

**ÔN TẬP: CÔNG THỨC LƯỢNG GIÁC**

**HỆ THỨC CƠ BẢN**

1.  $\sin^2x + \cos^2x = 1$       2.  $\tan x = \frac{\sin x}{\cos x}$       3.  $\cot x = \frac{\cos x}{\sin x}$   
4.  $\tan x \cdot \cot x = 1$       5.  $1 + \tan^2x = \frac{1}{\cos^2x}$       6.  $1 + \cot^2x = \frac{1}{\sin^2x}$

*Điều kiện tồn tại:*

- $\tan x$  là ( $x \neq \pi/2 + k\pi, k \in \mathbb{Z}$ )      •  $\cot x$  là ( $x \neq k\pi, k \in \mathbb{Z}$ )
- $\sin x$  là  $-1 \leq \sin x \leq 1$       •  $\cos x$  là  $-1 \leq \cos x \leq 1$

*chú ý:*

- $a^2 + b^2 = (a + b)^2 - 2ab$       •  $a^3 + b^3 = (a + b)^3 - 3ab(a + b)$

**CÔNG THỨC CỘNG**

7.  $\cos(a + b) = \cos a \cdot \cos b - \sin a \cdot \sin b$       8.  $\cos(a - b) = \cos a \cdot \cos b + \sin a \cdot \sin b$   
9.  $\sin(a + b) = \sin a \cdot \cos b + \cos a \cdot \sin b$       10.  $\sin(a - b) = \sin a \cdot \cos b - \cos a \cdot \sin b$   
11.  $\tan(a + b) = \frac{\tan a + \tan b}{1 - \tan a \cdot \tan b}$       12.  $\tan(a - b) = \frac{\tan a - \tan b}{1 + \tan a \cdot \tan b}$   
13.  $\cot(a + b) = \frac{\cot a \cdot \cot b - 1}{\cot a + \cot b}$       14.  $\cot(a - b) = \frac{\cot a \cot b + 1}{\cot a - \cot b}$

**CÔNG THỨC NHÂN**

**NHÂN ĐÔI**

15.  $\sin 2a = 2 \sin a \cdot \cos a$       16.  $\cos 2a = 2 \cos^2 a - 1 = 1 - 2 \sin^2 a = \cos^2 a - \sin^2 a$   
17.  $\tan 2a = \frac{2 \tan a}{1 - \tan^2 a}$

**NHÂN BA**

18.  $\cos 3a = 4 \cos^3 a - 3 \cos a$       19.  $\sin 3a = 3 \sin a - 4 \sin^3 a$       20.  $\tan 3a = \frac{3 \tan a - \tan^3 a}{1 - 3 \tan^2 a}$

**HẠ BẬC**

21.  $\sin^2 a = \frac{1 - \cos 2a}{2} \Rightarrow 1 - \cos 2a = 2 \sin^2 a$   
22.  $\cos^2 a = \frac{1 + \cos 2a}{2} \Rightarrow 1 + \cos 2a = 2 \cos^2 a$   
23.  $\sin^3 a = \frac{3 \sin a - \sin 3a}{4}$   
24.  $\cos^3 a = \frac{3 \cos a + \cos 3a}{4}$

**GÓC CHIA ĐÔI:** với  $t = \tan \frac{x}{2}$

25.  $\sin x = \frac{2t}{1+t^2}$       26.  $\cos x = \frac{1-t^2}{1+t^2}$       27.  $\tan x = \frac{2t}{1-t^2}$

**TỔNG THÀNH TÍCH**

	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\pi$
	0 <sup>0</sup>	30 <sup>0</sup>	45 <sup>0</sup>	60 <sup>0</sup>	90 <sup>0</sup>	120 <sup>0</sup>	135 <sup>0</sup>	180 <sup>0</sup>
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	0
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	-1
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$		$-\sqrt{3}$	-1	0
cot		$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	$-\frac{\sqrt{3}}{3}$	-1	

**CHÚ Ý:**

- $1 + \sin 2x = (\sin x + \cos x)^2$ ;  $1 - \sin 2x = (\sin x - \cos x)^2$ ;
- $1 + \sin x = \left(\sin \frac{x}{2} + \cos \frac{x}{2}\right)^2$ ;  $1 - \sin x = \left(\sin \frac{x}{2} - \cos \frac{x}{2}\right)^2$
- $1 - \cos 2x = 2 \sin^2 x$ ;  $1 + \cos 2x = 2 \cos^2 x$ .
- $1 + \cos x = 2 \cos^2 \frac{x}{2}$ ;  $1 - \cos x = 2 \sin^2 \frac{x}{2}$
- $\sin x + \cos x = \sqrt{2} \sin \left(x + \frac{\pi}{4}\right) = \sqrt{2} \cos \left(x - \frac{\pi}{4}\right)$ .
- $\sin x + \sqrt{3} \cos x = 2 \cos \left(x - \frac{\pi}{6}\right) = 2 \sin \left(x + \frac{\pi}{3}\right)$ .
- $\sqrt{3} \sin x + \cos x = 2 \sin \left(x + \frac{\pi}{6}\right) = 2 \cos \left(x - \frac{\pi}{3}\right)$
- $\sin^4 x + \cos^4 x = 1 - \frac{1}{2} \sin^2 2x$ ;  $\sin^6 x + \cos^6 x = 1 - \frac{3}{4} \sin^2 2x$