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√2 or b√2

c/√2=a or b

30-60-90 triangles

c=2b

a=b√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∆ = (1/2)bh

SOH-CAH-TOA

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

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

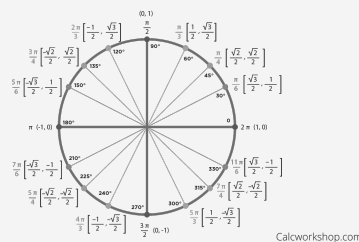| cosecant	hypotenuse/opposite
secant	hypotenuse/adjacent
cotangent	adjacent/opposite

Circle Measurements

area	πr^2
diameter	2r
circumference	2πr OR πd
arc length	θr

r = radius

d = diameter

θ = angle

Degrees & Radians

degrees to radians	θ·π/180
radians to degrees	θ·180/π

Unit Circle

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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

θ ± 360°	θ ± 2π

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

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

csc(x) = 1/sin(x)

restricting range: usually I & IV

except in $\cos^{-1}$: I & II

Reciprocal Identities

sinθ = 1/cscθ	cscθ = 1/sinθ
cosθ = 1/secθ	secθ = 1/cosθ
tanθ = 1/cotθ	cotθ = 1/tanθ

Ratio Identities

tanθ = sinθ/cosθ	cotθ = cosθ/sinθ

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

$\sin(a+b) = \sin(a)\cos(b) + \cos(a)\sin(b)$

$\sin(a-b) = \sin(a)\cos(b) - \cos(a)\sin(b)$

$\cos(a+b) = \cos(a)\cos(b) - \sin(a)\sin(b)$

$\cos(a-b) = \cos(a)\cos(b) + \sin(a)\sin(b)$

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

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