

Trigonometry / Goniometry (en)

三角 (zh), Trigonometrie / Goniometrie (de), Trygonometria, / Goniometria (pl, it),
Trygonometría, / Goniometría (es), 三角法 (jp), Тригонометрия / Гониометрия (ru)

Sine (en), 正弦 (zh), Sinus (de, pl),
Seno (it, es), 正弦 (jp), синус (ru)

$$\sin(\varphi) = \frac{y}{r}$$

Cosine (en), 餘弦 (zh), Cosinus (de, pl),
Coseno (it, es), 余弦 (jp), косинус (ru)

$$\cos(\varphi) = \frac{x}{r}$$

Tangent (en), 切線 (zh), Tangens (de, pl),
Tangente (it, es), 正接 (jp), касательный (ru)

$$\tan(\varphi) = \frac{y}{x}$$

Cotangent (en), 餘切 (zh), Cotangens (de, pl),
Cotangente (it, es), 正義の (jp), котангенс (ru)

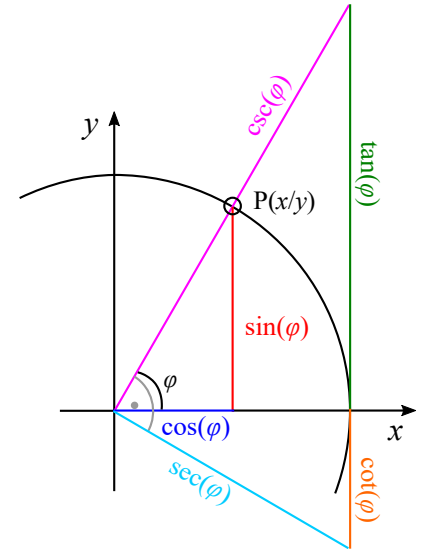
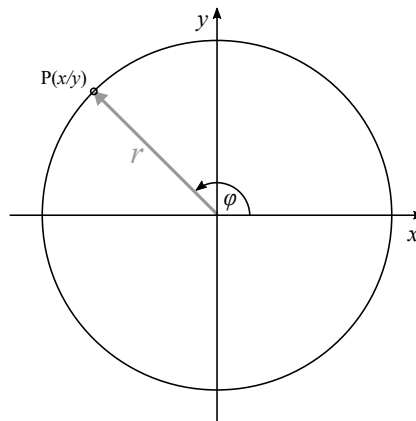
$$\cot(\varphi) = \frac{x}{y}$$

Secant (en), 割線 (zh), Secans (de, pl),
Secante (it, es), 割線 (jp), секущий (ru)

$$\sec(\varphi) = \frac{r}{x}$$

Cosecant (en), 餘割 (zh), Cosecans (de, pl),
Cosecante (it, es), コセカント (jp), coseканс (ru)

$$\csc(\varphi) = \frac{r}{y}$$



As Exponential functions

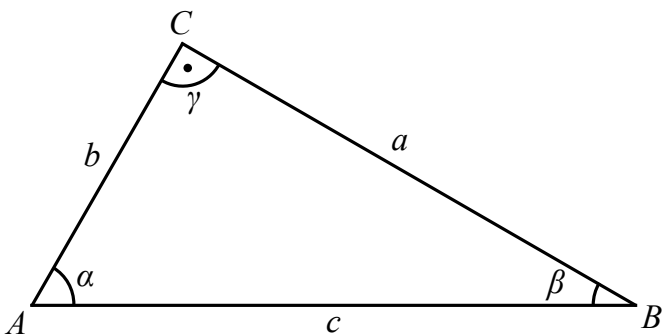
$$e^{\pm i\varphi} = \cos(\varphi) \pm i \cdot \sin(\varphi)$$

$$\sin(\varphi) = \frac{1}{2i} \cdot (e^{i\varphi} - e^{-i\varphi})$$

$$\cos(\varphi) = \frac{1}{2i} \cdot (e^{i\varphi} + e^{-i\varphi})$$

Right triangle (en)

直角三角形 (zh), Rechtwinkliges Dreieck (de), Trójkąt prostokątny (pl), Triangolo rettangolo (it),
Triángulo rectángulo (es), 直角三角形 (jp), прямоугольный треугольник (ru)



$$\alpha = 90^\circ - \beta$$

$$\sin(\alpha) = \frac{a}{c} = \cos(\beta)$$

$$\cos(\alpha) = \frac{b}{c} = \sin(\beta)$$

$$\tan(\alpha) = \frac{a}{b} = \frac{1}{\tan(\beta)}$$

$$\cot(\alpha) = \frac{b}{a} = \frac{1}{\cot(\beta)}$$

Relations

$$\sin(\varphi)^2 + \cos(\varphi)^2 = 1$$

$$\tan(\varphi) = \frac{\sin(\varphi)}{\cos(\varphi)}$$

$$1 + \tan(\varphi)^2 = \frac{1}{\cos(\varphi)^2}$$

$$-\sin(\varphi) = \sin(-\varphi)$$

$$\cos(-\varphi) = \cos(\varphi)$$

φ Rad Deg	0	15° $\frac{1}{12}\pi$	30° $\frac{1}{6}\pi$	45° $\frac{1}{4}\pi$	60° $\frac{1}{3}\pi$	75° $\frac{5}{12}\pi$	90° $\frac{1}{2}\pi$	105° $\frac{7}{12}\pi$	120° $\frac{2}{3}\pi$	135° $\frac{3}{4}\pi$	150° $\frac{5}{6}\pi$	165° $\frac{11}{12}\pi$	180° π	195° $\frac{13}{12}\pi$	210° $\frac{7}{6}\pi$	225° $\frac{5}{4}\pi$	240° $\frac{4}{3}\pi$	255° $\frac{17}{12}\pi$	270° $\frac{3}{2}\pi$	285° $\frac{19}{12}\pi$	300° $\frac{5}{3}\pi$	315° $\frac{7}{4}\pi$	330° $\frac{11}{6}\pi$	345° $\frac{23}{12}\pi$	360° 2π
sin(φ)	0	$\frac{\sqrt{6}-\sqrt{2}}{4}$	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{6}+\sqrt{2}}{4}$	1	$\frac{\sqrt{6}+\sqrt{2}}{4}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	$\frac{\sqrt{6}-\sqrt{2}}{4}$	0	$\frac{-\sqrt{6}+\sqrt{2}}{4}$	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	$\frac{-\sqrt{6}-\sqrt{2}}{4}$	-1	$\frac{-\sqrt{6}-\sqrt{2}}{4}$	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	$\frac{-\sqrt{6}+\sqrt{2}}{4}$	0
cos(φ)	1	$\frac{\sqrt{6}+\sqrt{2}}{4}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	$\frac{\sqrt{6}-\sqrt{2}}{4}$	0	$\frac{-\sqrt{6}+\sqrt{2}}{4}$	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{6}-\sqrt{2}}{4}$	-1	$\frac{-\sqrt{6}-\sqrt{2}}{4}$	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	$\frac{-\sqrt{6}+\sqrt{2}}{4}$	0	$\frac{\sqrt{6}-\sqrt{2}}{4}$	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{6}+\sqrt{2}}{4}$	1
tan(φ)	0	$-\sqrt{3}+2$	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	$\sqrt{3}+2$	∞	$-\sqrt{3}-2$	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	$\sqrt{3}-2$	0	$-\sqrt{3}+2$	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	$\sqrt{3}+2$	∞	$-\sqrt{3}-2$	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	$\sqrt{3}-2$	0
cot(φ)	∞	$\sqrt{3}+2$	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	$-\sqrt{3}+2$	0	$\sqrt{3}-2$	$-\frac{\sqrt{3}}{2}$	-1	$-\sqrt{3}$	$-\sqrt{3}-2$	∞	$\sqrt{3}+2$	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	$-\sqrt{3}+2$	0	$\sqrt{3}-2$	$-\frac{\sqrt{3}}{3}$	-1	$-\sqrt{3}$	$-\sqrt{3}-2$	∞

