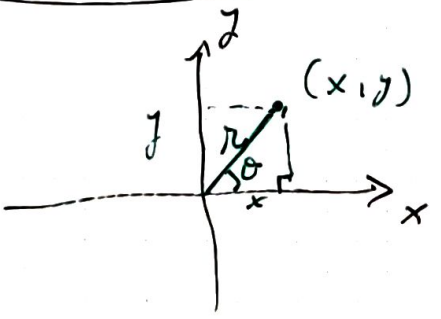
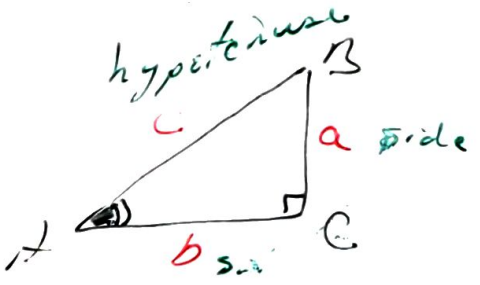
Sine of θ (a angle)	$\sin\theta =$
Cosine	$\cos\theta$
Tangent	$\tan\theta$
Cotangent	$\cot\theta$
secant	$\sec\theta$
cosecant	$\csc\theta$





angle of $A = \angle A = \hat{A} = A$

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

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

$\sin\theta = \frac{opp}{hyp} = \frac{y}{r}$ $\left.\vphantom{\frac{1}{1}}\right\}$ ≤ 1 or $\sin A = \frac{a}{c} \leq 1$

$\cos\theta = \frac{adj}{hyp} = \frac{x}{r}$ $\quad \cos A = \frac{b}{c}$

$\tan\theta = \frac{opp}{adj} = \frac{\sin\theta}{\cos\theta} = \frac{y}{x}$ $\quad \tan A = \frac{a}{b}$

$\csc\theta = \frac{1}{\sin\theta} = \frac{r}{y}$ $\quad \csc A = \frac{c}{a}$

$\sec\theta = \frac{1}{\cos\theta} = \frac{r}{x}$ $\quad \sec A = \frac{c}{b}$

$\cot\theta = \frac{1}{\tan\theta} = \frac{x}{r}$ $\quad \cot A = \frac{b}{a}$

Ex Find 6 trig θ: $(8, 15) \to 17$

$\sin\theta = \frac{15}{17}$ $\quad \cos\theta = \frac{8}{17}$ $\quad \tan\theta = \frac{15}{8}$

$\csc\theta = \frac{17}{15}$ $\quad \sec\theta = \frac{17}{8}$ $\quad \cot\theta = \frac{8}{15}$

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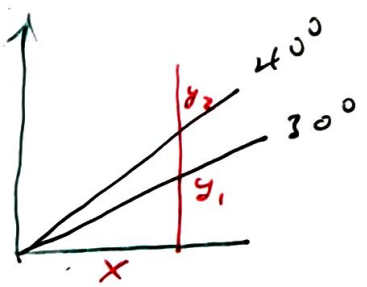
6 $(9, -12) \xrightarrow{3} (3, -4) \to 5$

$\sin\alpha = -\frac{4}{5}$ $\quad \cos\theta = \frac{3}{5}$ $\quad \tan\alpha = -\frac{4}{3}$

$\csc\alpha = -\frac{5}{4}$ $\quad \sec\alpha = \frac{5}{3}$ $\quad \cot\alpha = -\frac{3}{4}$

$\tan 30^\circ$? $\tan 40^\circ$



$\tan 30^\circ = \frac{y_1}{x}$

$\tan 40^\circ = \frac{y_2}{x}$

$y_2 > y_1$

$\frac{y_2}{x} > \frac{y_1}{x}$

$\tan 40^\circ > \tan 30^\circ$

Ex $\cos\theta = \frac{\sqrt{3}}{2}$ $\theta \in$ QIV

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

$\csc\theta = -2$ $\sec\theta = \frac{2}{\sqrt{3}}$ $\cot\theta = -\sqrt{3}$

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30 $\cos\theta = -\frac{12}{13}$ $\theta \in$ QIII

$\sin\theta = -\frac{5}{13}$ $\cos\theta = -\frac{12}{13}$ $\tan\theta = \frac{5}{12}$ (+)

$\csc\theta = -\frac{13}{5}$ $\sec\theta = -\frac{13}{12}$ $\cot\theta = \frac{12}{5}$

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

$$\left(\frac{x}{r}\right)^2 + \left(\frac{y}{r}\right)^2 = 1$$

$$\boxed{\cos^2\theta + \sin^2\theta = 1}$$

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

$$\boxed{1 + \tan^2\theta = \sec^2\theta}$$

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

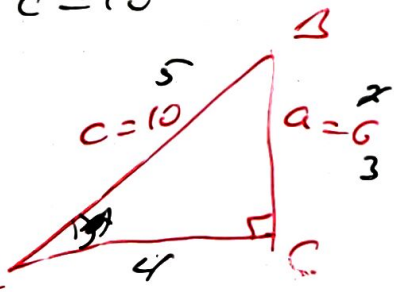
$$\cot^2\theta + 1 = \csc^2\theta$$

Ex $\sqrt{x^2+9}$ $3\tan\theta$ for $x = 3\tan\theta$

$$\sqrt{x^2+9} = \sqrt{9\tan^2\theta + 9}$$
$$= \sqrt{9(\tan^2\theta + 1)}$$
$$= 3\sqrt{\sec^2\theta}$$
$$= 3\sec\theta$$

ABC, $C = 90^\circ$ $a = 6$ $c = 10$

$b = 2(4)$



$\sin A = \frac{3}{5}$ $\cos A = \frac{4}{5}$ $\tan\theta = \frac{3}{4}$

$\csc A = \frac{5}{3}$ $\sec A = \frac{5}{4}$ $\cot A = \frac{4}{3}$

If $A + B = 90^\circ \Rightarrow$

$\sin A = \cos B = \cos(90^\circ - A)$

$\cos A = \sin B$