

$$1) \sin \theta = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{c}{b}$$

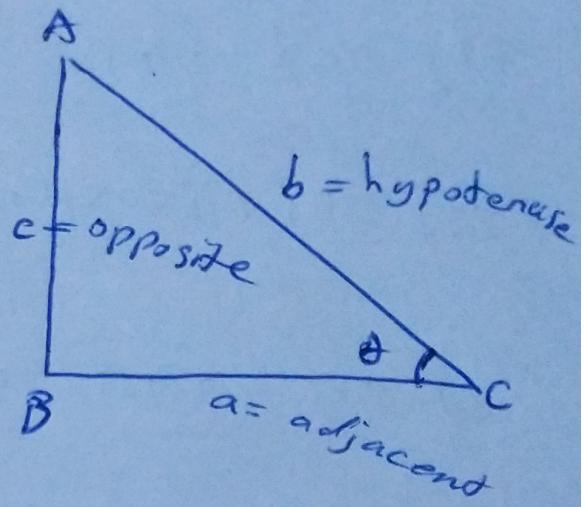
$$2) \cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{a}{b}$$

$$3) \tan \theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{c}{a}$$

$$4) \cot \theta = \frac{\text{adjacent}}{\text{opposite}} = \frac{a}{c} = \frac{1}{\tan \theta}$$

$$5) \csc \theta = \frac{1}{\cos \theta} = \frac{b}{a}$$

$$6) \sec \theta = \frac{1}{\sin \theta} = \frac{b}{c}$$



	0°	30°	45°	60°	90°
$\sin \theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan \theta$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	not defined
$\cot \theta$	not defined	$2\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0
$\sec \theta$	1	$\frac{2\sqrt{3}}{3}$	$\sqrt{2}$	2	not defined
$\csc \theta$	not defined	2	$\sqrt{2}$	$2\frac{\sqrt{3}}{3}$	1

$$37) \sin \alpha + \sin \beta = 2 \sin \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2}$$

$$38) \cos \alpha + \cos \beta = 2 \cos \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2}$$

$$39) \sin \alpha - \sin \beta = 2 \cos \frac{\alpha + \beta}{2} \sin \frac{\alpha - \beta}{2}$$

$$39) \cos \alpha - \cos \beta = -2 \sin \frac{\alpha + \beta}{2} \sin \frac{\alpha - \beta}{2}$$

$$35) \sin \alpha \cos \beta = \frac{\sin(\alpha + \beta) + \sin(\alpha - \beta)}{2}$$

$$36) \cos \alpha \cos \beta = \frac{\cos(\alpha + \beta) + \cos(\alpha - \beta)}{2}$$

$$37) \sin \alpha \sin \beta = \frac{\cos(\alpha - \beta) - \cos(\alpha + \beta)}{2}$$

$$18) \sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$19) \cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$20) \sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$21) \cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$22) \sin 2\theta = 2 \sin \theta \cos \theta$$

$$23) \cos 2\theta = \frac{\cancel{\cos^2 \theta} - 1}{\cancel{1 - 2 \sin^2 \theta}} = 2 \cos^2 \theta - 1$$

$$24) \sec^2 \theta = 1 + \tan^2 \theta$$

$$25) \tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

$$26) \tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta}$$

$$27) \tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \cdot \tan \beta}$$

$$28) \sin \frac{\theta}{2} = \pm \sqrt{\frac{1 - \cos \theta}{2}}$$

$$29) \cos \frac{\theta}{2} = \pm \sqrt{\frac{1 + \cos \theta}{2}}$$

$$30) \tan \frac{\theta}{2} = \frac{\sin \theta}{1 + \cos \theta} = \frac{1 - \cos \theta}{\sin \theta}$$

Trigonometric identities

$$1) \tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$2) \cot \theta = \frac{\cos \theta}{\sin \theta}$$

$$3) \sec \theta = \frac{1}{\cos \theta}$$

$$4) \csc \theta = \frac{1}{\sin \theta}$$

$$5) \sin^2 \theta + \cos^2 \theta = 1$$

$$6) \cos \theta = \sin \left(\frac{\pi}{2} - \theta \right)$$

$$7) \sin \theta = \cos \left(\frac{\pi}{2} - \theta \right)$$

$$8) \cot \theta = \tan \left(\frac{\pi}{2} - \theta \right)$$

$$9) \tan \theta = \cot \left(\frac{\pi}{2} - \theta \right)$$

$$10) \csc \theta = \sec \left(\frac{\pi}{2} - \theta \right)$$

$$11) \sec \theta = \csc \left(\frac{\pi}{2} - \theta \right)$$

12)

$$12) \sin(\theta + 2\pi) = \sin \theta$$

$$13) \cos(\theta + 2\pi) = \cos \theta$$

$$14) \tan(\theta + \pi) = \tan \theta$$

$$15) \sin(-\theta) = -\sin \theta$$

$$16) \cos(-\theta) = \cos \theta$$

$$17) \tan(-\theta) = -\tan \theta$$