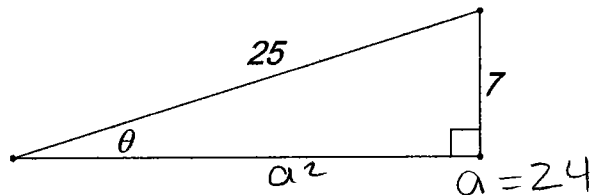


No Calculator

(13.1 Using Trigonometry with Right Triangles)

#1) Evaluate the 6 trigonometric functions of angle theta & Find the measurement of the angle theta.



$$7^2 + a^2 = 25^2$$

$$49 + a^2 = 625$$

$$\sqrt{a^2} = \sqrt{576}$$

$$a = 24$$

$$\sin \theta = \frac{7}{25}$$

$$\cos \theta = \frac{24}{25}$$

$$\tan \theta = \frac{7}{24}$$

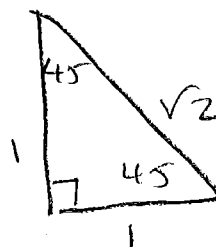
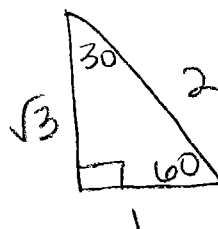
$$\csc \theta = \frac{25}{7}$$

$$\sec \theta = \frac{25}{24}$$

$$\cot \theta = \frac{24}{7}$$

2) Complete the following chart.

		30°	45°	60°	
sin θ		$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	
cos θ		$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	
tan θ		$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	
cot θ		$\frac{\sqrt{3}}{1}$	$\frac{\sqrt{2}}{1}$	$\frac{\sqrt{3}}{3}$	
sec θ		$\frac{2\sqrt{3}}{3}$	$\frac{\sqrt{2}}{1}$	2	
csc θ		$\frac{2}{1}$	$\frac{\sqrt{2}}{1}$	$\frac{2\sqrt{3}}{3}$	

4) Given $\tan \theta = \frac{7}{3}$, evaluate the other 5 trigonometric functions.

$$\sin \theta = \frac{7\sqrt{58}}{58}$$

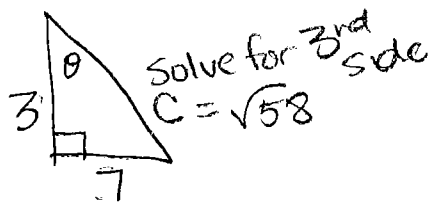
$$\cos \theta = \frac{3\sqrt{58}}{58}$$

$$\tan \theta = \frac{7}{3}$$

$$\csc \theta = \frac{\sqrt{58}}{7}$$

$$\sec \theta = \frac{\sqrt{58}}{3}$$

$$\cot \theta = \frac{3}{7}$$

5) Given $\csc \theta = \frac{10}{7}$, evaluate the other 5 trigonometric functions.

$$\sin \theta = \frac{7}{10}$$

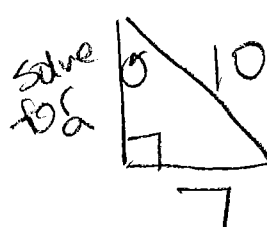
$$\cos \theta = \frac{\sqrt{51}}{10}$$

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

$$\csc \theta = \frac{10}{7}$$

$$\sec \theta = \frac{10\sqrt{51}}{51}$$

$$\cot \theta = \frac{\sqrt{51}}{7}$$



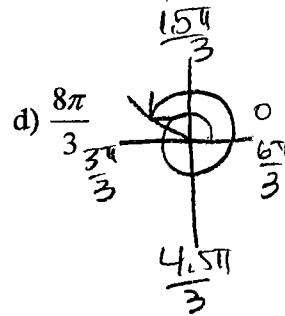
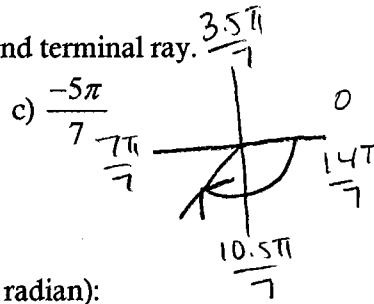
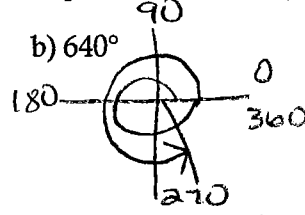
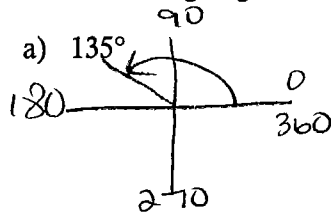
$$a^2 + 7^2 = 10^2$$

$$a^2 = 51$$

$$a = \sqrt{51}$$

(13.2 General Angles and Radian Measure)

6) Draw the following angles in standard position, include spiral and terminal ray.



7) Convert the following (from either radian to degree, or degree to radian):

a) $125^\circ \cdot \frac{\pi}{180}$

$\frac{25\pi}{36}$

b) $75^\circ \cdot \frac{\pi}{180}$

$\frac{5\pi}{12}$

c) $\frac{-\pi}{12} \cdot \frac{180}{\pi}$

-15°

d) $\frac{5\pi}{4} \cdot \frac{180}{\pi}$

225°

8) Find 1 positive and 1 negative Coterminal angle for the following.

a) $135^\circ + 360 = 495^\circ$

$-360 = -225^\circ$

b) $240^\circ + 360 = 600^\circ$

$-360 = -120^\circ$

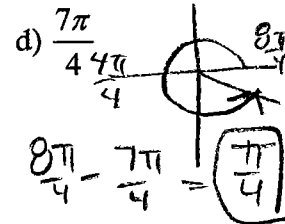
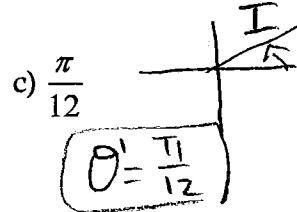
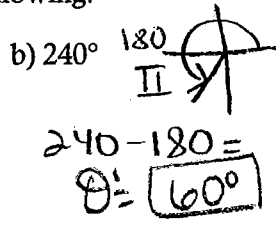
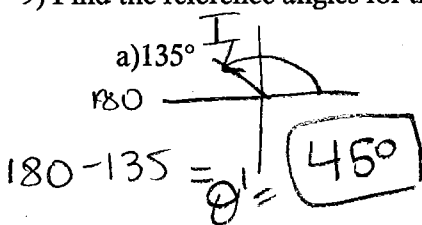
c) $\frac{5\pi}{6} + \frac{12\pi}{6} = \frac{17\pi}{6}$

$-\frac{12\pi}{6} = -\frac{7\pi}{6}$

d) $\frac{8\pi}{3} + \frac{6\pi}{3} = \frac{14\pi}{3}$

$-\frac{6\pi}{3} = -\frac{2\pi}{3}$

9) Find the reference angles for the following.



10) Sine is the reciprocal of what trig function? CSC

11) The cos of 0° is equal to the Sin of 90° ?

12) The tan of $\frac{\pi}{2}$ & $\frac{3\pi}{2}$ are undefined.

13) The sin of $\frac{\pi}{2}$ & $-\frac{3\pi}{2}$ are 1.

(13.3 Evaluating Trigonometric Functions of Any Angle)

14) Let $(-4, 3)$ be a point on the terminal side of an angle theta in standard position. Evaluate the 6 trigonometric functions of theta.

$(-4, 3)$

x, y

$x^2 + y^2 = r^2$

$(-4)^2 + 3^2 = r^2$

$25 = r^2$

$r = 5$

$\sin \theta = \frac{y}{r} = \frac{3}{5}$

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

$\tan \theta = \frac{y}{x} = \frac{3}{-4}$

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

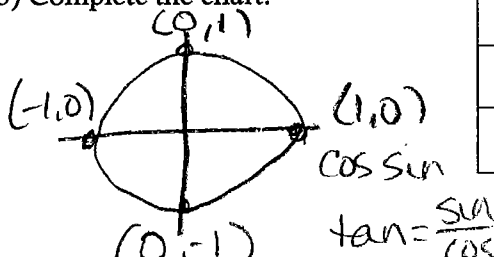
$\sec \theta = \frac{5}{-4}$

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

$(1, 0)$ $(0, 1)$ $(-1, 0)$ $(0, -1)$

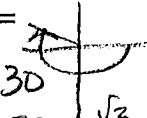
QUADRANTAL ANGLES

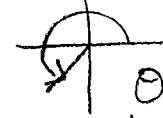
15) Complete the chart.

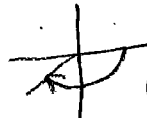


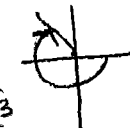
	0° 360°	90°	180°	270°
$\sin \theta = y$	0	1	0	-1
$\cos \theta = x$	1	0	-1	0
$\tan \theta = \frac{y}{x}$	0	und	0	und

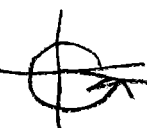
16) Evaluate the following trigonometric functions: (Answers in radians please)

a) $\cos(-210^\circ) =$

 $\theta' = 30$
 $\cos 30 = \frac{\sqrt{3}}{2}$
 $+/- \ominus$
 $\boxed{-\frac{\sqrt{3}}{2}}$

b) $\tan(240^\circ) =$

 $\theta' = 60$
 $\tan 60 = \sqrt{3}$
 $+/- \oplus$
 $\boxed{+\frac{\sqrt{3}}{1}}$

c) $\sin(-150^\circ) =$

 $\theta' = 30$
 $\sin 30 = \frac{1}{2}$
 $+/- \ominus$
 $\boxed{-\frac{1}{2}}$

d) $\csc(-240^\circ) =$

 $\theta' = 60$
 $\csc 60 = \frac{2\sqrt{3}}{3}$
 $+/- \ominus$
 $\boxed{+\frac{2\sqrt{3}}{3}}$

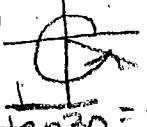
e) $\tan\left(\frac{11\pi}{6}\right) =$

 $\theta' = \frac{\pi}{6}$
 $\tan \frac{\pi}{6} = \tan 30 = \frac{\sqrt{3}}{3}$
 $+/- \ominus$
 $\boxed{-\frac{\sqrt{3}}{3}}$

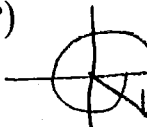
f) $\sin\left(\frac{13\pi}{6}\right) =$

 $\theta' = \frac{\pi}{6}$
 $\sin \frac{\pi}{6} = \sin 30 = \frac{1}{2}$
 $+/- \oplus$
 $\boxed{+\frac{1}{2}}$

g) $\sec\left(\frac{11\pi}{3}\right) =$

 $\theta' = 30$
 $\sec 30 = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$
 $+/- \ominus$
 $\boxed{-\frac{2\sqrt{3}}{3}}$

h) $\cot(330^\circ) =$

 $\theta' = 30$
 $\cot 30 = \frac{1}{\tan 30} = \sqrt{3}$
 $+/- \ominus$
 $\boxed{-\sqrt{3}}$

i) $\csc(-405^\circ) =$

 $\theta' = 45$
 $\csc 45 = \frac{1}{\sin 45} = \frac{1}{\frac{\sqrt{2}}{2}} = \frac{2}{\sqrt{2}} = \sqrt{2}$
 $+/- \ominus$
 $\boxed{-\sqrt{2}}$

(14.4 Solving Trigonometric Equations) Provide General Solutions.

17) $2\sin x - \sqrt{3} = 0$
 $\sin x = \frac{\sqrt{3}}{2}$
 $@ X = \frac{\pi}{6}, \frac{5\pi}{6}$

18) $3 - \tan^2 x = 0$
 $\tan x = \pm\sqrt{3}$
 $@ X = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

19) $\sin^2 x - \sin x - 2 = 0$
 $(\sin x - 2)(\sin x + 1) = 0$
 NP
 Extraneous
 $\sin x = -1$
 $@ X = \frac{3\pi}{2}$

20) $\tan^2 x - \sin x \tan^2 x = 0$
 $\tan^2 x (1 - \sin x) = 0$
 $\tan x = 0$
 $@ X = 0/2\pi, \pi$
 $\sin x = 1$
 $@ X = \frac{\pi}{2}$

Provide Solutions over the interval $0 \leq x \leq 2\pi$.

21) $\sqrt{3} \csc x + 2 = 0$
 $\csc x = -\frac{2}{\sqrt{3}}$
 $\sin x = -\frac{\sqrt{3}}{2}$
 $@ X = \frac{4\pi}{3}, \frac{5\pi}{3}$

22) $\sin x + \sqrt{2} = -\sin x$
 $2\sin x = -\sqrt{2}$
 $\sin x = -\frac{\sqrt{2}}{2}$
 $@ X = \frac{5\pi}{4}, \frac{7\pi}{4}$

23) $3\cot^2 x - 9 = 0$
 $\cot x = \pm\sqrt{3}$
 $@ X = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$
 I II III IV

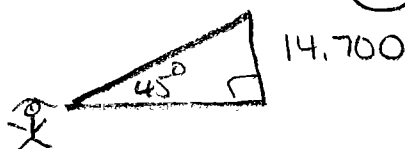
24) $4\sin^2 x - 1 = 0$
 $\sin x = \pm\frac{1}{2}$
 $@ X = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$
 I II III IV

Vocabulary: Be prepared to define and use the following terms correctly.

Radian	Quadrantal Angle	Reference Angle	Unit Circle
Coterminal	General Solution	Interval Solution	Extraneous Solution
Standard Position of an Angle	Sine, Cosine, Tangent, Cosecant, Secant, Cotangent		

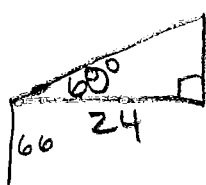
Word Problems. Calculator OK. Your WP Work Sheet & HW are the best reference – this is a sample.

1. The Matterhorn in the Swiss Alps is around 14,700 feet high. Standing several miles away you estimate the angle of elevation to the top of the mountain to be 45° . Approximate how far away you are from the base of the mountain.



Sides are =
you are 14,700 ft away

2. Mrs Watkins can't reach the top of the smart board. She is 24 inches away from the smartboard along the ground and is looking up to the top of the smart board at an angle of 60° . If Mrs Watkins is 66 inches tall, how high is the top of the smartboard?



$$h = 24\sqrt{3}$$

total height is

$$66 + 24\sqrt{3}$$

3. You and a friend are kicking a ball with an initial speed (v) of 49 ft per second. Your kick is at a 45° angle and your friends is at 60° . How much farther will your ball go than your friends? Use the formula:

$$d = \frac{v^2}{32} \sin(2\theta)$$

YOU

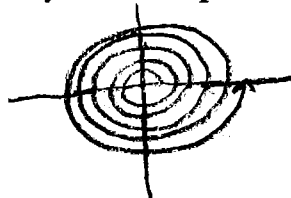
$$\frac{(49)^2}{32} \sin(90) = 75.03$$

Friend

$$\frac{(49)^2}{32} \sin(120) = 64.97$$

$$75.03 - 64.97 = \approx 10\text{ft}$$

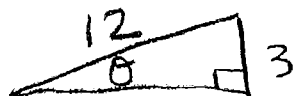
4. Brynlee (2 years old) likes to spin. She is trying to spin without getting dizzy. Her mother has observed that she can rotate $2\frac{1}{2}$ times before falling down. She thinks when she turns 4 she will be able to double that amount. How many degrees will Brynlee have spun if she reaches her goal? How many radians?



$$5 \times 360 = 1800^\circ$$

$$5 \times 2\pi = 10\pi$$

5. Savannah is building a ramp for her sister to ride down in her new train. The ramp is 12 feet long and rises to 3 feet at its highest point. What angle of elevation will the ramp make from the ground?



$$\sin \theta = \frac{3}{12}$$

$$\sin^{-1}\left(\frac{3}{12}\right) = \theta$$

$$\theta = 14.48^\circ$$