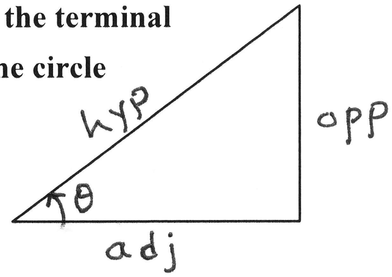
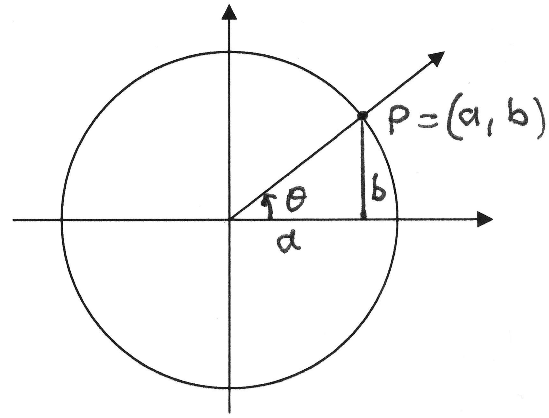
5.2: Trig. Functions: Unit Circle approach :

If $r \neq 1$, Find the values for all the Trig functions.

Let $p = (a, b)$ a point on the terminal side of θ that intersects the circle





$a^2 + b^2 = r^2$

1) **sine function:** $\sin\theta =$
2) **cosine function:** $\cos\theta =$
3) **tangent function:** $\tan\theta =$
4) **cotangent function:** $\cot\theta =$
5) **secant function:** $\sec\theta =$
6) **cosecant function:** $\csc\theta =$

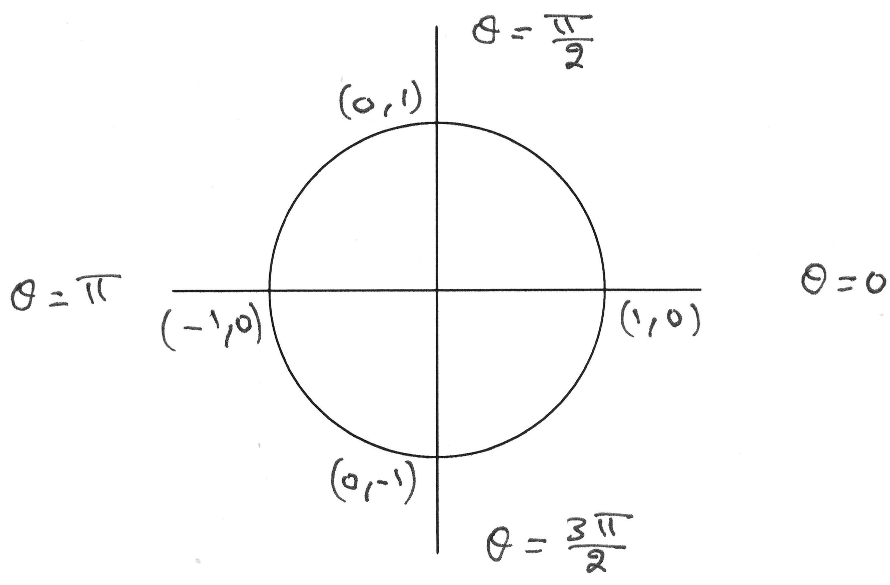
Ex: **If $(-5, 12)$ is a point on the terminal side of an angle θ, find the exact value for the remaining Trig. Functions.**

Note: **If $r = 1$, then we have a unit circle. We conclude that $a^2 + b^2 = 1$ and**

$\sin\theta =$, $\cos\theta =$, $\tan\theta =$, $\cot\theta =$, $\sec\theta =$, $\csc\theta =$

Ex: **1)If $p(x, -\frac{\sqrt{2}}{3})$ is on the unit circle such that $x > 0$, find $\cot\theta$ where p is on the terminal side of the angle of θ radians.**

Finding the exact values of the six Trig. Functions of quadrantel angles

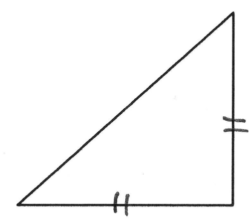


	0	π/2	π	3π/2
sin				
cos				
tan				

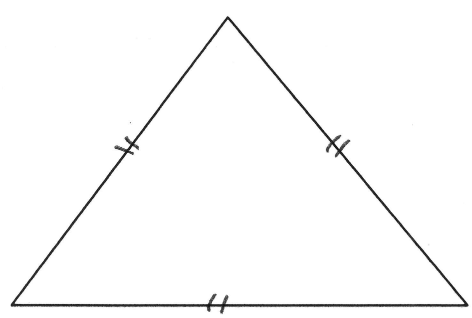
Ex: **Find the coordinate of** $p(x, y)$ **on the unit circle and on the terminal side of the angle** $-\frac{7\pi}{2}$.

Finding Exact values Trig functions of special angles:

1) $\theta = \frac{\pi}{4}$ *or* 45^o



2) $\theta = \frac{\pi}{6}$ *or* 30^o



3) $\theta = \frac{\pi}{3}$ *or* 60^o

Ex: Find the exact value of each expression.

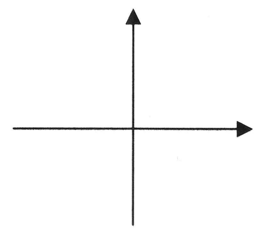
1) $\sqrt{3}\tan\frac{\pi}{3}+2\cos\frac{\pi}{3}$, 2) $\sec\pi-\csc\frac{\pi}{2}$, 3) $\sin\frac{3\pi}{2}+\tan\pi$, 4) $3\csc 60^{o}+\cot 45^{o}$

5) $\sec 30^{o}\sin 45^{o}$

Notes:

1) **Odd and even Trig. Functions**

2) **Trig. Function signs.**



REDUCING FUNCTIONS OF AN ANGLE IN ANY QUADRANT

1) $\sin(\pi-\theta)=$, $\sin(\pi+\theta)=$
2) $\cos(\pi-\theta)=$, $\cos(\pi+\theta)=$
3) $\tan(\pi-\theta)=$, $\tan(\pi+\theta)=$
4) $\sin(2\pi-\theta)=$, $\sin(2\pi+\theta)=$
5) $\cos(2\pi-\theta)=$, $\cos(2\pi+\theta)=$
6) $\tan(2\pi-\theta)=$, $\tan(2\pi+\theta)=$

NOTE: 1) If θ is an acute angle, then any function of $(2\pi+\theta)$, $(2\pi-\theta)$, $(\pi+\theta)$ or $(\pi-\theta)$ is reducible to the same-named function of θ,

7) $\sin(\frac{\pi}{2}-\theta)=$, $\sin(\frac{\pi}{2}+\theta)=$
8) $\cos(\frac{\pi}{2}-\theta)=$, $\cos(\frac{\pi}{2}+\theta)=$
9) $\tan(\frac{\pi}{2}-\theta)=$, $\tan(\frac{\pi}{2}+\theta)=$
10) $\sin(\frac{3\pi}{2}-\theta)=$, $\sin(\frac{3\pi}{2}+\theta)=$
11) $\cos(\frac{3\pi}{2}-\theta)=$, $\cos(\frac{3\pi}{2}+\theta)=$
12) $\tan(\frac{3\pi}{2}-\theta)=$, $\tan(\frac{3\pi}{2}+\theta)=$

2) whereas any function of $(\pi/2-\theta)$, $(\pi/2+\theta)$, $(3\pi/2-\theta)$ or $(3\pi/2+\theta)$ is reducible to the complementary-named function of θ

Ex: Evaluate

1) $\sin 150^{o}$, 2) $\cos(-\frac{\pi}{3})$, 3) $\sec 210^{o}$, 4) $\tan 300^{o}$, 5) $\sin(-\pi)$, 6) $\cos\frac{7\pi}{6}$

Ex: Find the exact value for $\tan 60^{o}+\tan 150^{o}$

Ex: If $\cos\theta = -0.3$ **find**

$$\cos(-\theta) + \cos(\pi - \theta) + \cos(5\pi + \theta) - \cos(6\pi - \theta)$$

Ex: **Using odd and even function definition evaluate the following.**

1) $\sin(\theta - \pi) =$
2) $\cos(\theta - \pi) =$
3) $\tan(\theta - 2\pi) =$

Ex: **Find the x coordinate of** $p(x, y)$ **on the unit circle and on the terminal side of the angle** $-\dfrac{7\pi}{6}$

Ex: **If** $\cot\theta = -\dfrac{1}{\sqrt{3}}$, **find all possible values for** θ **for** $0 \le \theta < 2\pi$

EX: Suppose that the terminal point determined by θ, is the point $(\frac{7}{25}, \frac{24}{25})$ on the unit circle. Find the terminal point determined by $\theta - 3\pi$.

EX: Suppose that the terminal point determined by θ, is the point $(\frac{7}{25}, \frac{24}{25})$ on the unit circle. Find the terminal point determined by $-\theta - 4\pi$.

EX: Suppose that the terminal point determined by $\pi - \theta$, is the point $(-\frac{7}{25}, \frac{24}{25})$ on the unit circle. Find the terminal point determined by $8\pi - \theta$.

EX: If θ is an acute angle and the terminal side is determined by θ, then the terminal side determined by $5\pi + \theta$ will be in quadrant.

EX: If θ is an acute angle and the terminal side is determined by θ, then the terminal side determined by $\theta - \dfrac{11\pi}{2}$ will be in quadrant.

Algebra question: **Simplify**

$$-\frac{\sqrt{2}}{2} + 1$$