Every Exact Trig Ratio You'd Ever Want to Know and Probably More!

degrees	radians	sin	cos	tan	csc	sec	cot
0	0	0	1	0	undefined	1	undefined
30	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$	2	$\frac{2}{\sqrt{3}}$	$\sqrt{3}$
45	$\frac{\pi}{4}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1	$\sqrt{2}$	$\sqrt{2}$	1
60	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{2}{\sqrt{3}}$	2	$\frac{1}{\sqrt{3}}$
90	$\frac{\pi}{2}$	1	0	undefined	1	undefined	0
120	$\frac{2\pi}{3}$	$\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$-\sqrt{3}$	$\frac{2}{\sqrt{3}}$	-2	$-\frac{1}{\sqrt{3}}$
135	$\frac{3\pi}{4}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	-1	$\sqrt{2}$	$-\sqrt{2}$	-1
150	$\frac{5\pi}{6}$	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{\sqrt{3}}$	2	$-\frac{2}{\sqrt{3}}$	$-\sqrt{3}$
180	π	0	-1	0	undefined	-1	undefined
210	$\frac{7\pi}{6}$	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$	-2	$-\frac{2}{\sqrt{3}}$	$\sqrt{3}$
225	$\frac{5\pi}{4}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	1	$-\sqrt{2}$	$-\sqrt{2}$	1
240	$\frac{4\pi}{3}$	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$\sqrt{3}$	$-\frac{2}{\sqrt{3}}$	-2	$\frac{1}{\sqrt{3}}$
270	$\frac{3\pi}{2}$	-1	0	undefined	-1	undefined	0
300	$\frac{5\pi}{3}$	$-\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$-\sqrt{3}$	$-\frac{2}{\sqrt{3}}$	2	$-\frac{1}{\sqrt{3}}$
315	$\frac{7\pi}{4}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	-1	$-\sqrt{2}$	$\sqrt{2}$	-1
330	$\frac{11\pi}{6}$	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$-\frac{1}{\sqrt{3}}$	-2	$\frac{2}{\sqrt{3}}$	$-\sqrt{3}$
360	2π	0	1	0	undefined	1	undefined

$\sqrt{2} \doteq 1.4142 \quad \frac{1}{\sqrt{2}} \doteq 0.7071 \quad \sqrt{3} \doteq 1.7321 \quad \frac{1}{\sqrt{3}} \doteq 0.5774 \quad \frac{\sqrt{3}}{2} \doteq 0.8660 \quad \frac{2}{\sqrt{3}} \doteq 1.1547$

The Rationale Behind Fractions

$$\frac{a}{b}+\frac{c}{d}=\frac{ad+bc}{bd} \qquad \frac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)}=\frac{a}{b}\times\frac{d}{c} \qquad \frac{\left(\frac{a}{b}\right)}{c}=\frac{a}{bc} \qquad \frac{a}{\left(\frac{b}{c}\right)}=\frac{ac}{b}$$

Factoring Productively

$$ax+ay=a(x+y) \qquad x^2-y^2=(x-y)(x+y) \qquad x^3\pm y^3=(x\pm y)(x^2\mp xy+y^2)$$

$$x^n-y^n=(x-y)(x^{n-1}+x^{n-2}y+x^{n-3}y^2+\ldots+xy^{n-2}+y^{n-1}),\ \text{for } n\in\mathbb{N}$$

$$x^n+y^n=(x+y)(x^{n-1}-x^{n-2}y+x^{n-3}y^2-\ldots-xy^{n-2}+y^{n-1}),\ \text{for } n\in\mathbb{N},\ n \text{ odd}$$

The Power of Binomials

$$(x\pm y)^2=x^2\pm 2xy+y^2 \qquad (x\pm y)^3=x^3\pm 3x^2y+3xy^2\pm y^3$$

Advocating Exponents

$$a^xa^y=a^{x+y} \qquad \frac{a^x}{a^y}=a^{x-y} \qquad \left(a^x\right)^y=a^{xy} \qquad \left(\frac{ab}{c}\right)^x=\frac{a^xb^x}{c^x} \qquad a^0=1 \qquad a^{-1}=\frac{1}{a}$$

Getting Powerful with Logs

$$\log_a(xy)=\log_a(x)+\log_a(y) \qquad \log_a\left(\frac{x}{y}\right)=\log_a(x)-\log_a(y) \qquad \log_a(x^y)=y\log_a(x)$$

$$\log_a(x^y) \overset{\text{Please note!}}{\neq} \left[\log_a(x)\right]^y \qquad \log_a(1)=0 \qquad \log_a(a)=1 \qquad \log_a\left(\frac{1}{a}\right)=-1$$

Inverse formulas: $a^{\log_a(x)}=x \qquad \log_a(a^x)=x$ **Change of base**: $\log_a(x)=\dfrac{\log_b(x)}{\log_b(a)} \qquad \log_a(b)=\dfrac{1}{\log_b(a)}$

Rooting for the Quadratic Formula

$$ax^2+bx+c=0\Rightarrow x=\frac{-b\pm\sqrt{b^2-4ac}}{2a} \qquad \text{Sum of roots}=-\frac{b}{a} \qquad \text{Product of roots}=\frac{c}{a}$$

The Slant on Slopes and Lines

Slope through points (x_1,y_1) and $(x_2,y_2)=\dfrac{y_2-y_1}{x_2-x_1}$; line $l_1\perp$ line $l_2\Rightarrow$ slope of $l_1=-\dfrac{1}{\text{slope of } l_2}$.

The equation of the line through (x_1,y_1) with slope m: $y-y_1=m(x-x_1)$.

Trig Truths

$$\pi \text{ radians}=180^\circ \qquad \sin^2(A)+\cos^2(A)=1 \qquad 1+\tan^2(A)=\sec^2(A) \qquad \cot^2(A)+1=\csc^2(A)$$

$$\sin\left(\frac{\pi}{2}-A\right)=\cos(A) \qquad \cos\left(\frac{\pi}{2}-A\right)=\sin(A) \qquad \tan\left(\frac{\pi}{2}-A\right)=\cot(A)$$

$$\sin(-A)=-\sin(A) \qquad \cos(-A)=\cos(A) \qquad \tan(-A)=-\tan(A)$$

$$\sin(A\pm B)=\sin(A)\cos(B)\pm\cos(A)\sin(B) \qquad \sin(2A)=2\sin(A)\cos(A) \qquad \sin^2(A)=\frac{1-\cos(2A)}{2}$$

$$\cos(A\pm B)=\cos(A)\cos(B)\mp\sin(A)\sin(B) \qquad \cos(2A)=\cos^2(A)-\sin^2(A) \qquad \cos^2(A)=\frac{1+\cos(2A)}{2}$$

Sine Law: $\dfrac{\sin(A)}{a}=\dfrac{\sin(B)}{b}=\dfrac{\sin(C)}{c}$

Cosine Law (eg): $a^2=b^2+c^2-2bc\cos(A)$