

REFUERZO ECUACIONES TRIGONOMÉTRICAS

Resolver las ecuaciones trigonométricas

1 $\text{sen } x = 0$ 2 $\text{cos } x = 0$ 3 $\text{tg } x = 0$ 4 $\text{sen } x = 1$

5 $\text{cos } x = 1$ 6 $\text{tg } x = 1$ 7 $\text{sen } x = -1$ 8 $\text{cos } x = -1$

9 $\text{tg } x = -1$ 10 $\text{sen } x = \frac{1}{2}$ 11 $\text{sen } x = -\frac{1}{2}$

12 $\text{cos } x = \frac{1}{2}$ 13 $\text{cos } x = -\frac{1}{2}$ 14 $\text{sen}\left(x + \frac{\pi}{4}\right) = \frac{\sqrt{3}}{2}$

15 $2\text{tg } x - 3\text{cotg } x - 1 = 0$

16 $3\text{sen}^2 x - 5\text{sen } x + 2 = 0$

17 $\text{cos}^2 x - 3\text{sen}^2 x = 0$

18 $\text{cos } 2x = 1 + 4\text{sen } x$

19 $\text{sen}^2 x - \text{cos}^2 x = \frac{1}{2}$

20 $\text{tg } 2x = -\text{tg } x$

21 $\text{sen } 2x - \text{cos } 60^\circ$

22 $2\text{cos } x = 3\text{tg } x$

23 $\text{sen } 2x \cdot \text{cos } x = 6\text{sen}^3 x$

Soluciones

$$1 \quad \mathbf{\text{sen } x = 0} \quad x = \begin{cases} 0 + 360k \\ 180 + 360k \end{cases}$$

$$2 \quad \mathbf{\text{cos } x = 0} \quad x = \begin{cases} 90 + 360k \\ 270 + 360k \end{cases}$$

$$3 \quad \mathbf{\text{tg } x = 0} \quad x = \begin{cases} 0 + 360k \\ 180 + 360k \end{cases}$$

$$4 \quad \mathbf{\text{sen } x = 1} \quad x = 90 + 360k$$

$$5 \quad \mathbf{\text{cos } x = 1} \quad x = 0 + 360k$$

$$6 \quad \mathbf{\text{tg } x = 1} \quad x = \begin{cases} 45 + 360k \\ 225 + 360k \end{cases}$$

$$7 \quad \mathbf{\text{sen } x = -1} \quad x = 270 + 360k$$

$$8 \quad \mathbf{\text{cos } x = -1} \quad x = 180 + 360k$$

$$9 \quad \mathbf{\text{tg } x = -1} \quad x = \begin{cases} 135 + 360k \\ 315 + 360k \end{cases}$$

$$10 \quad \mathbf{\text{sen } x = \frac{1}{2}} \quad x = \begin{cases} 30 + 360k \\ 150 + 360k \end{cases}$$

$$11 \quad \mathbf{\text{sen } x = -\frac{1}{2}} \quad x = \begin{cases} 210 + 360k \\ 330 + 360k \end{cases}$$

$$12 \quad \cos x = \frac{1}{2} \quad x = \begin{cases} 60 + 360k \\ 300 + 360k \end{cases}$$

$$13 \quad \cos x = -\frac{1}{2} \quad x = \begin{cases} 120 + 360k \\ 240 + 360k \end{cases}$$

$$14. \quad \sin\left(x + \frac{\pi}{4}\right) = \frac{\sqrt{3}}{2} \quad \text{Dado que}$$

$$\frac{\sqrt{3}}{2} = \begin{cases} \sin 60 \\ \sin 120 \end{cases} \Rightarrow \begin{cases} x + 45 = 60 \\ x + 45 = 120 \end{cases} \Rightarrow \begin{cases} x = 15 + 360k \\ x = 75 + 360k \end{cases}$$

$$15 \quad 2\operatorname{tg} x - 3\operatorname{cotg} x - 1 = 0$$

$$2\operatorname{tg} x - \frac{3}{\operatorname{tg} x} - 1 = 0$$

$$2\operatorname{tg}^2 x - \operatorname{tg} x - 3 = 0$$

$$\operatorname{tg} x = \frac{1 \pm \sqrt{1 + 24}}{4} = \frac{1 \pm 5}{4}$$

$$\operatorname{tg} x = \frac{3}{2} \Rightarrow x = \begin{cases} 56^\circ 18' 35'' + 360k \\ 236^\circ 18' 35'' + 360k \end{cases} ; \operatorname{tg} x = -1 \Rightarrow \begin{cases} x = 135 + 360k \\ x = 315 + 360k \end{cases}$$

$$16 \quad 3\operatorname{sen}^2 x - 5\operatorname{sen} x + 2 = 0$$

$$\operatorname{sen} x = \frac{5 \pm \sqrt{25 - 24}}{6} = \frac{5 \pm 1}{6}$$

$$\Rightarrow \operatorname{sen} x = 1 \quad x = 90^\circ + 360k$$

$$\operatorname{sen} x = \frac{2}{3}$$

$$x = \begin{cases} 41^\circ 48' 37'' + 360k \\ 138^\circ 11' 23'' + 360k \end{cases}$$

$$17 \quad \cos^2 x - 3\operatorname{sen}^2 x = 0$$

$$1 - \operatorname{sen}^2 x - 3\operatorname{sen}^2 x = 0$$

$$1 - 4\operatorname{sen}^2 x = 0$$

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

$$\text{sen } x = \frac{1}{2} \quad x = \begin{cases} 30 + 360k \\ 150 + 360k \end{cases}$$

$$\text{sen } x = -\frac{1}{2} \quad x = \begin{cases} 210 + 360k \\ 330 + 360k \end{cases}$$

18

$$\cos 2x = 1 + 4\text{sen } x$$

$$\cos^2 x - \text{sen}^2 x = 1 + 4\text{sen } x$$

$$1 - \text{sen}^2 x - \text{sen}^2 x = 1 + 4\text{sen } x$$

$$2\text{sen}^2 x + 4\text{sen } x = 0$$

$$2\text{sen } x (\text{sen } x + 2) = 0 \Rightarrow \begin{cases} \text{sen } x = 0 \\ \text{sen } x + 2 = 0 \end{cases}$$

$$\text{sen } x = 0 \quad x = \begin{cases} 0 + 360k \\ 180 + 360k \end{cases}$$

sen x = -2 no tiene solución

19

$$\text{sen}^2 x - \cos^2 x = \frac{1}{2}$$

$$1 - \cos^2 x - \cos^2 x = 1/2; \quad 2\cos^2 x = 1/2; \quad \cos^2 x = 1/4;$$

$$\cos x = \pm 1/2$$

$$\Rightarrow x = \begin{cases} 60 + 360k \\ 120 + 360k \\ 240 + 360k \\ 300 + 360k \end{cases}$$

20

$$\text{tg } 2x = -\text{tg } x$$

$$\frac{2\operatorname{tg} x}{1 - \operatorname{tg}^2 x} = -\operatorname{tg} x \quad \Rightarrow \begin{cases} \operatorname{tg} x = 0 \\ \operatorname{tg} x = \pm\sqrt{3} \end{cases}$$

$$\operatorname{tg} x (\operatorname{tg}^2 x - 3) = 0$$

$$\operatorname{tg} x = 0 \Rightarrow \begin{cases} x = 0 + 360k \\ x = 180 + 360k \end{cases};$$

$$\operatorname{tg} x + \sqrt{3} \Rightarrow \begin{cases} x = 60 + 360k \\ x = 240 + 360k \end{cases};$$

$$\operatorname{tg} x - \sqrt{3} \Rightarrow \begin{cases} x = 120 + 360k \\ x = 300 + 360k \end{cases};$$

21

$$\operatorname{sen} 2x = \cos 60^\circ$$

$$\operatorname{sen} 2x = \frac{1}{2}$$

$$2x = \begin{cases} 30 \\ 150 \end{cases} \Rightarrow x = \begin{cases} 15 + 360k \\ 75 + 360k \end{cases}$$

22

$$2 \cos x = 3 \operatorname{tg} x$$

$$2 \cos x = \frac{3 \operatorname{sen} x}{\cos x}$$

$$2 \cos^2 x = 3 \operatorname{sen} x$$

$$2(1 - \operatorname{sen}^2 x) = 3 \operatorname{sen} x$$

$$2 - 2 \operatorname{sen}^2 x = 3 \operatorname{sen} x$$

$$2 \operatorname{sen}^2 x + 3 \operatorname{sen} x - 2 = 0$$

$$\operatorname{sen} x = \frac{-3 \pm \sqrt{9 + 16}}{4} = \frac{-3 \pm 5}{4}$$

$$\operatorname{sen} x = \frac{1}{2} \Rightarrow \begin{cases} x_1 = 30^\circ + 360^\circ k \\ x_2 = 150^\circ + 360^\circ k \end{cases}$$

$\operatorname{sen} x = -2$ Sin solución porque $-1 \leq \operatorname{sen} x \leq 1$

23

$$\operatorname{sen} 2x \cdot \cos x = 6 \operatorname{sen}^3 x$$

$$2 \operatorname{sen} x \cdot \cos x \cdot \cos x = 6 \operatorname{sen}^3 x$$

$$\mathbf{\text{sen } x (\cos^2 x - 3\text{sen}^2 x) = 0}$$

$$\mathbf{\text{sen } x = 0} \quad x = \begin{cases} 0 + 360k \\ 180 + 360k \end{cases}$$

$$\mathbf{\cos^2 x - 3\text{sen}^2 x = 0}$$

$$\mathbf{\cos^2 x = 3\text{sen}^2 x}$$

$$1 - \text{sen}^2 x = 3\text{sen}^2 x; \quad 1 = 4\text{sen}^2 x; \quad \text{sen}^2 x = 1/4; \quad \text{sen } x = \pm \frac{1}{2}$$

$$\mathbf{\text{sen } x = \frac{1}{2}} \quad x = \begin{cases} 30 + 360k \\ 150 + 360k \end{cases}$$

$$\mathbf{\text{sen } x = -\frac{1}{2}} \quad x = \begin{cases} 210 + 360k \\ 330 + 360k \end{cases}$$