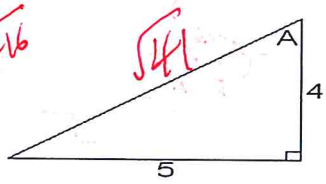


$\frac{r}{y} = \frac{2}{1}$

$\sin\theta = \frac{1}{2}$ $\cos\theta = \frac{\sqrt{3}}{2}$ $\tan\theta = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$ $\cot\theta = \sqrt{3}$

3. Find the exact values of the six trig functions for angle A.

$\sqrt{5^2+4^2}$ $\sqrt{25+16}$



$\sin A = \frac{5}{\sqrt{41}} = \frac{5\sqrt{41}}{41}$ $\cos A = \frac{4}{\sqrt{41}} = \frac{4\sqrt{41}}{41}$ $\tan A = \frac{5}{4}$

$\csc A = \frac{\sqrt{41}}{5}$ $\sec A = \frac{\sqrt{41}}{4}$ $\cot A = \frac{4}{5}$

4. Use trig identities to transform the left side of the equation into the right side.

a) $\frac{-\cot\theta}{\tan\theta} = 1 - \csc^2\theta$

$\frac{-\frac{\cos\theta}{\sin\theta} \cdot \frac{\cos\theta}{\sin\theta}}{\frac{\sin\theta}{\cos\theta} \cdot \frac{\cos\theta}{\sin\theta}}$

$\frac{-\cos^2\theta}{\sin^2\theta}$

$-\cot^2\theta$

$-\csc^2\theta + 1$

$1 - \csc^2\theta$

b) $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

FOIL

$\sec^2\theta - \tan^2\theta$

$(1 + \tan^2\theta) - \tan^2\theta$

1

5. State the quadrant in which θ lies under the conditions given.

a) $\sin\theta > 0$ and $\tan\theta < 0$ — II IS IN BOTH; $\frac{y}{r} > 0$ IN I, II; $\frac{y}{x} < 0$ IN II, IV

b) $\csc\theta > 0$ and $\cos\theta < 0$ — $\frac{y}{r} > 0$ IN I, II; $\frac{x}{r} < 0$ IN II, III; SO QUADRANT II IS IN BOTH

6. Evaluate the six trig functions when $\theta = \frac{7\pi}{6}$. Give exact values.

$\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

$\sin\theta = -\frac{1}{2}$ $\quad \csc\theta = -2$

$\cos\theta = \frac{-\sqrt{3}}{2}$ $\quad \sec\theta = -\frac{2\sqrt{3}}{3}$

$\tan\theta = \frac{-1}{-\sqrt{3}} = \frac{\sqrt{3}}{3}$ $\quad \cot\theta = \sqrt{3}$

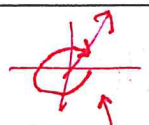
7. Name the trigonometric functions that are undefined for the following angles:

Quadrantal angle	Undefined trig function	Undefined trig function
0	csc 0	cot 0
$\frac{\pi}{2}$	$\tan\frac{\pi}{2}$	$\sec\frac{\pi}{2}$
π	csc π	cot π
$\frac{3\pi}{2}$	$\tan\frac{3\pi}{2}$	$\sec\frac{3\pi}{2}$

8. Determine the quadrant in which each angle lies.

a) $\frac{17\pi}{5} - \frac{10\pi}{5} = \frac{7\pi}{5}$ III

b) 3.1 II (3.14, 1.57, 0)



c) $-290°$ I

9. Determine two coterminal angles (one positive and one negative) for each angle, using π radians on part a) and degrees on part b).

a) $\frac{2\pi}{5} \pm 2\pi$ positive = $\frac{12\pi}{5}$ negative = $-\frac{8\pi}{5}$

b) $340° \pm 360°$ positive = $700°$ negative = $-20°$

10. Find (if possible) and simplify the complement and supplement of each angle.

a) $\frac{\pi}{4}$

comp = $\frac{\pi}{2} - \frac{\pi}{4} = \frac{\pi}{4}$

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

b) $\frac{1}{5}$

comp = $\frac{5\pi}{5\cdot 2} - \frac{1\cdot 2}{5\cdot 2} = \frac{5\pi - 2}{10}$

supp = $\pi - \frac{1}{5} = \frac{5\pi - 1}{5}$

c) $\frac{2\pi}{9}$

comp = $\frac{9\pi}{9\cdot 2} - \frac{2\pi}{9\cdot 2} = \frac{5\pi}{18}$

supp = $\frac{9\pi}{9} - \frac{2\pi}{9} = \frac{7\pi}{9}$

11. Rewrite 120° in radian measure as a multiple of π. $120^\circ\left(\frac{\pi}{180^\circ}\right) = \frac{2\pi}{3}$

12. Rewrite $\frac{7\pi}{12}$ in degree measure. $\frac{7\pi}{12}\left(\frac{180^\circ}{\pi}\right) = 105^\circ$

13. Find the radian measure of the central angle of a circle of radius 14 inches that intercepts an arc of length 10 inches.

$\theta = \frac{s}{r}$ $\quad \theta = \frac{10\text{ in}}{14\text{ in}} = \frac{5}{7}$ radian $\approx .714$ rad

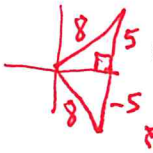
14. Find the radius of a circle with arc length of 8 *in.* intercepted by the central angle $\frac{2\pi}{3}$.

$\frac{2\pi}{3} = \frac{8\text{ in}}{r}$ CROSS-MULTIPLY $2\pi r = 24\text{ in}$

$r = \frac{24}{2\pi}\text{ in.} = \frac{12}{\pi}\text{ in}$

≈ 3.820 inches

15. If $\sin t = \frac{5}{8}$, evaluate each of the following functions:



a) $\sin(-t) = -\frac{5}{8}$ b) $\csc(-t) = -\frac{8}{5}$ c) $\csc(2\pi - t) = -\frac{8}{5}$

16. Each of the following statements is incorrect. Explain why.

a) $\cos(t) = 1.4$ $\frac{x}{r} = \frac{14}{10}$ → X CAN'T BE BIGGER THAN THE HYPOTENUSE (r) IN A RIGHT TRIANGLE.

b) $\sin\theta > 0$ and $\csc\theta < 0$ $\sin\theta = \frac{1}{\csc\theta}$ SO THEY ARE BOTH POSITIVE OR BOTH NEGATIVE

c) $\sin\theta = 14^\circ$ ← θ is the angle so 14° SHOULD HAVE BEEN THE RATIO.

d) 150° is a quadrantal angle 150° IS IN QUADRANT II, NOT ON AN AXIS.

e) $\frac{4\pi}{3} = 210^\circ$ $\frac{4\pi}{3}\left(\frac{180^\circ}{\pi}\right) = 240^\circ$

f) 43.34526 rounded to the nearest tenth is 43.4 IT'S 43.3 BECAUSE HUNDREDTHS PLACE IS NOT 5 OR BIGGER.

g) a calculator shows that $\theta = 59.008^\circ$ so rounded to the tenths place $\theta = 59^\circ$ IT SHOULD BE 59.0°

You should be able to do the following questions with a calculator.

17. A bicycle wheel with a radius of 12 inches makes 2.5 revolutions per second. Find the speed of the bicycle in miles per hour? Round your answer to the nearest tenth.

$2.5 \frac{\text{rev}}{\text{sec}} \left(\frac{2\pi \text{ rad}}{1 \text{ rev}}\right) = 5\pi \frac{\text{rad}}{\text{sec}}$

LINEAR SPEED = (ANGULAR SPEED)(RADIUS)

$= \left(5\pi \frac{\text{rad}}{\text{sec}}\right)(1 \text{ ft.})\left(\frac{1 \text{ mile}}{5280 \text{ ft}}\right)\left(\frac{3600 \text{ sec}}{1 \text{ hr}}\right)$

linear speed $= 10.7 \frac{\text{miles}}{\text{hr.}}$

18. The circular blade of a saw has a diameter of 8 inches and rotates at 2400 revolutions per minute.

a) Find the angular speed in radians per second.

$\frac{2400 \text{ rev}}{\text{min}} \cdot \left(\frac{2\pi \text{ rad}}{\text{rev}}\right)\left(\frac{1 \text{ min}}{60 \text{ sec}}\right) = 80\pi \frac{\text{rad}}{\text{sec}}$

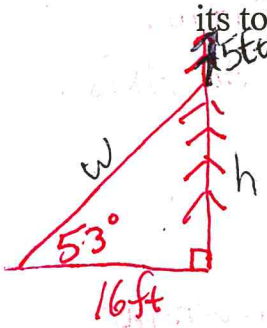
b) Find the exact linear velocity of the saw teeth (on the rim of the saw blade) in feet per second as the saw teeth contact the wood being cut.

linear speed = angular speed · radius

linear speed $= \left(80\pi \frac{\text{rad}}{\text{sec}}\right)(4 \text{ inches})\left(\frac{1 \text{ ft}}{12 \text{ inches}}\right)$

linear speed $= 83.776 \frac{\text{ft}}{\text{sec}}$

19. A support wire for a tree making an angle of 53° with the ground is stretched from a stake in the ground 16 feet from the base of the tree to a point on the tree 5 feet below its top.



a) How long is the wire to the nearest tenth of a foot?

$\cos 53° = \frac{16}{w}$

$w = \frac{16}{\cos 53°}$

$W = 26.586 \text{ ft}$

$W = 26.6 \text{ ft}$

b) How tall is the tree to the nearest hundredth of a foot?

$\tan 53° = \frac{h}{16 \text{ ft}}$

$16 \tan 53° = h$

$21.232 \text{ ft} = h$

$+5 \text{ ft}$

$26.23 \text{ ft} = \text{tree}$