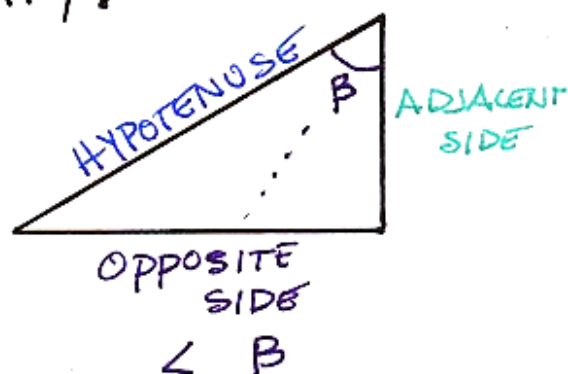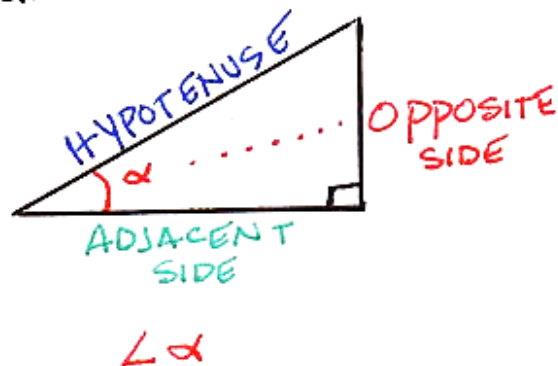# SEC 2.2 TRIGONOMETRY FUNCTION OF ACUTE ANGLES

1. TRIGONOMETRY : THE STUDY OF "TRIANGLE MEASUREMENT"
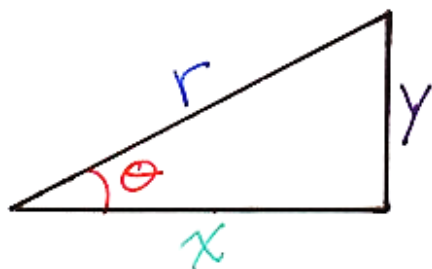
2. RIGHT TRIANGLE TRIGONOMETRY :

∠α

∠β

3. FOR ANY ∠θ : LET x = ADJACENT SIDE
                  LET y = OPPOSITE SIDE
                  LET r = HYPOTENUSE SIDE

SIX TRIGONOMETRIC FUNCTIONS

1) SINE (SIN)   4) COSECANT (CSC)

2) COSINE (COS)   5) SECANT (SEC)

3) TANGENT (TAN)   6) COTANGENT (COT)

4. 6 TRIGONOMETRIC RATIOS : (SOH CAH TOA)

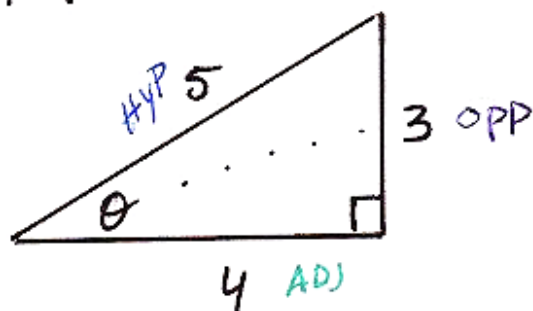$$\sin \theta = \frac{OPP}{HYP} = \frac{y}{r} \qquad \csc = \frac{HYP}{OPP} = \frac{r}{y}$$

$$\cos \theta = \frac{ADJ}{HYP} = \frac{x}{r} \qquad \sec = \frac{HYP}{ADJ} = \frac{r}{x}$$

$$\tan \theta = \frac{OPP}{ADJ} = \frac{y}{x} \qquad \cot = \frac{ADJ}{OPP} = \frac{x}{y}$$

EXAMPLE:

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

$$\cos \theta = \frac{4}{5} \qquad \sec \theta = \frac{5}{4}$$

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

PYTHAGOREAN THEOREM

$$a^2 + b^2 = c^2$$

$$3^2 + 4^2 = 5^2$$

$$9 + 16 = 25$$

$$25 = 25$$

5. USE THE PYTHAGOREAN THEOREM TO FIND r.

$$\sqrt{r^2} = \sqrt{x^2 + y^2}$$

$$r = \sqrt{x^2 + y^2}$$

6. SPECIAL RIGHT TRIANGLES

A) $45° - 45° - 90°$
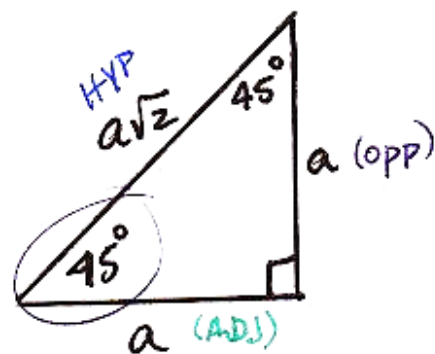
$$\sin 45° = \frac{\sqrt{2}}{2} \qquad \csc 45° = \sqrt{2}$$

$$\cos 45° = \frac{\sqrt{2}}{2} \qquad \sec 45° = \sqrt{2}$$

$$\tan 45 = 1 \qquad \cot 45° = 1$$

B) $30° - 60° - 90°$
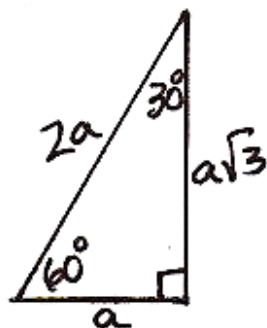
$$\sin 30° = \frac{1}{2} \qquad \csc 30° = 2$$

$$\cos 30° = \frac{\sqrt{3}}{2} \qquad \sec 30° = \frac{2\sqrt{3}}{3}$$

$$\tan 30° = \frac{\sqrt{3}}{3} \qquad \cot 30° = \sqrt{3}$$

CONTINUED

$$\sin 60° = \frac{\sqrt{3}}{2} \quad \csc 60° = \frac{2\sqrt{3}}{3}$$

$$\cos 60° = \frac{1}{2} \quad \sec 60° = 2$$

$$\tan 60° = \sqrt{3} \quad \cot 60° = \frac{\sqrt{3}}{3}$$

7. ANGLE OF ELEVATION: AN ANGLE MEASURED ABOVE THE "LINE OF SIGHT".

LINE OF SIGHT

8. ANGLE OF DEPRESSION: AN ANGLE MEASURED BELOW THE "LINE OF SIGHT"

LINE OF SIGHT

$\tan \dfrac{\text{SIN}}{\text{COS}}$ $\cot = \dfrac{\text{COS}}{\text{SIN}}$

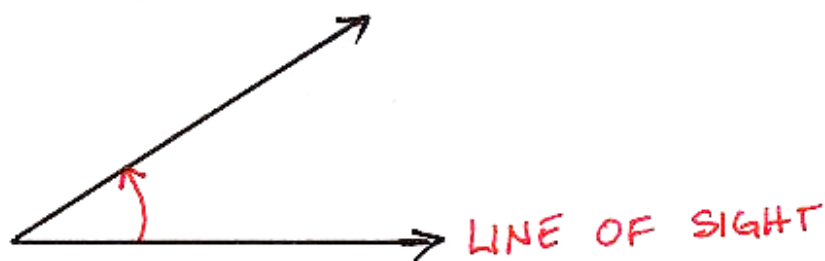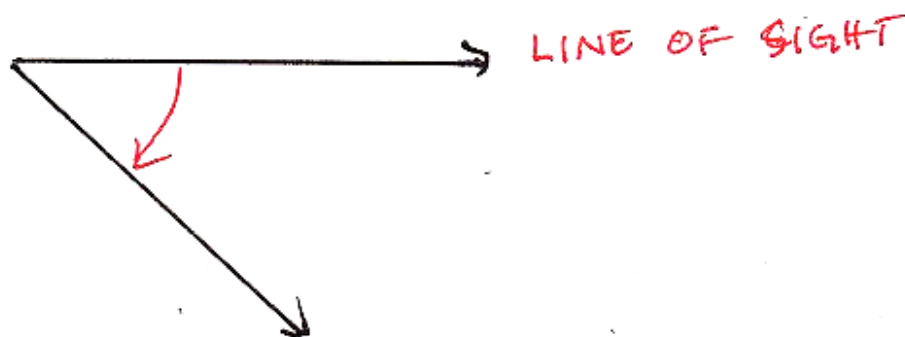$r = 1$

Fill in The Unit Circle

(x, y)

Positive: SIN, CSC
Negative: TAN, COT, COS, SEC

$(\cos, \sin)$

Positive: SIN, COS, TAN
csc, sec, cot
Negative: NONE

$(0, 1)$
$90°$ $\dfrac{\pi}{2}$

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

$\dfrac{\pi}{3}$

$\left(-\dfrac{\sqrt{2}}{2}, \dfrac{\sqrt{2}}{2}\right)$ $\dfrac{3\pi}{4}$ $120°$ $60°$ $\dfrac{\pi}{4}$ $\left(\dfrac{\sqrt{2}}{2}, \dfrac{\sqrt{2}}{2}\right)$

$\left(-\dfrac{\sqrt{3}}{2}, \dfrac{1}{2}\right)$ $\dfrac{5\pi}{6}$ $135°$ $45°$ $\dfrac{\pi}{6}$ $\left(\dfrac{\sqrt{3}}{2}, \dfrac{1}{2}\right)$

$150°$ $30°$

$\tan -\sqrt{3}$ $\tan$ UND $\tan \sqrt{3}$ $\tan 1$ $\tan \dfrac{\sqrt{3}}{3}$

$\tan -1$

$\tan -\dfrac{\sqrt{3}}{3}$

$(-1, 0)$ π $180°$ $\tan 0$ $\tan 0$ $0°$ 0 $(1, 0)$
$360°$ 2π

$\tan \dfrac{\sqrt{3}}{3}$ $\tan -\dfrac{\sqrt{3}}{3}$

$\tan 1$ $\tan -1$

$\tan \sqrt{3}$ $\tan -\sqrt{3}$

$210°$ $330°$ $\dfrac{11\pi}{6}$

$\dfrac{7\pi}{6}$ $225°$ $315°$ $\dfrac{7\pi}{4}$

$240°$ $\tan$ UND $300°$

$\left(-\dfrac{\sqrt{3}}{2}, -\dfrac{1}{2}\right)$ $\dfrac{5\pi}{4}$ $\dfrac{5\pi}{3}$ $\left(\dfrac{\sqrt{3}}{2}, \dfrac{-1}{2}\right)$

$\left(-\dfrac{\sqrt{2}}{2}, -\dfrac{\sqrt{2}}{2}\right)$ $\dfrac{4\pi}{3}$ $\left(\dfrac{\sqrt{2}}{2}, -\dfrac{\sqrt{2}}{2}\right)$

$\left(-\dfrac{1}{2}, -\dfrac{\sqrt{3}}{2}\right)$ $\dfrac{3\pi}{2}$ $270°$ $\left(\dfrac{1}{2}, -\dfrac{\sqrt{3}}{2}\right)$

$(0, -1)$

Positive: TAN, COT
Negative: SIN COS SEC CSC

Positive: COS SEC
Negative: TAN COT SIN CSC

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