

Quadratic Equation

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Discriminant

$b^2 - 4ac > 0$	2 real roots
$b^2 - 4ac = 0$	1 repeated root
$b^2 - 4ac < 0$	2 imaginary roots

Supplementary & Complementary Angles

supplementary angles	add up to 180°
complementary angles	add up to 90°

Pythagorean Theorem

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

45-45-90 triangles

$a = b$
$c = a\sqrt{2}$ or $b\sqrt{2}$
$c/\sqrt{2} = a$ or b

30-60-90 triangles

$c = 2b$
$a = b\sqrt{3}$
when a triangle's 3 angles are 30°, 60°, and 90°
a = long leg
b = short leg
c = hypotenuse

Area of a triangle

$$A\Delta = (1/2)bh$$

SOH-CAH-TOA

sine	opposite/hypotenuse
cosine	adjacent/hypotenuse
tangent	opposite/adjacent

csc, sec, cot - the opposite of SOH-CAH-TOA

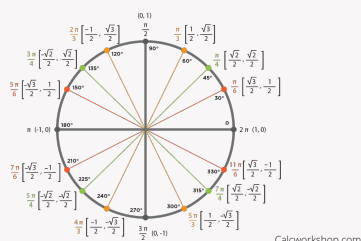
cosecant	hypotenuse/opposite
secant	hypotenuse/adjacent
cotangent	adjacent/opposite

Circle Measurements

Degrees & Radians

degrees to radians	$\theta \cdot \pi / 180$
radians to degrees	$\theta \cdot 180 / \pi$

Unit Circle



Unit Circle values

sin	y
cos	x
tan	y/x
csc	1/y
sec	1/x
cot	x/y

for tan & cot, only use the tops of the fractions

Coterminal Angles

$$\theta \pm 360^\circ \quad \theta \pm 2\pi$$

y = a (sin) b (x - c) + d

a	amplitude change
b	period change
c	horizontal change: + = left, - = right
d	vertical change: + = up, - = down
$-\sin(x)$	reflection across x-axis
$\sin(-x)$	reflection across y-axis

Amplitude & Period

amplitude	vertical
period	horizontal
both always positive	
tan, cos, sec, cot: no amplitude	

Inverses

$$\sin^{-1}(y) = x \quad \sin(x) = y$$

$$\csc(x) = 1/\sin(x)$$

restricting range: usually I & IV
except in $\cos^{-1}$: I & II

Reciprocal Identities

$\sin \theta = 1/\csc \theta$	$\csc \theta = 1/\sin \theta$
$\cos \theta = 1/\sec \theta$	$\sec \theta = 1/\cos \theta$
$\tan \theta = 1/\cot \theta$	$\cot \theta = 1/\tan \theta$

Ratio Identities

$$\tan \theta = \sin \theta / \cos \theta \quad \cot \theta = \cos \theta / \sin \theta$$

Pythagorean Identities

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

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

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

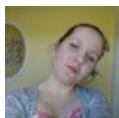
Double-Angle Identities

$\sin 2\theta = 2 \sin \theta \cos \theta$
$\tan 2\theta = 2 \tan \theta / 1 - \tan^2 \theta$
$\cos 2\theta = \cos^2 \theta - \sin^2 \theta$
$\cos 2\theta = 1 - 2 \sin^2 \theta$
$\cos 2\theta = 2 \cos^2 \theta - 1$

some more identities

$\sin(a+b) = \sin(a)\cos(b) + \cos(a)\sin(b)$
$\sin(a-b) = \sin(a)\cos(b) - \cos(a)\sin(b)$
$\cos(a+b) = \cos(a)\cos(b) - \sin(a)\sin(b)$
$\cos(a-b) = \cos(a)\cos(b) + \sin(a)\sin(b)$
$\tan(a+b) = \tan(a) + \tan(b) / 1 - \tan(a)\tan(b)$
$\tan(a-b) = \tan(a) - \tan(b) / 1 + \tan(a)\tan(b)$

area	πr^2
diameter	$2r$
circumference	$2\pi r$ OR πd
arc length	θr
r = radius d = diameter θ = angle	



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Page 1 of 2.

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