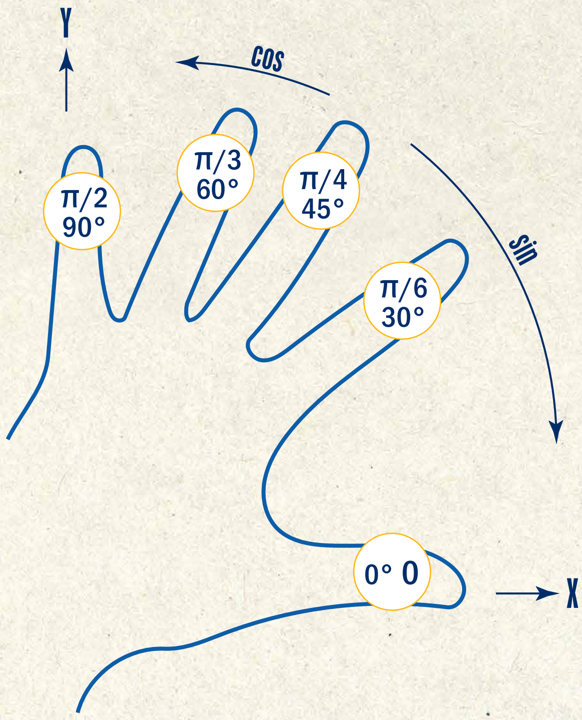
MATHEMATICS

Values of Special Angles from 0° to 90°



THE "HAND" METHOD

Instructions

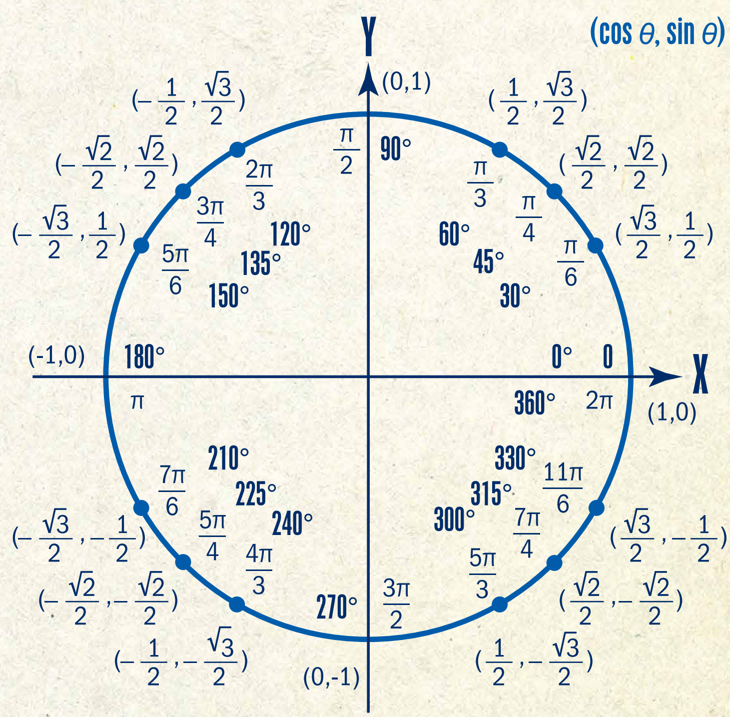
1. Fold down the finger of the desired angle.
2. Place in the numerator the number of fingers from the folded finger in the direction of the desired function.
3. Place $\sqrt{\ }$ over the numerator.
4. Place 2 in the denominator.

$$\cos\theta = \frac{\sqrt{\text{top fingers}}}{2} \quad \sin\theta = \frac{\sqrt{\text{bottom fingers}}}{2} \quad \tan\theta = \frac{\sqrt{\text{bottom fingers}}}{\sqrt{\text{top fingers}}}$$

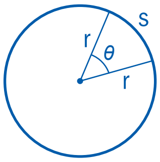
VALUES CHART

Angle	cos	sin	tan
0	1	0	0
π/6	√3/2	1/2	√3/3
π/4	√2/2	√2/2	1
π/3	1/2	√3/2	√3
π/2	0	1	undefined

UNIT CIRCLE



ANGLE MEASUREMENT AND ALGEBRAIC FORMULAS



π radians = 180°

$1° = \frac{\pi}{180}$ rad

(θ in radians) $1 \text{ rad} = \frac{180°}{\pi}$

$s = r\theta$

Slope:

$m = \frac{y_2 - y_1}{x_2 - x_1}$

Line:

$y = mx + b$

$y - y_1 = m(x - x_1)$

Distance:

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Quadratic Formula:

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

where $ax^2 + bx + c = 0$

Special Polynomials:

$x^3 + y^3 = (x + y)(x^2 - xy + y^2)$

$x^3 - y^3 = (x - y)(x^2 + xy + y^2)$

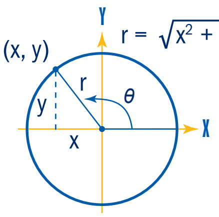
$(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$

$(x - y)^3 = x^3 - 3x^2y + 3xy^2 - y^3$

MATHEMATICS

IDENTITIES

Circular Function Definitions, where θ is any angle:

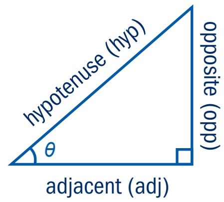


$\sin\theta = \frac{y}{r}$ $\csc\theta = \frac{r}{y}$

$\cos\theta = \frac{x}{r}$ $\sec\theta = \frac{r}{x}$

$\tan\theta = \frac{y}{x}$ $\cot\theta = \frac{x}{y}$

Right Triangle Definitions, where $0 < \theta < \pi/2$:



$\sin\theta = \frac{opp}{hyp}$ $\csc\theta = \frac{hyp}{opp}$

$\cos\theta = \frac{adj}{hyp}$ $\sec\theta = \frac{hyp}{adj}$

$\tan\theta = \frac{opp}{adj}$ $\cot\theta = \frac{adj}{opp}$

FORMULAS

Tangent and Cotangent Identities:

$\tan\theta = \frac{\sin\theta}{\cos\theta}$ $\cot\theta = \frac{\cos\theta}{\sin\theta}$

Reciprocal Identities:

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

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

$\cot\theta = \frac{1}{\tan\theta}$ $\tan\theta = \frac{1}{\cot\theta}$

Pythagorean Identities:

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

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

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

Periodic Formulas - If *n* is an integer:

$\sin(\theta + 2\pi n) = \sin\theta$ $\csc(\theta + 2\pi n) = \csc\theta$

$\cos(\theta + 2\pi n) = \cos\theta$ $\sec(\theta + 2\pi n) = \sec\theta$

$\tan(\theta + \pi n) = \tan\theta$ $\cot(\theta + \pi n) = \cot\theta$

Even/Odd Formulas:

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

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

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

Cofunction Formulas:

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

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

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

Double Angle Formulas:

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

$\cos(2\theta) = \cos^2\theta - \sin^2\theta$

$= 2\cos^2\theta - 1$

$= 1 - 2\sin^2\theta$

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

CONICS

Circle: $x^2 + y^2 = a^2$

Ellipse: $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

Parabola: $y^2 = 4ax$

Hyperbola: $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

GRAPHS