

♦ Arce mărite sau micșorate cu un nr. par de circumferinte

$\sin(\pm 2k\pi + \alpha) = \sin \alpha$
$\cos(\pm 2k\pi + \alpha) = \cos \alpha$
$\operatorname{tg}(\pm 2k\pi + \alpha) = \operatorname{tg} \alpha$
$\operatorname{ctg}(\pm 2k\pi + \alpha) = \operatorname{ctg} \alpha$

♦ Arce mărite sau micșorate cu un nr. impar de circumferinte

$\sin[\pm(2k+1)\pi + \alpha] = -\sin \alpha$
$\cos[\pm(2k+1)\pi + \alpha] = -\cos \alpha$
$\operatorname{tg}[\pm(2k+1)\pi + \alpha] = \operatorname{tg} \alpha$
$\operatorname{ctg}[\pm(2k+1)\pi + \alpha] = \operatorname{ctg} \alpha$

♦ Arce simple și complementare

$\sin \alpha = \cos\left(\frac{\pi}{2} - \alpha\right)$	$\operatorname{tg} \alpha = \operatorname{ctg}\left(\frac{\pi}{2} - \alpha\right)$
$\cos \alpha = \sin\left(\frac{\pi}{2} - \alpha\right)$	$\operatorname{ctg} \alpha = \operatorname{tg}\left(\frac{\pi}{2} - \alpha\right)$

♦ Arce suplementare

$\sin(\pi - \alpha) = \sin \alpha$
$\cos(\pi - \alpha) = -\cos \alpha$
$\operatorname{tg}(\pi - \alpha) = -\operatorname{tg} \alpha$
$\operatorname{ctg}(\pi - \alpha) = -\operatorname{ctg} \alpha$

♦ Arce egale, opuse și de semn contrar

$\sin(-\alpha) = -\sin \alpha$
$\cos(-\alpha) = \cos \alpha$
$\operatorname{tg}(-\alpha) = -\operatorname{tg} \alpha$
$\operatorname{ctg}(-\alpha) = -\operatorname{ctg} \alpha$

♦ Arce mărite cu $\frac{\pi}{2}$

$\sin\left(\frac{\pi}{2} + \alpha\right) = \cos \alpha$	$\operatorname{tg}\left(\frac{\pi}{2} + \alpha\right) = -\operatorname{ctg} \alpha$
$\cos\left(\frac{\pi}{2} + \alpha\right) = -\sin \alpha$	$\operatorname{ctg}\left(\frac{\pi}{2} + \alpha\right) = -\operatorname{tg} \alpha$

♦ Formule fundamentale

$\sin^2 \alpha + \cos^2 \alpha = 1$	$\operatorname{tg} \alpha \operatorname{ctg} \alpha = 1$
$\operatorname{tg} \alpha = \frac{\sin \alpha}{\cos \alpha}$	$\operatorname{ctg} \alpha = \frac{\cos \alpha}{\sin \alpha}$
$1 + \operatorname{tg}^2 \alpha = \frac{1}{\cos^2 \alpha}$	$1 + \operatorname{ctg}^2 \alpha = \frac{1}{\sin^2 \alpha}$

♦ Formule de transformare ale sumei;

$\sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \sin \beta \cos \alpha$
$\cos(\alpha \pm \beta) = \cos \alpha \cos \beta \mp \sin \alpha \sin \beta$
$\operatorname{tg}(\alpha \pm \beta) = \frac{\operatorname{tg} \alpha \pm \operatorname{tg} \beta}{1 \mp \operatorname{tg} \alpha \operatorname{tg} \beta}$
$\operatorname{ctg}(\alpha \pm \beta) = \frac{\operatorname{ctg} \alpha \operatorname{ctg} \beta \mp 1}{\operatorname{ctg} \alpha \pm \operatorname{ctg} \beta}$

♦ Formule de transformare din sumă în produs

$\sin \alpha \pm \sin \beta = 2 \sin \frac{\alpha \pm \beta}{2} \cos \frac{\alpha \mp \beta}{2}$
$\cos \alpha \pm \cos \beta = 2 \cos \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2}$
$\cos \alpha - \cos \beta = -2 \sin \frac{\alpha + \beta}{2} \sin \frac{\alpha - \beta}{2}$
$\operatorname{tg} \alpha \pm \operatorname{tg} \beta = \frac{\sin(\alpha \pm \beta)}{\cos \alpha \cos \beta}$
$\operatorname{ctg} \alpha \pm \operatorname{ctg} \beta = \frac{\sin(\alpha \pm \beta)}{\sin \alpha \sin \beta}$

♦ Funcții trigonometrice ale arcelor de jumătate

$\left \sin \frac{\alpha}{2} \right = \sqrt{\frac{1 - \cos \alpha}{2}}$	$\left \cos \frac{\alpha}{2} \right = \sqrt{\frac{1 + \cos \alpha}{2}}$
$\left \operatorname{tg} \frac{\alpha}{2} \right = \sqrt{\frac{1 - \cos \alpha}{1 + \cos \alpha}}$	$\left \operatorname{ctg} \frac{\alpha}{2} \right = \sqrt{\frac{1 + \cos \alpha}{1 - \cos \alpha}}$

◆ Tabelul cu valori principale

α f. trig.	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0	1
tg	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	$+\infty$	0	$+\infty$	0
ctg	$+\infty$	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	$-\infty$	0	$+\infty$

◆ Teorema sinusurilor

În orice triunghi ABC avem :

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$$

$$\Rightarrow a = 2R \sin A, b = 2R \sin B, c = 2R \sin C.$$

◆ Teorema cosinusului

În orice triunghi ABC avem:

$$\begin{aligned} a^2 &= b^2 + c^2 - 2bc \cos A, \\ b^2 &= a^2 + c^2 - 2ac \cos B, \\ c^2 &= a^2 + b^2 - 2ab \cos C. \end{aligned}$$

◆ Formule de transformare din produs în sumă

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

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

$$\cos \alpha \cos \beta = \frac{1}{2} [\cos(\alpha + \beta) + \cos(\alpha - \beta)]$$

$$tg \alpha \operatorname{tg} \beta = \frac{tg \alpha + tg \beta}{ctg \alpha + ctg \beta}$$

$$ctg \alpha \operatorname{ctg} \beta = \frac{ctg \alpha + ctg \beta}{tg \alpha + tg \beta}$$

◆ Formule trigonometrice ale arcelor duble și triple

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha$$

$$tg 2\alpha = \frac{2tg \alpha}{1 - tg^2 \alpha}$$

$$ctg 2\alpha = \frac{ctg^2 \alpha - 1}{2ctg \alpha}$$

$$\sin 3\alpha = 3 \sin \alpha - 4 \sin^3 \alpha$$

$$\cos 3\alpha = 4 \cos^3 \alpha - 3 \cos \alpha$$

◆ Funcții trigonometrice funcție de $\operatorname{tg} \frac{\alpha}{2}$

$$\sin \alpha = \frac{2tg \frac{\alpha}{2}}{1 + tg^2 \frac{\alpha}{2}}$$

$$\cos \alpha = \frac{1 - tg^2 \frac{\alpha}{2}}{1 + tg^2 \frac{\alpha}{2}}$$

$$tg \alpha = \frac{2tg \frac{\alpha}{2}}{1 - tg^2 \frac{\alpha}{2}}$$