



# RECURSOS DIDÁCTICOS

QUINTO DE SECUNDARIA

TRIGONOMETRÍA

## ECUACIONES TRIGONOMÉTRICAS II

Hasta ahora hemos resuelto ecuaciones trigonométricas encontrando una, dos o tres soluciones de las tantas que existen para obtener la solución general de una ecuación tendremos en cuenta lo siguiente.

$$\text{Si: } \operatorname{sen} x = \frac{\sqrt{2}}{2}$$

Entonces :  $x = \dots\dots\dots -315^\circ, 225^\circ, 45^\circ, 135^\circ, 405^\circ \dots\dots\dots$

Solución General

### OBSERVACIONES:

I. Si :  $\left. \begin{array}{l} \operatorname{sen} x = a \\ \operatorname{csc} x = a \end{array} \right\}$  entonces  $x = n\pi + (-1)^n V_p$   $n \in \mathbb{Z}$

II. Si :  $\left. \begin{array}{l} \operatorname{cos} x = a \\ \operatorname{sec} x = a \end{array} \right\}$  entonces  $x = 2n\pi \pm V_p$   $n \in \mathbb{Z}$

III. Si :  $\left. \begin{array}{l} \operatorname{tg} x = a \\ \operatorname{Ctg} x = a \end{array} \right\}$  entonces  $x = n\pi + V_p$   $n \in \mathbb{Z}$

Ejemplo ① : Hallar la solución general.

$$\text{Si: } \operatorname{sen} x = \frac{1}{2}$$

Hallando el  $V_p$  (menor valor positivo)

$$V_p = 30^\circ \text{ ó } \frac{\pi}{6}$$

Utilizando la observación I:

$$x = n\pi + (-1)^n \frac{\pi}{6} \text{ (solución general) } n \in \mathbb{Z}$$

Ejemplo ② : Si :  $\operatorname{cos} 6x = \frac{\sqrt{3}}{2}$

Hallando el :  $V_p$  :  $V_p = 30^\circ \text{ ó } \frac{\pi}{6}$

Utilizando la observación II:

$$6x = 2n\pi \pm \frac{\pi}{6} \quad \Rightarrow \quad x = \frac{2n\pi}{6} + \frac{\pi}{36}$$

$$\therefore x = \frac{n\pi}{3} \pm \frac{\pi}{36} \quad n \in \mathbb{Z}$$



## Ejercicios de Aplicación

1. Resolver:  $\text{Sen}2x = \frac{1}{2}$

- a)  $\pi n + (-1)^n \frac{\pi}{6}$       d)  $\frac{\pi}{2} n + (-1)^n \frac{\pi}{15}$   
 b)  $\frac{\pi}{2} n + (-1)^n \frac{\pi}{12}$       e)  $\pi n + (-1)^n \frac{\pi}{12}$   
 c)  $\frac{\pi n}{12}$

2. Resolver :  $\cos 2x = \frac{\sqrt{2}}{2}$

- a)  $n\pi \pm \frac{\pi}{2}$       b)  $n\pi \pm \frac{\pi}{4}$       c)  $n\pi \pm \frac{\pi}{8}$   
 d)  $n\pi \pm \frac{\pi}{16}$       e)  $2n\pi \pm \frac{\pi}{2}$

3. Resolver :  $\cos 6x = \frac{\sqrt{3}}{2}$

- a)  $\frac{n\pi}{3} \pm \frac{\pi}{36}$       b)  $\frac{n\pi}{3} + \frac{\pi}{18}$       c)  $\frac{n\pi}{2} \pm \frac{\pi}{36}$   
 d)  $\frac{n\pi}{3} + \frac{\pi}{5}$       e)  $\frac{n\pi}{3}$

4. Resolver:  $\cos 3x = 1$

- a)  $\frac{n\pi}{2}$       b)  $\frac{n\pi}{3}$       c)  $\frac{2n\pi}{3}$   
 d)  $\frac{n\pi}{4}$       e)  $\frac{n\pi}{5}$

5. Resolver :  $\cos 2x = 1$

- a)  $n\pi$       b)  $2n\pi$       c)  $3n\pi$   
 d)  $\frac{3n\pi}{2}$       e)  $\frac{n\pi}{2}$

6. Resolver:  $2\text{sen}(5x - 20^\circ) - \sqrt{2} = 0$

E indicar el menor valor positivo para "x"

- a)  $10^\circ$       b)  $11^\circ$       c)  $12^\circ$   
 d)  $13^\circ$       e)  $15^\circ$

7. Resolver:  $\sqrt[3]{\frac{\sec x - \cos x}{\csc x - \text{sen} x}} = \sqrt{3}$

- a)  $\frac{\pi}{2}$       b)  $\frac{\pi}{3}$       c)  $\frac{\pi}{4}$   
 d)  $\frac{\pi}{6}$       e)  $\pi$

8. Resolver :  $\text{ctg} x \sqrt{1 + \text{tg}^2 x} - 2 = 0$        $x \in \text{I C}$

- a)  $\frac{\pi}{3}$       b)  $\frac{\pi}{4}$       c)  $\frac{\pi}{5}$   
 d)  $\frac{\pi}{6}$       e)  $\frac{\pi}{12}$

9. Resolver:

$\text{Sen}2x = \cos x$        $x \in \langle 0 ; 2\pi \rangle$

Dar la suma de soluciones.

- a)  $\pi$       b)  $2\pi$       c)  $3\pi$   
 d)  $4\pi$       e)  $5\pi$

10. Resolver :

$\sqrt{3} \text{tg} 3x - 1 = 0$

- a)  $n\pi + \frac{\pi}{3}$       b)  $n\pi + \frac{\pi}{6}$       c)  $\frac{n\pi}{2} + \frac{\pi}{6}$   
 d)  $\frac{n\pi}{3} + \frac{\pi}{6}$       e)  $\frac{n\pi}{3} + \frac{\pi}{18}$

11. Resolver:

$\text{tg} 5x = 1$

- a)  $\frac{n\pi}{5} + \frac{\pi}{10}$       b)  $\frac{n\pi}{5} + \frac{\pi}{12}$       c)  $\frac{n\pi}{5} + \frac{\pi}{20}$   
 d)  $\frac{n\pi}{5}$       e)  $\frac{n\pi}{5} - \frac{\pi}{12}$

12. Resolver:

$\text{tg} 4x = 1$

- a)  $n\pi + \frac{\pi}{4}$       b)  $\frac{n\pi}{4} + \frac{\pi}{16}$       c)  $\frac{n\pi}{2} + \frac{\pi}{4}$   
 d)  $\frac{n\pi}{2} + \frac{\pi}{16}$       e)  $\frac{n\pi}{8} + \frac{\pi}{8}$

13. Resolver:

$\text{sen}^2 6x = \frac{1}{4}$

- a)  $\frac{n\pi}{6} \pm \frac{\pi}{10}$       b)  $\frac{n\pi}{6} \pm \frac{\pi}{12}$       c)  $\frac{n\pi}{6} \pm \frac{\pi}{30}$   
 d)  $\frac{n\pi}{6} \pm \frac{\pi}{36}$       e)  $\frac{n\pi}{6} - \frac{\pi}{5}$

14. Resolver:

$\text{sen}^6 x + \cos^6 x = 1$

- a)  $\frac{n\pi}{2}$       b)  $\frac{n\pi}{3}$       c)  $\frac{n\pi}{4}$   
 d)  $\frac{n\pi}{6}$       e)  $\frac{n\pi}{8}$

15. Resolver :

$\text{tg}^4 x + \text{ctg}^4 x = 2$

- a)  $(4n + 1) \frac{\pi}{3}$       b)  $(2n + 1) \frac{\pi}{4}$       c)  $(4n + 1) \frac{\pi}{4}$   
 d)  $(4n - 1) \frac{\pi}{4}$       e)  $(2n - 1) \frac{\pi}{3}$

# Tarea Domiciliaria

# 5

1. Resolver :  $\text{sen}2x = 1$
- a)  $n\pi + (-1)^n \frac{\pi}{2}$     b)  $n\pi + (-1)^n \frac{\pi}{4}$     c)  $\frac{n\pi}{2} + (-1)^n \frac{\pi}{4}$   
 d)  $n\pi + (-1)^n \frac{\pi}{8}$     e)  $\frac{n\pi}{2} + (-1)^n \pi$

2. Resolver :  $\text{sen}3x = 0$
- a)  $n\pi$     b)  $\frac{n\pi}{3}$     c)  $3n\pi$   
 d)  $n\pi + (-1)^n \frac{\pi}{2}$     e)  $\frac{n\pi}{3} + (-1)^n \frac{\pi}{6}$

3. Resolver :  $\text{tg}3x = \sqrt{3}$
- a)  $n\pi + \frac{\pi}{3}$     b)  $\frac{n\pi}{3} + \frac{\pi}{3}$     c)  $\frac{n\pi}{3} + \frac{\pi}{9}$   
 d)  $\frac{n\pi}{6} + \frac{\pi}{3}$     e)  $\frac{n\pi + \pi}{6}$

4. Resolver :  $\text{sen}6x = \frac{1}{2}$
- a)  $\frac{n\pi}{6} + (-1)^n \frac{\pi}{36}$     d)  $\frac{n\pi}{2} + (-1)^n \frac{\pi}{6}$   
 b)  $\frac{n\pi}{3} + (-1)^n \frac{\pi}{10}$     e)  $\frac{n\pi}{6}$   
 c)  $\frac{n\pi}{3}$

5. Resolver :  $\text{tg}2x = 1$
- a)  $n\pi + \frac{\pi}{4}$     b)  $n\pi + \frac{\pi}{8}$     c)  $\frac{n\pi}{2} + \frac{\pi}{4}$   
 d)  $\frac{n\pi}{2} + \frac{\pi}{8}$     e)  $\frac{n\pi}{2}$

6. Resolver :  $\text{tg}\left(\frac{3x}{2}\right) = 1$
- a)  $\frac{2n\pi}{3}$     b)  $\frac{2n\pi}{3} + \frac{\pi}{6}$     c)  $\frac{2n\pi}{3} - \frac{\pi}{6}$   
 d)  $\frac{n\pi}{6} + \frac{\pi}{6}$     e)  $\frac{n\pi}{6} - \frac{\pi}{6}$

7. Resolver:  $\text{tg}\left(2x + \frac{\pi}{5}\right) = 1$
- a)  $\frac{n\pi}{2} + \frac{\pi}{40}$     d)  $\frac{n\pi}{2} + (-1)^n \frac{\pi}{40}$   
 b)  $\frac{n\pi}{2} + \frac{\pi}{20}$     e)  $\frac{n\pi}{2} - \frac{\pi}{20}$   
 c)  $\frac{n\pi}{2} + (-1)^n \frac{\pi}{20}$

8. Hallar la solución general de:  $\text{Sen}^4x + \text{cos}^4x = \frac{7}{8}$
- a)  $\frac{n\pi}{2} \pm \frac{\pi}{2}$     b)  $n\pi \pm \frac{\pi}{12}$     c)  $\frac{n\pi}{4} \pm \frac{\pi}{12}$   
 d)  $\frac{n\pi}{4} \pm \frac{\pi}{18}$     e)  $\frac{n\pi}{6} \pm \frac{\pi}{18}$

9. Resolver :  $\text{Cos}^2\left(\frac{\pi}{4} - x\right) - \text{sen}^2\left(\frac{\pi}{4} - x\right) = \frac{1}{2}$
- a)  $n\pi + (-1)^n \frac{\pi}{6}$     d)  $\frac{n\pi}{2} + (-1)^n \frac{\pi}{6}$   
 b)  $n\pi + (-1)^n \frac{\pi}{12}$     e)  $\frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$   
 c)  $n\pi + (-1)^n \frac{\pi}{3}$

10. Resolver :  $\frac{\text{sen}7x - \text{sen}x}{\text{cos}x - \text{cos}7x} = 1$
- a)  $\frac{n\pi}{2}$     b)  $\frac{n\pi}{4}$     c)  $\frac{n\pi}{4} + \frac{\pi}{16}$   
 d)  $\frac{n\pi}{2} + \frac{\pi}{16}$     e)  $\frac{n\pi}{3}$

11. Resolver :  $\text{sen}5x + \text{sen}x = \text{sen}3x$
- a)  $\frac{n\pi}{6}$     b)  $n\pi \pm \frac{\pi}{6}$     c)  $\frac{n\pi}{3}$   
 d)  $a \cup b$     e)  $b \cup c$

12. Resolver :  $2\text{cos}7x\text{cos}3x - \text{cos}10x = 1$
- a)  $n\pi$     b)  $\frac{n\pi}{2}$     c)  $\frac{n\pi}{4}$   
 d)  $\frac{n\pi}{8}$     e)  $\frac{n\pi}{16}$

13. Resolver:  $\frac{\text{sen}7x + \text{sen}3x}{\text{cos}7x + \text{cos}3x} = \sqrt{3}$
- a)  $n\pi + \frac{\pi}{3}$     b)  $\frac{n\pi}{5} + \frac{\pi}{15}$     c)  $n\pi + \frac{\pi}{15}$   
 d)  $\frac{n\pi}{6} + \frac{\pi}{15}$     e)  $n\pi + \frac{\pi}{6}$

14. Resolver :  $\text{Cos}3x + \text{cos}x = 0$
- a)  $2n\pi \pm \frac{\pi}{2}$     b)  $n\pi \pm \frac{\pi}{4}$     c)  $2n\pi \pm \frac{\pi}{4}$   
 d)  $a \text{ y } b$     e)  $a \text{ y } c$

15. Resolver :  $\text{Cos}3x - \text{cos}5x = 0$
- a)  $\frac{n\pi}{4}$     b)  $\frac{n\pi}{3}$     c)  $\frac{n\pi}{2}$   
 d)  $\frac{4n\pi}{3}$     e)  $\frac{n\pi}{6}$