Key

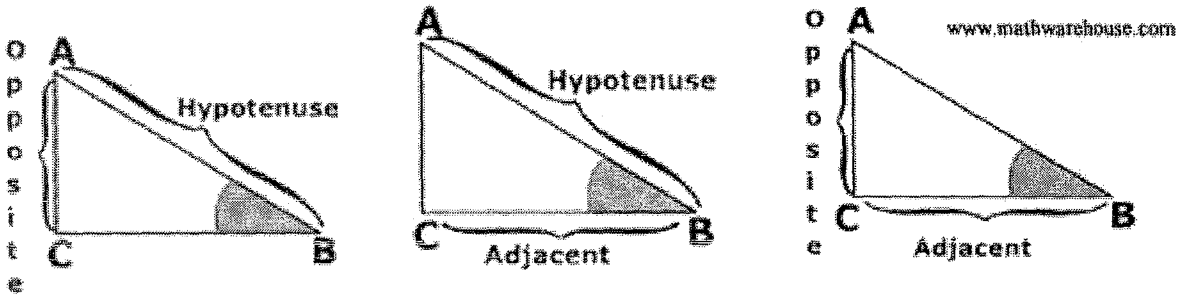
FRONT ONLY

saved as trig.intro

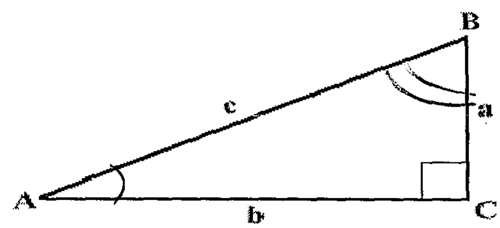
Intro to Trigonometry:

First, a review of SOH-CAH-TOA:

$$\sin(B) = \frac{opposite}{hypotenuse} \qquad \cos(B) = \frac{adjacent}{hypotenuse} \qquad \tan(B) = \frac{opposite}{adjacent}$$

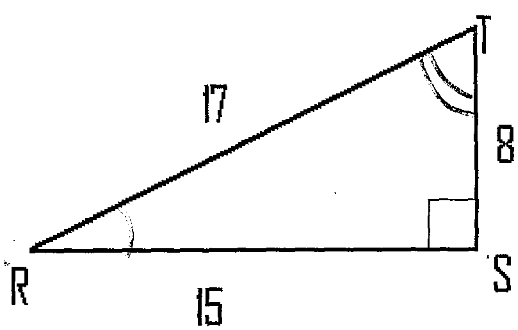


Write the ratios for each of the following functions below:



sine $A = \frac{a}{c}$ cosine $A = \frac{b}{c}$ tangent $A = \frac{a}{b}$	Sine $B = \frac{b}{c}$ cosine $B = \frac{a}{c}$ tangent $B = \frac{b}{a}$

Give the value of each ratio as a fraction.



Sin R = $\frac{8}{17}$

Cos R= $15/17$

Tan R= $8/15$

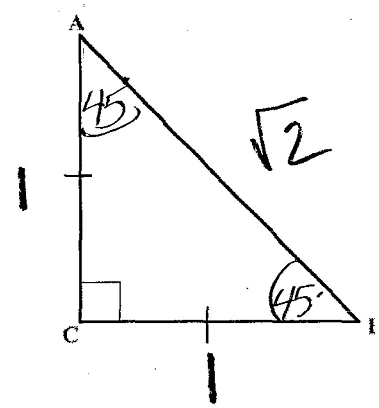
Sin T= $\frac{15}{17}$

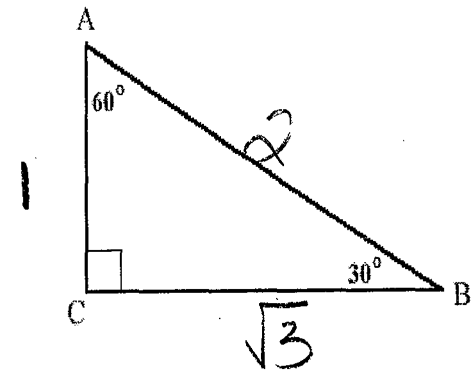
Cos T= $\frac{8}{17}$

Tan T = $\frac{15}{8}$

$X : X : X\sqrt{2} \quad X : X\sqrt{3} : 2X$

There are two special triangles you need to know, 45-45-90 and 30-60-90 triangles. Do you remember the ratios???





Fill in the table of common trig values based off of the special right triangles above:

	30°	45°	60°
Sine	$\frac{1}{2}$	$\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
Cosine	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
Tangent	$\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$	1	$\sqrt{3}$

Evaluate the following:

1) Sin 60 + Cos 30 =

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

2) (tan 60)(tan 30)=

$$\frac{\sqrt{3}}{1} \cdot \frac{\sqrt{3}}{3} = \frac{3}{3} = 1$$

3) tan 45 + 2cos60 =

$$1 + 2\left(\frac{1}{2}\right)$$

$$= 2$$

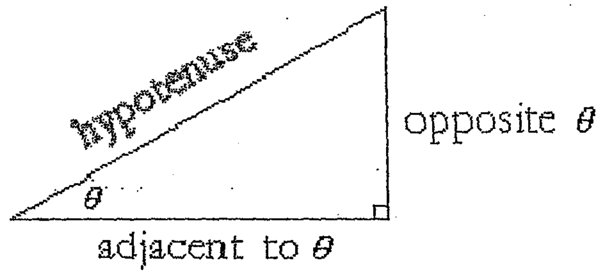
4) $(\sin 45)^2 + (\cos 45)^2 =$

$$\left(\frac{\sqrt{2}}{2}\right)^2 + \left(\frac{\sqrt{2}}{2}\right)^2$$

$$\frac{2}{4} + \frac{2}{4} = \frac{4}{4} = 1$$

Key

The SiX Trig Functions – That's right I said SiX!



sine of θ= $\frac{O}{H}$	**cosecant of** θ: **csc** θ= $\frac{H}{O}$
cosine of θ= $\frac{A}{H}$	**secant of** θ: **sec** θ= $\frac{H}{A}$
tangent of θ = $\frac{O}{A}$	**cotangent of** θ: **cot** θ = $\frac{A}{O}$

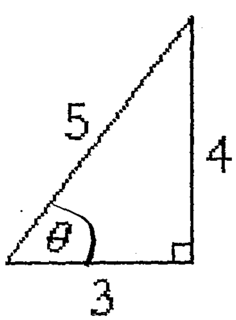
Notice that each ratio (function) in the right-hand column is the reciprocal ratio, of the ratio in the left-hand column.

The reciprocal of sin θ is csc θ; and vice-versa

The reciprocal of cos θ is sec θ

And the reciprocal of tan θ is cot θ

1) The sides of a right triangle are in the ratio 3:4:5, as shown. Name and evaluate the ***SIX*** trigonometric functions of angle θ.



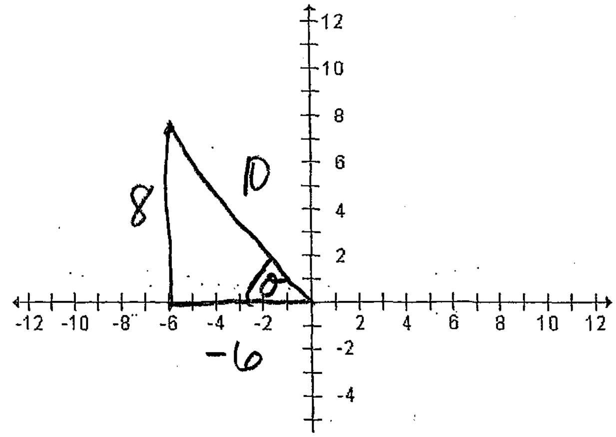
$\sin\theta = \frac{4}{5}$ $\csc\theta = \frac{5}{4}$

$\cos\theta = \frac{3}{5}$ $\sec\theta = \frac{5}{3}$

$\tan\theta = \frac{4}{3}$ $\cot\theta = \frac{3}{4}$

2) Given the coordinates of point P(-6,8)

find the ratio of all six trig functions:



$\sin\theta = \frac{8}{10}$

$\cos\theta = \frac{-6}{10}$

$\tan\theta = \frac{8}{-6}$

$\csc\theta = \frac{10}{8}$

$\sec\theta = \frac{10}{-6}$

$\cot\theta = \frac{-6}{8}$

3) Name the Quadrant in which <B must lie.

S | A
T | C

a) Cot B < 0 and Sin B > 0

tan ⊖ sin ⊕ II

b) Csc B < 0 and Sec B >0

sin ⊖ cos ⊕

4) Evaluate the following

1) Sec 240 cos 240 $-\cos 60 = -\frac{1}{2} \rightarrow \boxed{-2}$

2) Csc 120 sin 120 sin 60 $\frac{\sqrt{3}}{2} \rightarrow \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{2\sqrt{3}}{3}}$

3) (Tan 45)(Sec 30)
1 cos 30 → $\frac{\sqrt{3}}{2} \rightarrow \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{2\sqrt{3}}{3}}$

4) $Csc\,90^\circ + Sec\,180^\circ$
(0,1)
sin 90 + cos 180
"y" "x"
1 + -1
recip. 1 + -1 = $\boxed{0}$

5) $Cot^2\,60^\circ$

$\tan 60 = (\sqrt{3})^2 = 3 \Rightarrow \boxed{\frac{1}{3}}$

Angles formed from the Unit Circle

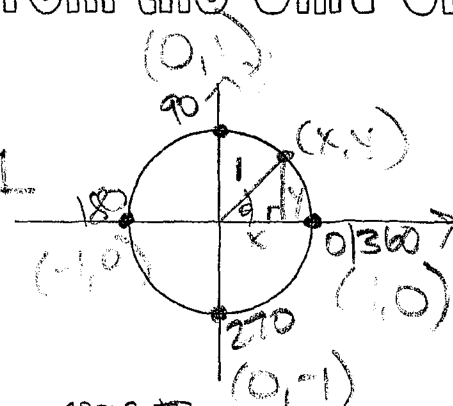
Given a point (x,y) on the unit circle:

radius = 1

X = cos θ

Y = sin θ

$\frac{Y}{X}$ = tan θ



$\cos\theta = \frac{x}{1}$

$\sin\theta = \frac{y}{1}$

$\tan\theta = \frac{y}{x}$

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

$\cos^2\theta + \sin^2\theta = 1$ → on back - come to later

In which Quadrants are the Sine, Cosine, and Tangent Positive?

	Quadrant I	Quadrant II	Quadrant III	Quadrant IV
Sine	+	+	−	−
Cosine	+	−	−	+
Tangent	+	−	+	−
	A	S	T	C

How about the trig values for the Quadrantal angles on the Unit Circle? → ∠s that terminate on x or y axis

Cos 0 = 1 Sin 0 = 0 Tan 0 = $\frac{0}{1} = 0$

Cos90 = 0 Sin90 = 1 Tan 90 = $\frac{1}{0}$ = und.

Cos 180 = −1 Sin 180 = 0 Tan 180 = $\frac{0}{-1} = 0$

Cos 270 = 0 Sin 270 = −1 Tan 270 = $\frac{-1}{0}$ = und

Cos 360 = 1 Sin 360 = 0 Tan 360 = $\frac{0}{1} = 0$

X Y $\frac{Y}{X}$

Examples

Name which quadrant θ must lie when...

1) cosθ > 0 (+) and sinθ > 0 (+) I

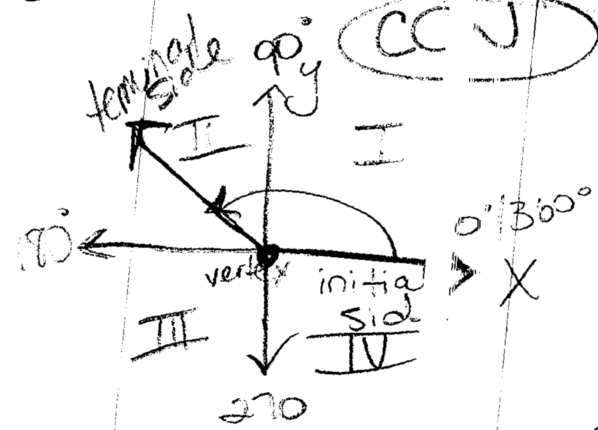
) cosθ < 0 (−) and sinθ < 0 (−) III

∴ tan (+)

Sketching ∡s

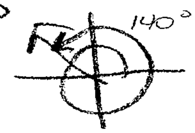
Angles in Standard Position:

(CCW)

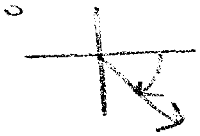


ex: 1) 240°

2) 500°



3) −50°



500°, 140°
−360

Coterminal ∡s b/c they have same terminal side, found by adding / subtracting multiples of 360°

Pyt. Id. Practice

① Find sec θ using Pyt. Id. if $\sin\theta = \frac{3}{5}$, + θ is in QII

$\csc\theta = \frac{5}{3}$

$\left(\frac{3}{5}\right)^2 + \cos^2\theta = 1$

$\frac{9}{25} + \cos^2\theta = 1 \quad \frac{25}{25}$

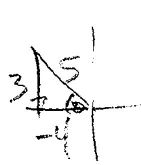
$-\frac{9}{25} \qquad -\frac{9}{25}$

$\sqrt{\cos^2\theta} = \frac{16}{25}$

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

$\boxed{\sec\theta = -\frac{5}{4}}$

S | A
T | C



② Find sin θ if θ is in Q IV + $\cos\theta = \frac{2}{7}$

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

$\sin^2\theta + \frac{4}{49} = 1 = \frac{49}{49}$

$-\frac{4}{49} \qquad -\frac{4}{49}$

$\sqrt{\sin^2\theta} = \sqrt{\frac{45}{49}}$

$\sin\theta = \pm\frac{3\sqrt{5}}{7}$

S | A
T | C

$\boxed{\sin\theta = -\frac{3\sqrt{5}}{7}}$

Name Key Date ____________ Period ____________

Find the exact value of each of the remaining trigonometric functions of θ.

1) $\sin\theta = \frac{12}{13}$, θ in Quadrant II

$\cos = -\frac{5}{13}$ $\sec = -\frac{13}{5}$

$\tan = -\frac{12}{5}$ $\cot = -\frac{5}{12}$

$\csc = \frac{13}{12}$

ref $= 67°$

$\theta = 113°$

2) $\cos\theta = \frac{3}{5}$, θ in Quadrant IV

$\sin = -\frac{4}{5}$

$\tan = -\frac{4}{3}$

$\sec = \frac{5}{3}$

$\csc = -\frac{5}{4}$

$\cot = -\frac{3}{4}$

ref∠ $= 53°$

$\theta = 307°$

3) $\cos\theta = -\frac{4}{5}$, θ in Quadrant III

$\sin = -\frac{3}{5}$

$\tan = \frac{3}{4}$

$\sec = -\frac{5}{4}$

$\csc = -\frac{5}{3}$

$\cot = \frac{4}{3}$

ref∠ $= 37°$

$\theta = 217°$

4) $\sin\theta = -\frac{5}{13}$, θ in Quadrant III

$\cos = -\frac{12}{13}$

$\tan = \frac{5}{12}$

$\csc = -\frac{13}{5}$

$\sec = -\frac{13}{12}$

$\cot = \frac{12}{5}$

ref∠ $= 23°$

$\theta = 203°$

5) $\sin\theta = \frac{5}{13}$, $90° < \theta < 180°$

$\cos = -\frac{12}{13}$

$\tan = -\frac{5}{12}$

$\csc = \frac{13}{5}$

$\sec = -\frac{13}{12}$

$\cot = -\frac{12}{5}$

ref∠ $= 23°$

$\theta = 157°$

6) $\cos\theta = \frac{4}{5}$, $270° < \theta < 360°$

$\sin = -\frac{3}{5}$ $\csc = -\frac{5}{3}$

$\tan = -\frac{3}{4}$ $\cot = -\frac{4}{3}$

$\sec = \frac{5}{4}$

ref∠ $= 37°$

$\theta = 323°$

7) $\cos\theta = -\frac{1}{3}$, $180° < \theta < 270°$

$1 + x^2 = 9$

$x^2 = 8$

$x = 2\sqrt{2}$

$\sec = -3$

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

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

$\tan = \frac{+2\sqrt{2}}{+1} = 2\sqrt{2}$

$\cot = \frac{1}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{4}$

8) $\sin\theta = -\frac{2}{3}$, $180° < \theta < 270°$

ref∠ $= 42$ $\theta = 222$

$4 + x^2 = 9$

$x = \sqrt{5}$

$\cos = -\frac{\sqrt{5}}{3}$

$\tan = \frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

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

$\sec = -\frac{3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = -\frac{3\sqrt{5}}{5}$

$\cot = \frac{\sqrt{5}}{2}$

9) $\sin\theta = \frac{2}{3}$, $\tan\theta < 0$

ref∠ $= 42$ $\theta = 138$

$4 + x^2 = 9$

$x = \sqrt{5}$

$\cos = -\frac{\sqrt{5}}{3}$

$\tan = -\frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = -\frac{2\sqrt{5}}{5}$

$\csc = \frac{3}{2}$

$\sec = -\frac{3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = -\frac{3\sqrt{5}}{5}$

$\cot = -\frac{\sqrt{5}}{2}$

Name ______________________ **Date** ______________________ **Period** ____________

$1 + x^2 = 16$

$\sqrt{x^2} = \sqrt{15}$

ref∡ = 76° θ = 256

$\cos = \frac{1}{2}$

$\sin = \frac{1}{3}$ $1^2 + x^2 = 3^2$ $1 - x^2 = 9$

10) $\cos\theta = -\frac{1}{4}, \ \tan\theta > 0$

$\sin = \frac{\sqrt{15}}{4}$

$\tan = \frac{\sqrt{15}}{-1} = \sqrt{15}$

$\sec = -4$

$\csc = \frac{-4}{\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = \frac{-4\sqrt{15}}{15}$

$\cot = \frac{1}{\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = \frac{\sqrt{15}}{15}$

11) $\sec\theta = 2, \ \sin\theta < 0$, $\cos = \frac{1}{2}$

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

$\tan = -\sqrt{3}$

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

$\cot = \frac{-1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$

ref∡ = 60°

θ = 300°

12) $\csc\theta = 3, \ \cot\theta < 0$

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

$\tan = \frac{1}{-2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{-\sqrt{2}}{4}$

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

$\cot = -2\sqrt{2}$

ref∡ = 19°

θ = 161°

13) $\tan\theta = \frac{3}{4}, \ \sin\theta < 0$

$\sin = \frac{-3}{5}$

$\cos = \frac{-4}{5}$

$\csc = \frac{-5}{3}$

$\sec = \frac{-5}{4}$

$\cot = \frac{4}{3}$

ref∡ = 37°

θ = 217°

14) $\cot\theta = \frac{4}{3}, \ \cos\theta < 0$

$\tan = \frac{3}{4}$

$\sin = \frac{-3}{5}$

$\cos = \frac{-4}{5}$

$\csc = \frac{-5}{3}$

$\sec = \frac{-5}{4}$

ref∡ = 37°

θ = 217°

15) $\tan\theta = -\frac{1}{3}, \ \sin\theta > 0$

$\sin = \frac{1}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}}$

$\cos = \frac{-3}{\sqrt{10}}$

$\cot = -3$

$\csc = \sqrt{10}$

$\sec = \frac{-\sqrt{10}}{3}$

ref∡ = 18°

θ = 162°

16) $\sec\theta = -2, \ \tan\theta > 0$

$\cos = -\frac{1}{2}$

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

$\tan = \sqrt{3}$

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

$\cot = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

ref∡ = 60°

θ = 240°

17) $\csc\theta = -2, \ \tan\theta > 0$

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

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

$\tan = \frac{-1}{-\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

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

$\cot = \frac{3}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{3}}{3}$

ref∡ = 30° θ = 210°

18) $\cot\theta = -2, \ \sec\theta > 0$

$\cos > 0$

$\tan = \frac{-1}{2}$

$\sin = \frac{-1}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$\cos = \frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$\csc = \frac{-5}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{-5\sqrt{5}}{5} = -\sqrt{5}$

$\sec = \frac{5}{2\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{5\sqrt{5}}{10} = \frac{\sqrt{5}}{2}$

ref∡ = 27°

θ = 333°

Converting from radians to degrees and Vise Vera....

- Converting Degrees → Radians: Multiply the angle in degrees by $\frac{\pi \text{ radian}}{180^\circ}$

1) Convert 45 degrees to radians. $45^\circ \cdot \frac{\pi}{180^\circ} = \boxed{\frac{45\pi}{180}} = \boxed{\frac{\pi}{4}}$

2) Convert 90 degrees to radians. $\boxed{\frac{\pi}{2}}$

3) Convert 135 degrees to radians. $135^\circ \cdot \frac{\pi}{180} = \boxed{\frac{3\pi}{4}}$

Converting Radians → Degrees: $\frac{180^\circ}{\pi \text{ radians}}$

1. Convert $\frac{5\pi}{9}$ radians to degrees. $\frac{5\cancel{\pi}}{\cancel{9}_1} \cdot \frac{\cancel{180}^{20}}{\cancel{\pi}} = \boxed{100^\circ}$

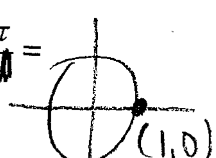
2. Convert 4π radians to degrees. $4\pi \cdot \frac{180}{\cancel{\pi}} = \boxed{720^\circ}$

(2 circles)

3) 1 → $\approx 57.3^\circ$

Find the Exact value of the following:

* 1) $Tan \frac{8\pi}{\text{[illegible]}} =$



$\frac{y}{x} = \frac{0}{1} = \boxed{0}$

2) $Sin\frac{\pi}{3} + Cos\frac{\pi}{6} =$

$\sin 60^\circ + \cos 30^\circ$

$\frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} = \frac{\cancel{2}\sqrt{3}}{\cancel{2}} = \boxed{\sqrt{3}}$

Name Key Date______ Radian Measure

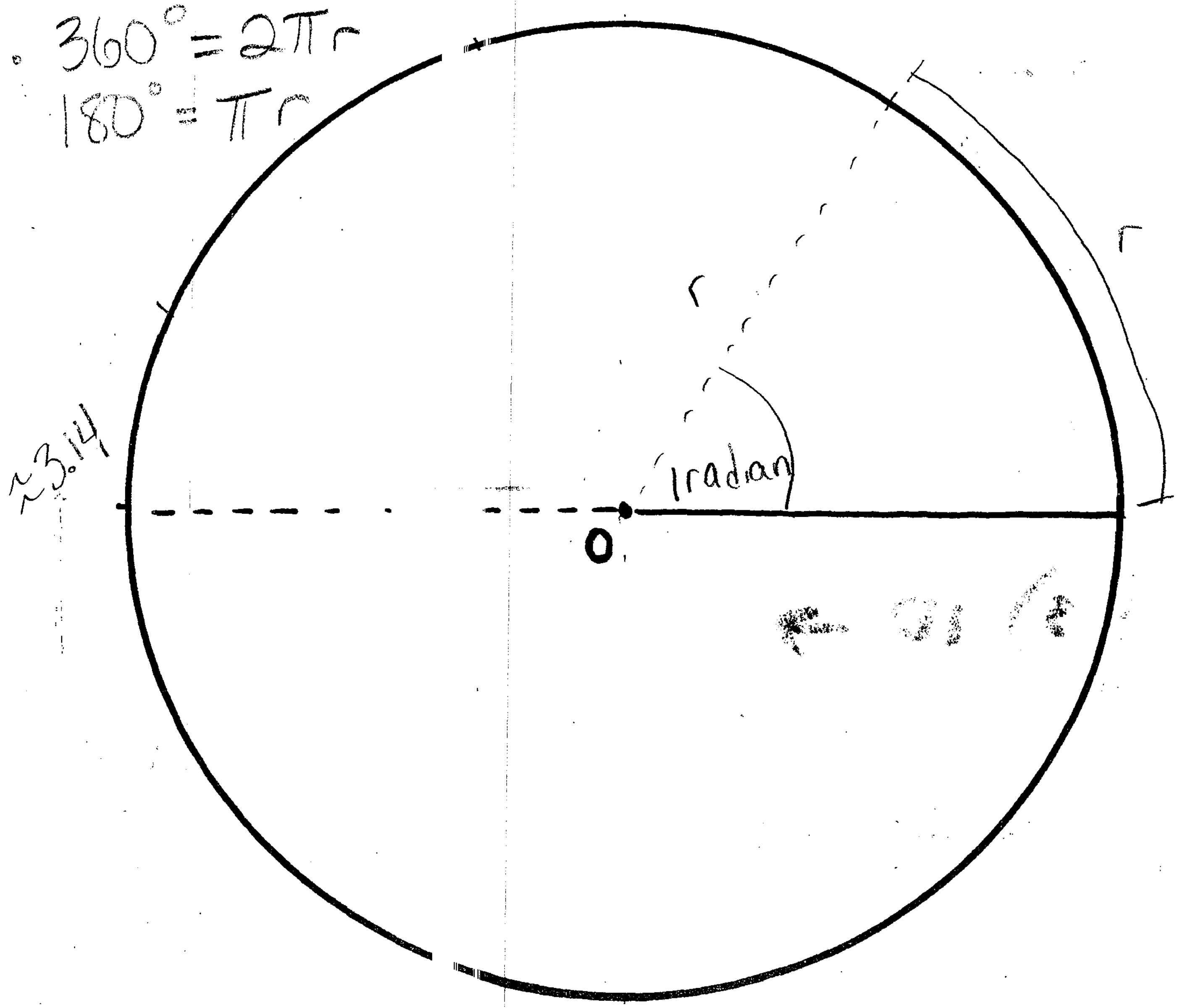
Class Notes:

One radian is the measure of an $\measuredangle$ in standard position whose terminal side intercepts an arc of length r.

B/c $C = 2\pi r$, there are 2π (approx 6.28) radians in a full circle.

$\therefore\ 360^\circ = 2\pi r$

$180^\circ = \pi r$

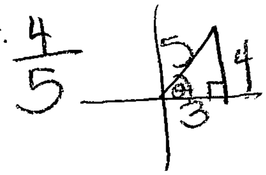


Regents Exam Questions
F.TF.C.8: Determining Trigonometric Functions 1a
www.jmap.org

Name: Key

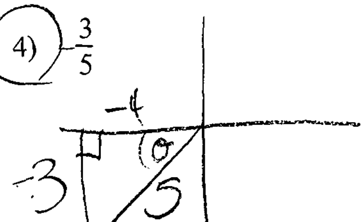
F.TF.C.8: Determining Trigonometric Functions 1a

1 If x is a positive acute angle and $\cos x = \frac{3}{5}$, find the value of $\sin x$. $\frac{4}{5}$



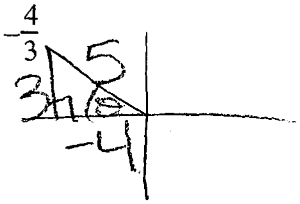
2 If $\cos x = -\frac{4}{5}$ and $\tan x > 0$, the value of $\sin x$ is?

1) $\frac{3}{5}$ 2) $\frac{5}{3}$ 3) $-\frac{5}{3}$ 4) $-\frac{3}{5}$



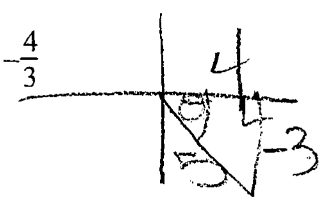
3 If $\cos \theta = -\frac{4}{5}$ and θ lies in Quadrant II, what is the value of $\tan \theta$?

1) $\frac{3}{4}$ 2) $\frac{4}{3}$ 3) $-\frac{3}{4}$ 4) $-\frac{4}{3}$

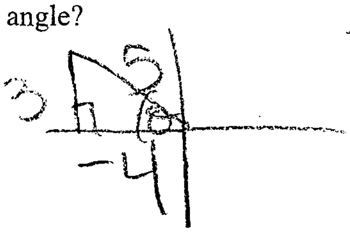


4 If $\sin \theta = -\frac{3}{5}$ and $\cos \theta > 0$, what is the value of $\tan \theta$?

1) $\frac{3}{4}$ 2) $-\frac{3}{4}$ 3) $\frac{4}{3}$ 4) $-\frac{4}{3}$

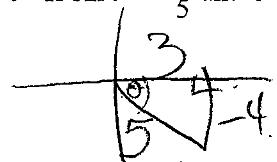


5 If the sine of an angle is $\frac{3}{5}$ and the angle is *not* in Quadrant I, what is the value of the cosine of the angle?



$\frac{-4}{5}$

6 If $\sin \theta = -\frac{4}{5}$ and θ is in Quadrant IV, find $\tan \theta$.

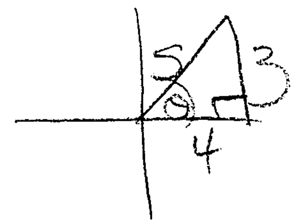


$\frac{-4}{3}$

7 If $\cos A = \frac{4}{5}$ and A is in Quadrant I, what is the value of $\sin A \cdot \tan A$?

1) $\frac{9}{20}$ 2) $\frac{12}{25}$ 3) $\frac{16}{25}$ 4) $\frac{16}{20}$

$\frac{3}{5} \cdot \frac{3}{4} = \frac{9}{20}$

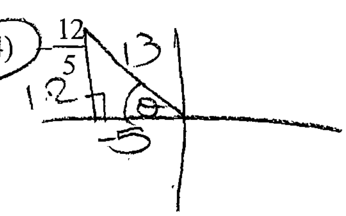


8 If θ terminates in Quadrant II and $\sin \theta = \frac{12}{13}$, find $\cos \theta$.

$\frac{-5}{13}$

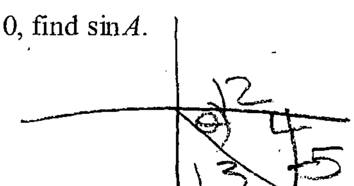
9 If $\cos \theta = -\frac{5}{13}$ and $\sin \theta > 0$, then $\tan \theta$ is

1) $\frac{5}{12}$ 2) $-\frac{5}{12}$ 3) $\frac{12}{5}$ 4) $-\frac{12}{5}$

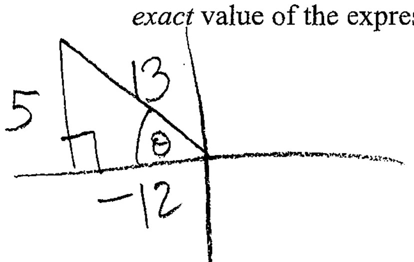


10 If $\tan A = \frac{-5}{12}$ and $\cos A > 0$, find $\sin A$.

$\frac{-5}{13}$



11 Given $\tan \theta = -\frac{5}{12}$ and $\frac{\pi}{2} < \theta < \pi$, determine the *exact* value of the expression $\sin \theta \cot \theta$.



$\frac{\cancel{5}}{13} \cdot \frac{-12}{\cancel{5}} = \frac{-12}{13}$

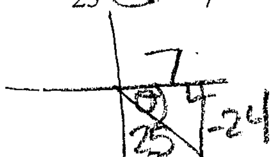
Name: Key

12 If $\sin\theta = -\frac{8}{17}$ and $\tan\theta$ is positive, what is the value of $\cos\theta$?

$-\frac{15}{17}$

13 Given $\cos\theta = \frac{7}{25}$, where θ is an angle in standard position terminating in quadrant IV, and $\sin^2\theta + \cos^2\theta = 1$, what is the value of $\tan\theta$?

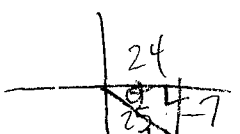
1) $-\frac{24}{25}$ 2) $-\frac{24}{7}$ 3) $\frac{24}{25}$ 4) $\frac{24}{7}$



$-\frac{24}{7}$

14 If $\sin A = -\frac{7}{25}$ and $\angle A$ terminates in Quadrant IV, $\tan A$ equals

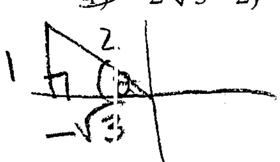
1) $-\frac{7}{25}$ 2) $-\frac{7}{24}$ 3) $-\frac{24}{7}$ 4) $-$[illegible]



$\frac{-7}{24}$

15 If $\sin\theta = \frac{1}{2}$ and θ terminates in Quadrant II, what is the value of $\csc\theta \bullet \cot\theta$?

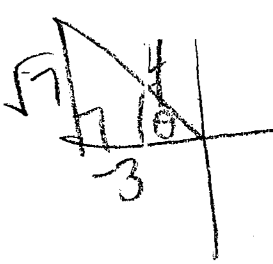
1) $-2\sqrt{3}$ 2) $\frac{\sqrt{3}}{2}$ 3) -2 4) $\frac{2\sqrt{3}}{3}$



$2 \cdot \frac{-\sqrt{3}}{1} = -2\sqrt{3}$

16 If $\cos\theta = -\frac{3}{4}$ and $\tan\theta$ is negative, the value of $\sin\theta$ is

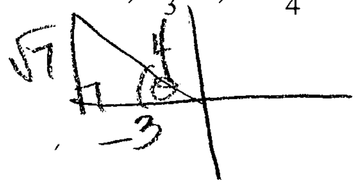
1) $\frac{4}{5}$ 2) $-\frac{\sqrt{7}}{4}$ 3) $\frac{7}{4}$ 4) $\frac{\sqrt{7}}{4}$



$(-3)^2 + c^2 = 4^2$
$9 + c^2 = 16$
$\sqrt{x} = \sqrt{7}$

17 If $\sin\theta = \frac{\sqrt{7}}{4}$ and $\cos\theta = -\frac{3}{4}$, what is $\tan\theta$?

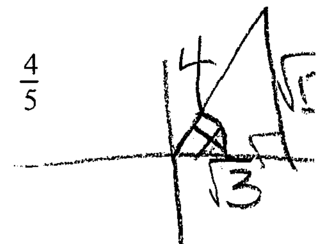
1) $\frac{4}{3}$ 2) $-\frac{\sqrt{7}}{4}$ 3) $\frac{\sqrt{7}}{3}$ 4) $-\frac{\sqrt{7}}{3}$



$\frac{\sqrt{7}}{-3}$

18 If x is a positive acute angle and $\cos x = \frac{\sqrt{3}}{4}$, what is the exact value of $\sin x$?

1) $\frac{\sqrt{3}}{5}$ 2) $\frac{\sqrt{13}}{4}$ 3) $\frac{3}{5}$ 4) $\frac{4}{5}$



$(\sqrt{3})^2 + x^2 = 4^2$
$3 + x^2 = 16$
$x^2 = \sqrt{13}$

19 Given that $\sin^2\theta + \cos^2\theta = 1$ and $\sin\theta = -\frac{\sqrt{2}}{5}$, what is a possible value of $\cos\theta$?

1) $\frac{5+\sqrt{2}}{5}$ 2) $\frac{\sqrt{23}}{5}$ 3) $\frac{3\sqrt{3}}{5}$ 4) $\frac{\sqrt{35}}{5}$

$\left(-\frac{\sqrt{2}}{5}\right)^2 + \cos^2\theta = 1 \rightarrow \frac{25}{25}$
$\frac{2}{25} + \cos^2\theta = 1$
$\sqrt{\cos^2\theta} = \sqrt{\frac{23}{25}} = \frac{\sqrt{23}}{5}$

20 If $\tan x = -\frac{2}{3}$ and angle x lies in the second quadrant, what is the value of $\cos x$?

1) $\frac{3\sqrt{5}}{5}$ 2) $-\frac{3\sqrt{5}}{5}$ 3) $\frac{3\sqrt{13}}{13}$ 4) $-\frac{3\sqrt{13}}{13}$

$2^2 + (-3)^2 = c^2$
$4 + 9 = c^2$
$\sqrt{13} = c$
$\frac{-3}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = -3\sqrt{13}/13$

21 Using the identity $\sin^2\theta + \cos^2\theta = 1$, find the value of $\tan\theta$, to the *nearest hundredth*, if $\cos\theta$ is -0.7 and θ is in Quadrant II.

$\sin^2\theta + (-.7)^2 = 1$
$\sin^2\theta + .49 = 1$
$\sqrt{\sin^2\theta} = \sqrt{.51}$
$\sin\theta = \sqrt{.51}$

S A
T C

$\tan\theta = \frac{\sqrt{.51}}{-.7} = \boxed{-1.02}$

Trigonometric Identities

(you must memorize)

Reciprocal Identities	Quotient Identities
$\cot\theta = \dfrac{1}{\tan\theta}$ $\csc\theta = \dfrac{1}{\sin\theta}$ $\sec\theta = \dfrac{1}{\cos\theta}$	$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ $\cot\theta = \dfrac{\cos\theta}{\sin\theta}$

Pythagorean Identities

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

$$\tan^2\theta + 1 = \sec^2\theta$$

$$1 + \cot^2\theta = \csc^2\theta$$

Name: Key

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

F.TF.C.8: Simplifying Trigonometr Expressions

1 If $\sin^2(32°) + \cos^2(M) = 1$, then M eq ls
1) 32°
2) 58°
3) 68°
4) 72°

2 Which expression always equals 1?
1) $\cos^2 x - \sin^2 x$
2) $\cos^2 x + \sin^2 x$
3) $\cos x - \sin x$
4) $\cos x + \sin x$

3 The expression $\cos^2 4\theta + \sin^2 4\theta$ is ec valent to
1) 1
2) 2
3) $\cos\theta$
4) $\cos 8\theta$

4 The expression $\underbrace{\sin^2 x + \cos^2 x - b^2}_{1-b^2}$ is uivalent to
1) 1
2) b^2
3) $(1+b)(1-b)$
4) $\sin x \cos x - b$

5 If θ is a positive acute angle and sin $= a$, which expression represents $\cos\theta$ in terms a?
1) $\sqrt{a}$
2) $\sqrt{1-a^2}$
3) $\frac{1}{\sqrt{a}}$
4) $\frac{1}{\sqrt{1-a^2}}$

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

$\sqrt{\cos^2\theta} : \sqrt{1-a^2}$

$\cos\theta = \sqrt{1-a^2}$

6 If $\sin A = k$, then the value of the exp ssion $(\sin A)(\cos A)(\tan A)$ is equivalent t
1) 1
2) $\frac{1}{k}$
3) k
4) k^2

$k \cdot \cancel{\cos A} \cdot \frac{\sin A}{\cancel{\cos A}}$

$k \cdot \sin A$

$k \cdot k$

k^2

7 The expression $\frac{\overset{\cos^2 x}{\cancel{1-\sin^2 x}}}{\cos^2 x}$ is equivalent to
1) 1
2) -1
3) $\cos x$
4) $\sin x$

8 The expression $\frac{\overset{\sin^2 x}{1-\cos^2 x}}{\sin^2 x}$ is equivalent to
1) 1
2) -1
3) $\sin x$
4) $\cos x$

9 The expression $\frac{\sin^2 A}{\tan A}$ is equivalent to
1) $\frac{\sin A}{\cos A}$
2) $\sin A \cos A$
3) $\frac{1}{\sin A \cos A}$
4) $\frac{\cos A}{\sin A}$

$\frac{\sin^2 A}{\frac{\sin A}{\cos A}} = \sin^2 A \cdot \frac{\cos A}{\sin A} = \sin A \cos A$

10 The expression $\frac{\sin x \cdot \cos x}{\tan x}$ is equivalent to
1) 1
2) $\sin^2 x$
3) $\cos x$
4) $\cos^2 x$

$\frac{\sin x \cdot \cos x}{\frac{\sin x}{\cos x}} = \cancel{\sin x}\cos x \cdot \frac{\cos x}{\cancel{\sin x}}$

$= \cos^2 x$

11 Express in simplest terms: $\frac{2 - 2\sin^2 x}{\cos x}$

$\frac{2(\overset{\cos^2 x}{\cancel{1-\sin^2 x}})}{\cos x} = 2\cos x$

12 For all values of θ for which the expressions are defined, prove that the following is an identity:

$\cos\theta(\cos\theta + 1) + \sin^2\theta = \frac{\sin\theta + \tan\theta}{\tan\theta}$

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

$\boxed{1 + \cos\theta} = \sin\theta + \frac{\sin\theta}{\cos\theta}$

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

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

$= \frac{\cancel{\sin\theta}(\cos\theta + 1)}{\cancel{\sin\theta}}$