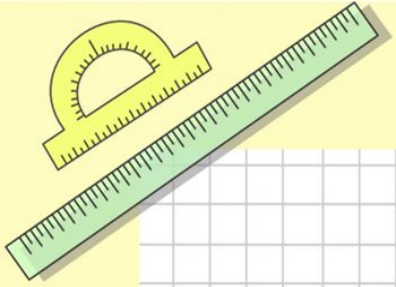
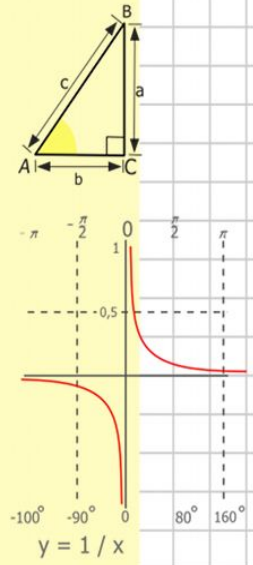
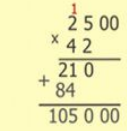
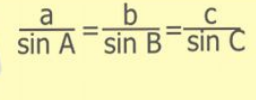
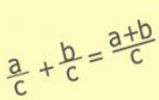
Математика

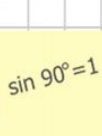
Занятие 44.
Формулы сложения.

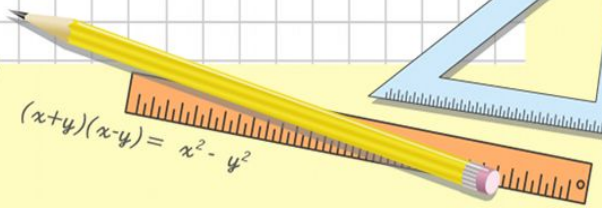



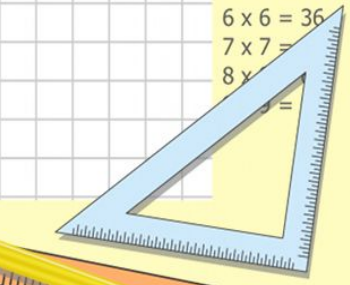
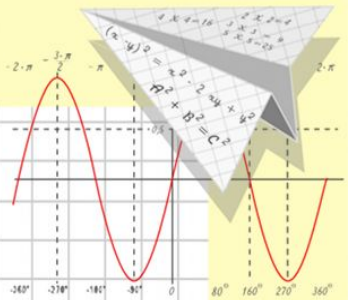
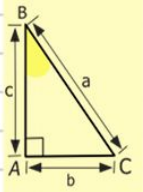
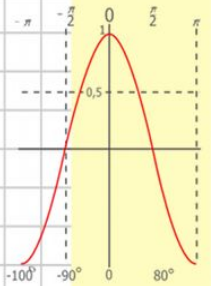






Формулы сложения

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$

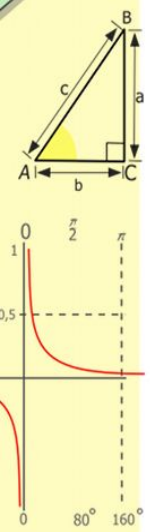
$$\sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$$

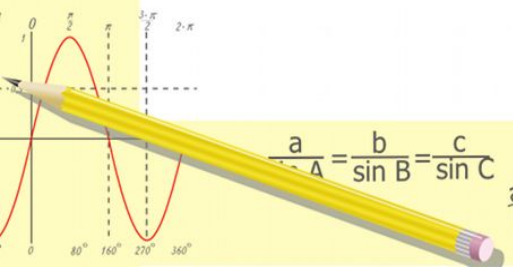
$$\cos(\alpha+\beta)=\cos\alpha\cos\beta-\sin\alpha\sin\beta$$

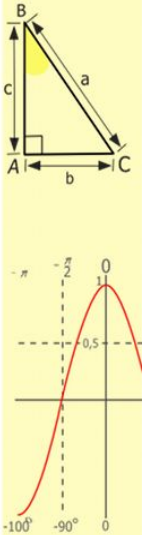
$$\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$$

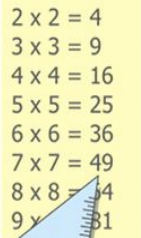
$$tg(\alpha+\beta)=\frac{tg\alpha+tg\beta}{1-tg\alpha\cdot tg\beta}$$

$$tg(\alpha-\beta)=\frac{tg\alpha-tg\beta}{1+tg\alpha\cdot tg\beta}$$









Формулы сложения

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$
$$\sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$$

$$\cos(\alpha+\beta)=\cos\alpha\cos\beta-\sin\alpha\sin\beta$$
$$\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$$

$$tg(\alpha+\beta)=\frac{tg\alpha+tg\beta}{1-tg\alpha\cdot tg\beta}$$

$$tg(\alpha-\beta)=\frac{tg\alpha-tg\beta}{1+tg\alpha\cdot tg\beta}$$

$$\sin 4\alpha=\sin(3\alpha+\alpha)=\sin 3\alpha\cos\alpha+\cos 3\alpha\sin\alpha$$

$$\sin 4\alpha=\sin(5\alpha-\alpha)=\sin 5\alpha\cos\alpha-\cos 5\alpha\sin\alpha$$

$$\cos 3x=\cos(2x+x)=\cos 2x\cos x-\sin 2x\sin x$$

$$\cos 3x=\cos(5x-2x)=\cos 5x\cos 2x+\sin 5x\sin 2x$$

$$tg\,7y=tg(5y+2y)=\frac{tg\,5y+tg\,2y}{1-tg\,5y\cdot tg\,2y}$$

$$tg\,7y=tg(10y-3y)=\frac{tg\,10y-tg\,3y}{1+tg\,10y\cdot tg\,3y}$$

Формулы сложения

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$
$$\sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$$

$$\cos(\alpha+\beta)=\cos\alpha\cos\beta-\sin\alpha\sin\beta$$
$$\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$$

$$tg(\alpha+\beta)=\frac{tg\alpha+tg\beta}{1-tg\alpha\cdot tg\beta}$$

$$tg(\alpha-\beta)=\frac{tg\alpha-tg\beta}{1+tg\alpha\cdot tg\beta}$$

$$\sin 2\alpha\cos 3\alpha+\cos 2\alpha\sin 3\alpha=\sin(2\alpha+3\alpha)=\sin 5\alpha$$

$$\cos 5x\cos 4x+\sin 5x\sin 4x=\cos(5x-4x)=\cos x$$

$$\cos 50^\circ\cos 20^\circ-\sin 50^\circ\sin 20^\circ=\cos(50^\circ+20^\circ)=\cos 70^\circ$$

$$\sin(\alpha+10^\circ)\cos(\alpha-10^\circ)-\cos(\alpha+10^\circ)\sin(\alpha-10^\circ)=$$
$$=\sin\left[(\alpha+10^\circ)-(\alpha-10^\circ)\right]=\sin(\alpha+10^\circ-\alpha+10^\circ)=\sin 20^\circ$$

$$\frac{tg55^\circ-tg10^\circ}{1+tg55^\circ\cdot tg10^\circ}=tg(55^\circ-10^\circ)=tg45^\circ=1$$

Формулы сложения

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$
$$\sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$$

$$\cos(\alpha+\beta)=\cos\alpha\cos\beta-\sin\alpha\sin\beta$$
$$\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$$

$$tg(\alpha+\beta)=\frac{tg\alpha+tg\beta}{1-tg\alpha\cdot tg\beta}$$

$$tg(\alpha-\beta)=\frac{tg\alpha-tg\beta}{1+tg\alpha\cdot tg\beta}$$

$$\cos\frac{7\pi}{12}\cos\frac{\pi}{4}+\sin\frac{7\pi}{12}\sin\frac{\pi}{4}=\cos\left(\frac{7\pi}{12}-\frac{\pi}{4}\right)=\cos\frac{4\pi}{12}=\cos\frac{\pi}{3}=\frac{1}{2}$$

$$\sin 0{,}8\pi\cos 0{,}7\pi+\cos 0{,}8\pi\sin 0{,}7\pi=\sin(0{,}8\pi+0{,}7\pi)=$$
$$=\sin 1{,}5\pi=-1$$

$$\frac{tg\frac{2\pi}{15}+tg\frac{\pi}{5}}{1-tg\frac{2\pi}{15}\cdot tg\frac{\pi}{5}}=tg\left(\frac{2\pi}{15}+\frac{\pi}{5}\right)=tg\frac{5\pi}{15}=tg\frac{\pi}{3}=\sqrt{3}$$

Формулы сложения

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$
$$\sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$$

$$\cos(\alpha+\beta)=\cos\alpha\cos\beta-\sin\alpha\sin\beta$$
$$\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$$

$$tg(\alpha+\beta)=\frac{tg\alpha+tg\beta}{1-tg\alpha\cdot tg\beta}$$

$$tg(\alpha-\beta)=\frac{tg\alpha-tg\beta}{1+tg\alpha\cdot tg\beta}$$

Вычислить:

$\cos 75°=$????? ?????

????? ?????

$tg15°=$????? ????? ?????

????? ????? ?????

Формулы сложения

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$
$$\sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$$

$$\cos(\alpha+\beta)=\cos\alpha\cos\beta-\sin\alpha\sin\beta$$
$$\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$$

$$tg(\alpha+\beta)=\frac{tg\alpha+tg\beta}{1-tg\alpha\cdot tg\beta}$$

$$tg(\alpha-\beta)=\frac{tg\alpha-tg\beta}{1+tg\alpha\cdot tg\beta}$$

Упростить:

$$\cos 40^\circ\sin 20^\circ-\cos 20^\circ\sin 40^\circ=\sin(20^\circ-40^\circ)=\sin(-20^\circ)=-\sin 20^\circ$$

$$\sin 38^\circ\sin 22^\circ-\cos 38^\circ\cos 22^\circ=-\cos(38^\circ+22^\circ)=-\cos 60^\circ=-\frac{1}{2}$$

$$\sin 40^\circ\sin 20^\circ+\sin 70^\circ\sin 50^\circ=\begin{vmatrix}\sin 70^\circ=\cos(90^\circ-70^\circ)=\cos 20^\circ\\ \sin 50^\circ=\cos(90^\circ-50^\circ)=\cos 40^\circ\end{vmatrix}=$$

$$=\sin 40^\circ\sin 20^\circ+\cos 20^\circ\cos 40^\circ=\cos(20^\circ-40^\circ)=\cos(-20^\circ)=\cos 20^\circ$$

$$\frac{\sin 52^\circ\cos 18^\circ+\cos 52^\circ\sin 18^\circ}{\cos 36^\circ\cos 34^\circ-\sin 36^\circ\sin 34^\circ}=\frac{\sin(52^\circ+18^\circ)}{\cos(36^\circ+34^\circ)}=\frac{\sin 70^\circ}{\cos 70^\circ}=tg\,70^\circ$$

Формулы сложения

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta$$
$$\sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$$

$$\cos(\alpha+\beta)=\cos\alpha\cos\beta-\sin\alpha\sin\beta$$
$$\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$$

$$tg(\alpha+\beta)=\frac{tg\alpha+tg\beta}{1-tg\alpha\cdot tg\beta}$$

$$tg(\alpha-\beta)=\frac{tg\alpha-tg\beta}{1+tg\alpha\cdot tg\beta}$$

Упростить:

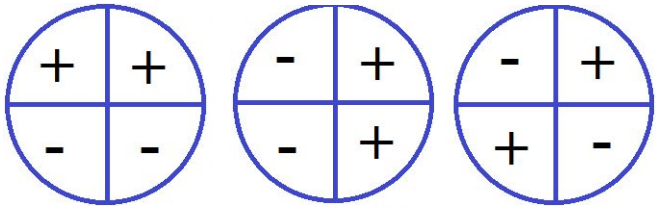
$$\frac{\sin 72^\circ\sin 28^\circ-\cos 72^\circ\sin 62^\circ}{\cos 35^\circ\cos 25^\circ+\sin 25^\circ\cos 55^\circ}=\left|\begin{array}{l}\sin 28^\circ=\cos(90^\circ-28^\circ)=\cos 62^\circ\\ \cos 35^\circ=\sin(90^\circ-35^\circ)=\sin 55^\circ\end{array}\right|=$$

$$=\frac{\sin 72^\circ\cos 62^\circ-\cos 72^\circ\sin 62^\circ}{\sin 55^\circ\cos 25^\circ+\sin 25^\circ\cos 55^\circ}=\frac{\sin(72^\circ-62^\circ)}{\sin(55^\circ+25^\circ)}=\frac{\sin 10^\circ}{\sin 80^\circ}=$$

$$=\frac{\sin 10^\circ}{\cos 10^\circ}=tg10^\circ$$

Справочные материалы

α	0°	30°	45°	60°	90°	180°	270°	360°
	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
sin α	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	−1	0
cos α	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	−1	0	1
tg α	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	—	0	—	0
ctg α	—	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	—	0	—



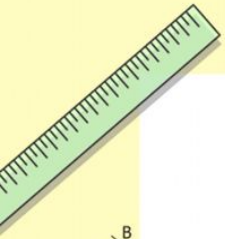
$\sin\alpha$ $\cos\alpha$ $tg\alpha$ $ctg\alpha$

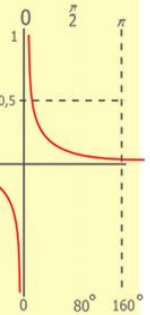
$$\sin(-\alpha) = -\sin\alpha$$
$$\cos(-\alpha) = \cos\alpha$$
$$tg(-\alpha) = -tg\alpha$$
$$ctg(-\alpha) = -ctg\alpha$$

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$ $\sin 90° = 1$

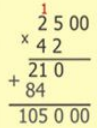
$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$ $\begin{cases} y = 1 \\ x = 25 + 45 \end{cases}$ $x = 70$

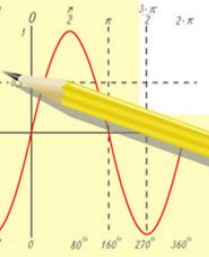
$(x+y)(x-y) = x^2 - y^2$





y = 1 / x





$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$

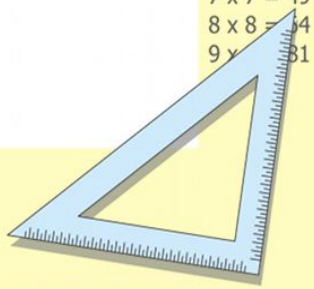
$\sin 90° = 1$

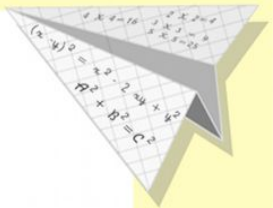
$\begin{cases} y = \sin 90 \\ x = 25y + 45 \end{cases}$

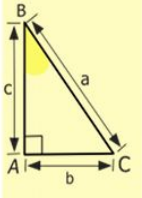
$\begin{cases} y = 1 \\ x = 25 + 45 \end{cases}$

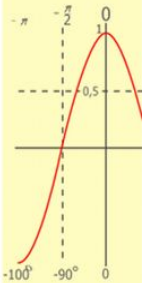
$x = 70$

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









y = co

2 x 2 = 4
3 x 3 = 9
4 x 4 = 16
5 x 5 = 25
6 x 6 = 36
7 x 7 = 49
8 x 8 = 64
9 x 9 = 81

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