

trigonometric identities

sum + difference

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

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

$$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

double angle

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

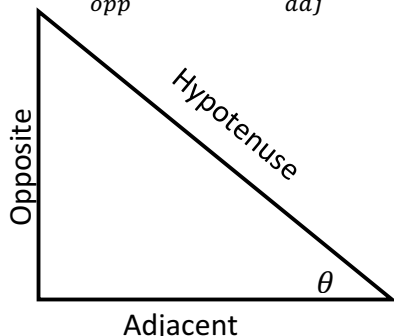
$$\cos(2A) = \cos^2 A - \sin^2 A$$
$$\cos(2A) = 1 - 2 \sin^2 A$$
$$\cos(2A) = 2 \cos^2 A - 1$$

$$\tan(2A) = \frac{2 \tan A}{1 - \tan^2 A}$$

right angle definitions

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} \quad \cos \theta = \frac{\text{adj}}{\text{hyp}} \quad \tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\csc \theta = \frac{\text{hyp}}{\text{opp}} \quad \sec \theta = \frac{\text{hyp}}{\text{adj}} \quad \cot \theta = \frac{\text{adj}}{\text{opp}}$$



reciprocal + quotient

$$\sin A = \frac{1}{\csc A}$$

$$\csc A = \frac{1}{\sin A}$$

$$\cos A = \frac{1}{\sec A}$$

$$\sec A = \frac{1}{\cos A}$$

$$\tan A = \frac{1}{\cot A} = \frac{\sin A}{\cos A}$$

$$\cot A = \frac{1}{\tan A} = \frac{\cos A}{\sin A}$$

pythagorean

$$\sin^2 A + \cos^2 A = 1$$

$$\tan^2 A + 1 = \sec^2 A$$

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

half angle

$$\sin\left(\frac{A}{2}\right) = \pm \sqrt{\frac{1 - \cos A}{2}}$$

$$\cos\left(\frac{A}{2}\right) = \pm \sqrt{\frac{1 + \cos A}{2}}$$

$$\tan\left(\frac{A}{2}\right) = \frac{\sin A}{1 + \cos A} = \frac{1 - \cos A}{\sin A}$$