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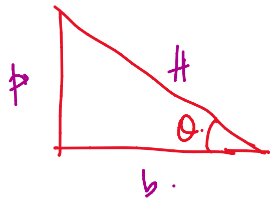
Trigonometry:



$\sin\theta = \frac{p}{H}$ $\cos\theta = \frac{b}{H}$ $\tan\theta = \frac{p}{b}$

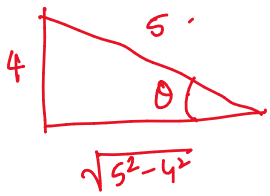
$\operatorname{cosec}\theta = \frac{H}{p}$ $\sec\theta = \frac{H}{b}$ $\cot\theta = \frac{b}{p}$

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

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

$\cot^2\theta + 1 = \operatorname{cosec}^2\theta$

$\sin\theta = \frac{4}{5}$ find $\cos\theta$, $\tan\theta$

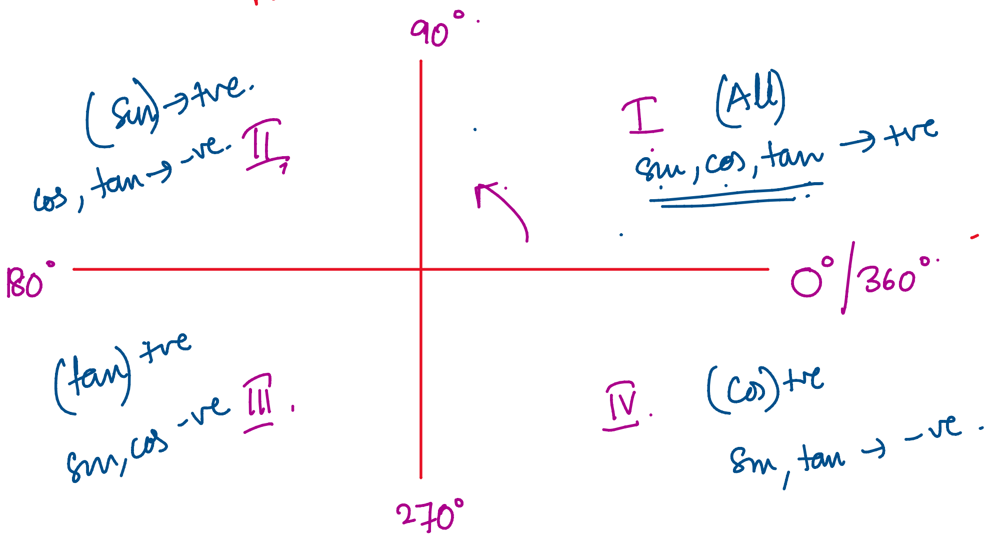


$\cos\theta = \frac{3}{5}$

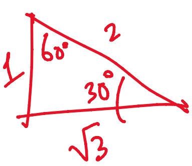
$\tan\theta = \frac{4}{3}$

I II III IV

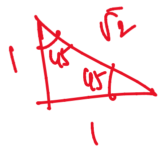
All – Sin – Tan – Cos



Standard angles



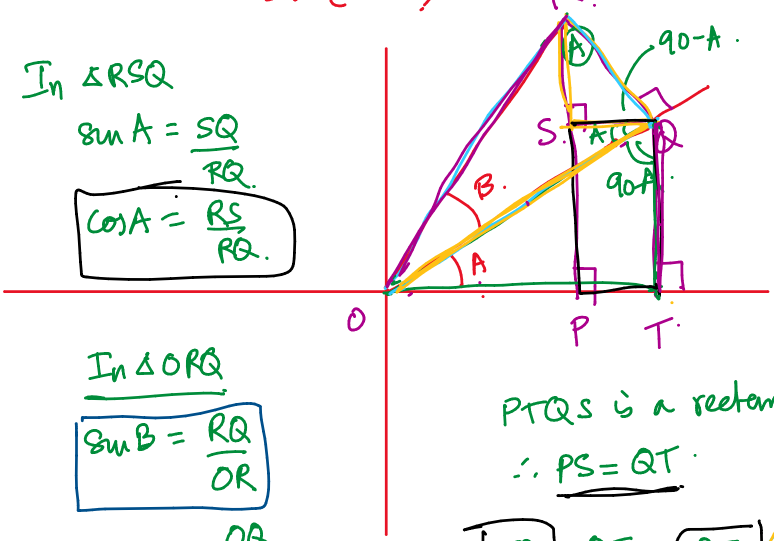
	0°	30°	45°	60°	90°
sin	$\sqrt{\frac{0}{4}} = 0$	$\sqrt{\frac{1}{4}} = \frac{1}{2}$	$\sqrt{\frac{2}{4}} = \frac{1}{\sqrt{2}}$	$\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{2}$	$\sqrt{\frac{4}{4}} = 1$
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0



cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan $= \frac{\sin}{\cos}$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	undefined.

Multiple angles

$\sin(A+B)$



In ΔRSQ

$\sin A = \frac{SQ}{RQ}$

$\boxed{\cos A = \frac{RS}{RQ}}$

In ΔORQ

$\boxed{\sin B = \frac{RQ}{OR}}$

$\cos B = \frac{OQ}{OR}$

In ΔOPR

$\sin(A+B) = \frac{PR}{OR}$

$= \frac{RS + PS}{OR}$

$= \frac{RS}{OR} + \frac{PS}{OR}$

$= \frac{RS}{RQ} \cdot \frac{RQ}{OR} + \frac{PS}{OR}$

$= \cos A \sin B + \frac{PS}{OR}$

In ΔOQT

$\boxed{\sin A = \frac{QT}{OQ}}$

In ΔOQR

$\boxed{\cos B = \frac{OQ}{OR}}$

PTQS is a rectangle

$\therefore PS = QT$

$\boxed{\frac{PS}{OR}} = \frac{QT}{OR} = \boxed{\frac{QT}{OQ}} \cdot \frac{OQ}{OR}$

$= \boxed{\sin A \cos B.}$

$= \cos A \sin B + \sin A \cos B$

$$\boxed{\sin(A+B) = \sin A \cos B + \cos A \sin B}$$

Uses. ① To find non-standard angles.

$\sin 75^\circ = \sin(45^\circ + 30^\circ) = \sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ$

$= \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \times \frac{1}{2} = \frac{\sqrt{3}}{2\sqrt{2}} + \frac{1}{2\sqrt{2}}$

$= \frac{\sqrt{3}+1}{2\sqrt{2}}$

② To find multiple angles.

$\sin 2A = \sin(A+A) = \sin A \cos A + \cos A \sin A$

$= 2 \sin A \cos A.$

$\cos(-\theta) = \cos\theta$

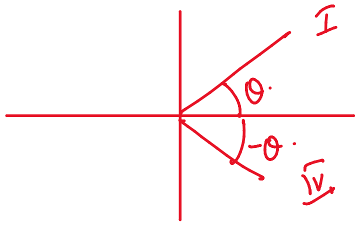
$\sin(-\theta) = -\sin\theta$

$\sin(A-B) = \sin[A + (-B)] = \sin A \cos(-B) + \cos A \sin(-B)$

$$\boxed{\sin(A-B) = \sin A \cos B - \cos A \sin B}$$

$\cos(-\theta) = \cos$

$\sin(-\theta) = -\sin\theta$



$$\boxed{\sin(A-B) = \sin A\cos B - \cos A\sin B}$$

Uses

(1) $\sin(15^\circ) = \sin(45^\circ - 30^\circ) = \sin 45\cos 30 - \cos 45\sin 30$

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

(2)

$$\sin(A+B) = \sin A\cos B + \cancel{\cos A\sin B}$$

$$+\quad \sin(A-B) = \sin A\cos B - \cancel{\cos A\sin B}$$

$$\sin(A+B) + \sin(A-B) = 2\sin A\cos B$$

$\sin A + \sin B$

$\boxed{A+B = x}$ $\quad$ $A+B = x$

$\boxed{A-B = y}$ $\quad$ $-(A-B = y)$

$2A = x+y$ $\quad$ $2B = x-y$

$\boxed{A = \frac{x+y}{2}}$ $\quad$ $\boxed{B = \frac{x-y}{2}}$

$$\sin x + \sin y = 2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$$

$$\sin A + \sin B = 2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$$

$\sin A - \sin B$

$$\sin(A+B) = \sin A\cos B + \cos A\sin B$$

$$-\left[\sin(A-B) = \sin A\cos B - \cos A\sin B\right]$$

$$\sin(A+B) - \sin(A-B) = 2\cos A\sin B$$

$A+B = x \quad A-B = y \quad A = \frac{x+y}{2} \quad B = \frac{x-y}{2}$

$$\sin x - \sin y = 2\cos\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$$

$$\sin A - \sin B = 2\cos\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$$