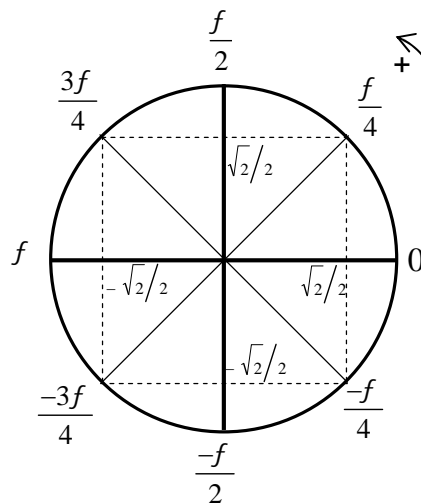
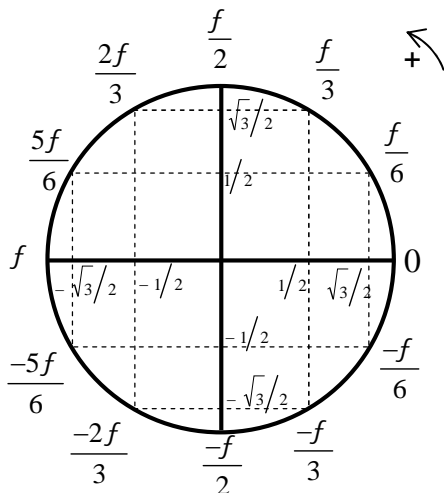




الحساب المثلثي

مذكرة القواعد

النسب المثلثية للزوايا الهامة



r	0	$\frac{f}{6}$	$\frac{f}{4}$	$\frac{f}{3}$	$\frac{f}{2}$	$\frac{2f}{3}$	$\frac{3f}{4}$	$\frac{5f}{6}$	f
sin r	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 r	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 r	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	∞	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0

صيغ و تعاريف مثلثية هامة

$\sin^2 x + \cos^2 x = 1$	$\tan x = \frac{\sin x}{\cos x}$	$\cotan x = \frac{1}{\tan x} = \frac{\cos x}{\sin x}$	$\tan^2 x = \frac{1}{\cos^2 x} - 1$	$\cotan^2 x = \frac{1}{\sin^2 x} - 1$
$\sin(x + 2kf) = \sin x$ $\sin(-x) = -\sin x$ $\sin(f - x) = \sin x$ $\sin(f + x) = -\sin x$ $\sin\left(\frac{f}{2} - x\right) = \cos x$ $\sin\left(\frac{f}{2} + x\right) = \cos x$	$\cos(x + 2kf) = \cos x$ $\cos(-x) = \cos x$ $\cos(f - x) = -\cos x$ $\cos(f + x) = -\cos x$ $\cos\left(\frac{f}{2} - x\right) = \sin x$ $\cos\left(\frac{f}{2} + x\right) = -\sin x$	$\tan(x + kf) = \tan x$ $\tan(-x) = -\tan x$ $\tan\left(\frac{f}{2} - x\right) = \frac{1}{\tan x}$ $\tan\left(\frac{f}{2} + x\right) = \frac{-1}{\tan x}$		

المعادلات المثلثية

$$\cos x = \cos y \Leftrightarrow (x = y + 2kf / k \in \mathbb{Z}) \text{ ou } (x = -y + 2kf / k \in \mathbb{Z})$$

$$\sin x = \sin y \Leftrightarrow (x = y + 2kf / k \in \mathbb{Z}) \text{ ou } (x = (f - y) + 2kf / k \in \mathbb{Z})$$

$$\tan x = \tan y \Leftrightarrow x = y + kf / k \in \mathbb{Z}$$

حالات خاصة

$\sin x = 0 \Leftrightarrow x = k f / k \in \mathbb{Z}$	$\cos x = 0 \Leftrightarrow x = \frac{f}{2} + k f / k \in \mathbb{Z}$	$\tan x = 0 \Leftrightarrow x = k f / k \in \mathbb{Z}$
$\sin x = 1 \Leftrightarrow x = \frac{f}{2} + 2k f / k \in \mathbb{Z}$	$\cos x = 1 \Leftrightarrow x = 2k f / k \in \mathbb{Z}$	$\tan x = 1 \Leftrightarrow x = \frac{f}{4} + k f / k \in \mathbb{Z}$
$\sin x = -1 \Leftrightarrow x = \frac{-f}{2} + 2k f / k \in \mathbb{Z}$	$\cos x = -1 \Leftrightarrow x = (2k+1) f / k \in \mathbb{Z}$	$\tan x = -1 \Leftrightarrow x = \frac{-f}{4} + k f / k \in \mathbb{Z}$

صيغ التحويل

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

صيغ النشر و التعميل

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

المربع والضعف

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

كتابة $\sin a$ و $\cos a$ و $\tan a$ بدلالة $\tan \frac{a}{2}$

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