FUNZIONI GONIOMETRICHE

$360° = 2\pi$

$\sin^2\alpha + \cos^2\alpha = 1$

$\tan\alpha = \frac{\sin\alpha}{\cos\alpha}$

$\cot\alpha = \frac{\cos\alpha}{\sin\alpha} = \frac{1}{\tan\alpha}$

$sec\,\alpha = \frac{1}{cos\,\alpha}$

$cosec\,\alpha = \frac{1}{sin\,\alpha}$

FORMULE DI ADDIZIONE

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

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

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

FORMULE DI SOTTRAZIONE

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

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

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

FORMULE DI DUPLICAZIONE

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

$$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha = 1 - 2\sin^2\alpha = 2\cos^2\alpha - 1$$

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

FORMULE DI BISEZIONE

$$\sin\frac{\alpha}{2} = \pm\sqrt{\frac{1-\cos\alpha}{2}}$$

$$\cos\frac{\alpha}{2} = \pm\sqrt{\frac{1+\cos\alpha}{2}}$$

$$\tan\frac{\alpha}{2} = \pm\sqrt{\frac{1-\cos\alpha}{1+\cos\alpha}}$$

FUNZIONI GONIOMETRICHE

FORMULE PARAMETRICHE

$$\sin\alpha = \frac{2\tan\frac{\alpha}{2}}{1+\tan^2\frac{\alpha}{2}} = \frac{2t}{1+t^2} \quad \text{con} \quad t = \tan\frac{\alpha}{2}$$

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

FORMULE DI TRIPLICAZIONE

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

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

$$\tan 3\alpha = \frac{3\tan\alpha - \tan^3\alpha}{1-3\tan^2\alpha}$$

FORMULE DI PROSTAFERESI

$$\sin p + \sin q = 2\sin\frac{p+q}{2}\cos\frac{p-q}{2}$$

$$\sin p - \sin q = 2\sin\frac{p-q}{2}\cos\frac{p+q}{2}$$

$$\cos p + \cos q = 2\cos\frac{p+q}{2}\cos\frac{p-q}{2}$$

$$\cos p - \cos q = 2\sin\frac{p+q}{2}\sin\frac{p-q}{2}$$

FORMULE DI WERNER

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

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

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

FUNZIONI GONIOMETRICHE

Funzioni goniometriche	***In funzione di:***			
↓	$\sin\alpha$	$\cos\alpha$	$\tan\alpha$	$\cot\alpha$
$\sin\alpha$	$\sin\alpha$	$\pm\sqrt{1-\cos^2\alpha}$	$\frac{\tan\alpha}{\pm\sqrt{1+\tan^2\alpha}}$	$\frac{1}{\pm\sqrt{1+\cot^2\alpha}}$
$\cos\alpha$	$\pm\sqrt{1-\sin^2\alpha}$	$\cos\alpha$	$\frac{1}{\pm\sqrt{1+\tan^2\alpha}}$	$\frac{\cot\alpha}{\pm\sqrt{1+\cot^2\alpha}}$
$\tan\alpha$	$\frac{\sin\alpha}{\pm\sqrt{1-\sin^2\alpha}}$	$\frac{\pm\sqrt{1-\cos^2\alpha}}{\cos\alpha}$	$\tan\alpha$	$\frac{1}{\cot\alpha}$
$\cot\alpha$	$\frac{\pm\sqrt{1-\sin^2\alpha}}{\sin\alpha}$	$\frac{\cos\alpha}{\pm\sqrt{1-\cos^2\alpha}}$	$\frac{1}{\tan\alpha}$	$\cot\alpha$

ANGOLI NOTEVOLI:

	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
$\sin\alpha$	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	0	1	0	-1	0
$\cos\alpha$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	1	0	-1	0	1
$\tan\alpha$	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	0	∞	0	∞	0
$\cot\alpha$	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	∞	0	∞	0	∞

DIMOSTRAZIONI:

$$\sin^2\alpha+\cos^2\alpha=1$$

$$\frac{\sin^2\alpha}{\cos^2\alpha}+\frac{\cancel{\cos^2\alpha}^{1}}{\cancel{\cos^2\alpha}_{1}}=\frac{1}{\cos^2\alpha}$$

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

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

$$\cos\alpha=\frac{1}{\pm\sqrt{\tan^2\alpha+1}}$$

$$\sin^2\alpha+\cos^2\alpha=1$$

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

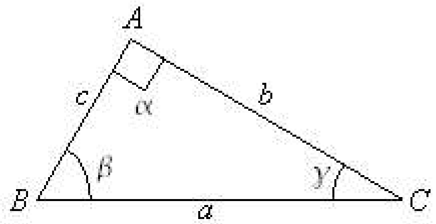
$$\sin^2\alpha=1-\frac{1}{\tan^2\alpha+1}$$

$$\sin^2\alpha=\frac{\tan^2\alpha+\cancel{1}-\cancel{1}}{\tan^2\alpha+1}$$

$$\sin\alpha=\frac{\tan\alpha}{\pm\sqrt{\tan^2\alpha+1}}$$

FUNZIONI GONIOMETRICHE

RELAZIONI TRA GLI ELEMENTI DEL TRIANGOLO RETTANGOLO



$$b = a \cdot \sin\beta = a \cdot \cos\gamma$$

$$c = a \cdot \sin\gamma = a \cdot \cos\beta$$

$$c = b \cdot \tan\gamma$$

$$b = c \cdot \tan\beta = b \cdot \cot\gamma$$

$$a = \frac{b}{\sin\beta} = \frac{b}{\cos\gamma} = \frac{c}{\sin\gamma} = \frac{c}{\cos\beta}$$

AREA DEL TRIANGOLO

$$S = \frac{1}{2} a \cdot b \cdot \sin\gamma$$

$$S = \frac{1}{2} a \cdot c \cdot \sin\beta$$

$$S = \frac{1}{2} b \cdot c \cdot \sin\alpha$$

TEOREMA DEL SENO

$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$$

TEOREMA DEL COSENO O DI CARNOT

$$a^2 = b^2 + c^2 - 2bc\cos\alpha$$

$$b^2 = c^2 + a^2 - 2ac\cos\beta$$

$$c^2 = a^2 + b^2 - 2ab\cos\gamma$$

TEOREMA DELLA CORDA

$c = d \cdot \sin\alpha$

$c =$ corda

$d =$ diametro

$\alpha =$ angolo alla circonferenza

FORMULA DI ERONE

area triangolo: $A = \sqrt{\frac{1}{2} \cdot \left(\frac{1}{2} p - a\right) \cdot \left(\frac{1}{2} p - b\right) \cdot \left(\frac{1}{2} p - c\right)}$

$p =$ semiperimetro del triangolo