

Trigonometric Identities

Reciprocal Identities:

$$(1) \csc x = \frac{1}{\sin x} \qquad (2) \sec x = \frac{1}{\cos x} \qquad (3) \cot x = \frac{1}{\tan x}$$

Quotient Identities:

$$(4) \tan x = \frac{\sin x}{\cos x} \qquad (5) \cot x = \frac{\cos x}{\sin x}$$

Pythagorean Identities:

$$(6) \cos^2 \theta + \sin^2 \theta = 1$$
$$(7) \cot^2 \theta + 1 = \csc^2 \theta$$
$$(8) 1 + \tan^2 \theta = \sec^2 \theta$$

Sum Identities:

$$(9) \sin(A + B) = \sin A \cos B + \cos A \sin B$$
$$(10) \cos(A + B) = \cos A \cos B - \sin A \sin B$$
$$(11) \tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

Difference Identities:

$$(12) \sin(A - B) = \sin A \cos B - \cos A \sin B$$
$$(13) \cos(A - B) = \cos A \cos B + \sin A \sin B$$
$$(14) \tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

Double Angle Identities:

$$(15) \sin 2A = 2 \sin A \cos A \qquad (16) \cos 2A = \cos^2 A - \sin^2 A$$
$$(17) \cos 2A = 2 \cos^2 A - 1$$
$$(18) \cos 2A = 1 - 2 \sin^2 A$$
$$(19) \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$