

الحساب المثلثي وصيغ التحويل

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

$$\tan a + \tan b = \frac{\sin(a+b)}{\cos a \cos b}$$

$$\tan a - \tan b = \frac{\sin(a-b)}{\cos a \cos b}$$

$$\tan(a+b) = \frac{\tan a + \tan b}{1 - \tan a \tan b}$$

$$\tan(a-b) = \frac{\tan a - \tan b}{1 + \tan a \tan b}$$

إذا وضعنا $t = \tan\left(\frac{x}{2}\right)$

$$\cos x = \frac{1-t^2}{1+t^2} \quad \text{فإن}$$

$$\sin x = \frac{2t}{1+t^2}$$

$$\tan x = \frac{2t}{1-t^2}$$

	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π
$\sin x$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\cos x$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1
$\tan x$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	غير معرف	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0

$$\begin{cases} \sin(-x) = -\sin(x) \\ \cos(-x) = \cos(x) \end{cases}$$

	$\pi - x$	$\pi + x$	$\frac{\pi}{2} - x$	$\frac{\pi}{2} + x$
$\sin(\quad)$	$\sin x$	$-\sin x$	$\cos x$	$\cos x$
$\cos(\quad)$	$-\cos x$	$-\cos x$	$\sin x$	$-\sin x$

$$a \cos x + b \sin x = \sqrt{a^2 + b^2} \cos(x - \alpha)$$

حيث: $\sin(\alpha) = \frac{b}{\sqrt{a^2 + b^2}}$, $\cos(\alpha) = \frac{a}{\sqrt{a^2 + b^2}}$

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

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

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

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

$$\cos a \cos b = \frac{1}{2} [\cos(a+b) + \cos(a-b)]$$

$$\sin a \sin b = \frac{1}{2} [\cos(a-b) - \cos(a+b)]$$

$$\sin a \cos b = \frac{1}{2} [\sin(a+b) + \sin(a-b)]$$

$$\cos a + \cos b = 2 \cos\left(\frac{a+b}{2}\right) \cos\left(\frac{a-b}{2}\right)$$

$$\cos a - \cos b = -2 \sin\left(\frac{a+b}{2}\right) \sin\left(\frac{a-b}{2}\right)$$

$$\sin a + \sin b = 2 \sin\left(\frac{a+b}{2}\right) \cos\left(\frac{a-b}{2}\right)$$

$$\sin a - \sin b = 2 \sin\left(\frac{a-b}{2}\right) \cos\left(\frac{a+b}{2}\right)$$

$$\begin{aligned} \cos(2a) &= \cos^2 a - \sin^2 a \\ &= 2 \cos^2 a - 1 \\ &= 1 - 2 \sin^2 a \\ \sin(2a) &= 2 \sin a \cos a \end{aligned}$$

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

$$\sin^2(a) = \frac{1 - \cos(2a)}{2}$$

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

$$1 + \cos(a) = 2 \cos^2\left(\frac{a}{2}\right)$$

$$1 - \cos(a) = 2 \sin^2\left(\frac{a}{2}\right)$$

$$\sin a = 2 \sin\left(\frac{a}{2}\right) \cos\left(\frac{a}{2}\right)$$