
Résolution d'équations trigonométriques

Sujets

Dans chacun des exercices proposés ci-dessous, résolvez l'équation indiquée sur $] -\pi; \pi]$.

Exercice 1 $\sin\left(\frac{\pi}{6} - 4x\right) = \sin\left(3x - \frac{\pi}{6}\right)$.

Exercice 2 $\sin(-3x - \pi) = \sin(3x)$.

Exercice 3 $\sin(-4x) = \sin(-3x - \pi)$.

Exercice 4 $\sin\left(2x + \frac{2\pi}{3}\right) = \sin(4x - \pi)$.

Exercice 5 $\sin(4x - \pi) = \sin\left(-x - \frac{\pi}{2}\right)$.

Exercice 6 $\sin\left(-2x - \frac{5\pi}{6}\right) = \sin\left(3x - \frac{5\pi}{6}\right)$.

Exercice 7 $\sin\left(2x + \frac{2\pi}{3}\right) = \sin\left(\frac{\pi}{3} - x\right)$.

Exercice 8 $\sin\left(-2x - \frac{3\pi}{4}\right) = \sin(-3x)$.

Exercice 9 $\sin\left(x - \frac{\pi}{6}\right) = \sin\left(-2x - \frac{3\pi}{4}\right)$.

Exercice 10 $\sin\left(x - \frac{\pi}{4}\right) = \sin\left(3x + \frac{\pi}{2}\right)$.

Exercice 11 $\sin(3x) = \sin(4x)$.

Exercice 12 $\sin(4x) = \sin\left(\frac{\pi}{4} - 3x\right)$.

Exercice 13 $\sin\left(\frac{2\pi}{3} - 2x\right) = \sin\left(\frac{\pi}{3} - x\right)$.

Exercice 14 $\sin(4x) = \sin\left(-3x - \frac{\pi}{3}\right)$.

Exercice 15 $\sin\left(-x - \frac{\pi}{4}\right) = \sin\left(\frac{3\pi}{4} - 2x\right)$.

Exercice 16 $\sin\left(-2x - \frac{3\pi}{4}\right) = \sin\left(\frac{2\pi}{3} - x\right)$.

Exercice 17 $\sin\left(-x - \frac{\pi}{3}\right) = \sin\left(x + \frac{\pi}{3}\right)$.

Exercice 18 $\sin\left(-4x - \frac{2\pi}{3}\right) = \sin(-x)$.

Exercice 19 $\sin\left(-2x - \frac{\pi}{3}\right) = \sin\left(-4x - \frac{3\pi}{4}\right)$.

Exercice 20 $\sin\left(x - \frac{2\pi}{3}\right) = \sin\left(\frac{\pi}{3} - 3x\right)$.

Solutions

Solution 1 *L'ensemble des solutions de l'équation*

$$\sin\left(\frac{\pi}{6} - 4x\right) = \sin\left(3x - \frac{\pi}{6}\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{17\pi}{21}, -\frac{11\pi}{21}, -\frac{5\pi}{21}, \frac{\pi}{21}, \frac{\pi}{3}, \frac{13\pi}{21}, \frac{19\pi}{21}, \pi \right\}.$$

Solution 2 *L'ensemble des solutions de l'équation*

$$\sin(-3x - \pi) = \sin(3x)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{5\pi}{6}, -\frac{\pi}{2}, \frac{\pi}{2}, k = -1 \wedge -\pi < x \leq \pi, -\frac{\pi}{6}, \frac{5\pi}{6} \right\}.$$

Solution 3 *L'ensemble des solutions de l'équation*

$$\sin(-4x) = \sin(-3x - \pi)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{6\pi}{7}, -\frac{4\pi}{7}, -\frac{2\pi}{7}, 0, \frac{2\pi}{7}, \frac{4\pi}{7}, \frac{6\pi}{7}, \pi \right\}.$$

Solution 4 *L'ensemble des solutions de l'équation*

$$\sin\left(2x + \frac{2\pi}{3}\right) = \sin(4x - \pi)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{7\pi}{9}, -\frac{4\pi}{9}, -\frac{\pi}{6}, -\frac{\pi}{9}, \frac{2\pi}{9}, \frac{5\pi}{9}, \frac{5\pi}{6}, \frac{8\pi}{9} \right\}.$$

Solution 5 *L'ensemble des solutions de l'équation*

$$\sin(4x - \pi) = \sin\left(-x - \frac{\pi}{2}\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{7\pi}{10}, -\frac{\pi}{2}, -\frac{3\pi}{10}, \frac{\pi}{10}, \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{9\pi}{10} \right\}.$$

Solution 6 *L'ensemble des solutions de l'équation*

$$\sin\left(-2x - \frac{5\pi}{6}\right) = \sin\left(3x - \frac{5\pi}{6}\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{-\frac{4\pi}{5}, -\frac{2\pi}{5}, 0, \frac{2\pi}{5}, \frac{2\pi}{3}, \frac{4\pi}{5}\right\}.$$

Solution 7 *L'ensemble des solutions de l'équation*

$$\sin\left(2x + \frac{2\pi}{3}\right) = \sin\left(\frac{\pi}{3} - x\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{-\frac{7\pi}{9}, -\frac{\pi}{9}, 0, \frac{5\pi}{9}\right\}.$$

Solution 8 *L'ensemble des solutions de l'équation*

$$\sin\left(-2x - \frac{3\pi}{4}\right) = \sin(-3x)$$

sur $]-\pi; \pi]$ est

$$S = \left\{-\frac{3\pi}{4}, -\frac{7\pi}{20}, \frac{\pi}{20}, \frac{9\pi}{20}, \frac{3\pi}{4}, \frac{17\pi}{20}\right\}.$$

Solution 9 *L'ensemble des solutions de l'équation*

$$\sin\left(x - \frac{\pi}{6}\right) = \sin\left(-2x - \frac{3\pi}{4}\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{-\frac{31\pi}{36}, -\frac{7\pi}{36}, \frac{\pi}{12}, \frac{17\pi}{36}\right\}.$$

Solution 10 *L'ensemble des solutions de l'équation*

$$\sin\left(x - \frac{\pi}{4}\right) = \sin\left(3x + \frac{\pi}{2}\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{-\frac{13\pi}{16}, -\frac{3\pi}{8}, -\frac{5\pi}{16}, \frac{3\pi}{16}, \frac{5\pi}{8}, \frac{11\pi}{16}\right\}.$$

Solution 11 *L'ensemble des solutions de l'équation*

$$\sin(3x) = \sin(4x)$$

sur $]-\pi; \pi]$ est

$$S = \left\{-\frac{5\pi}{7}, -\frac{3\pi}{7}, -\frac{\pi}{7}, 0, \frac{\pi}{7}, \frac{3\pi}{7}, \frac{5\pi}{7}, \pi\right\}.$$

Solution 12 *L'ensemble des solutions de l'équation*

$$\sin(4x) = \sin\left(\frac{\pi}{4} - 3x\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{23\pi}{28}, -\frac{15\pi}{28}, -\frac{\pi}{4}, \frac{\pi}{28}, \frac{9\pi}{28}, \frac{17\pi}{28}, \frac{3\pi}{4}, \frac{25\pi}{28} \right\}.$$

Solution 13 *L'ensemble des solutions de l'équation*

$$\sin\left(\frac{2\pi}{3} - 2x\right) = \sin\left(\frac{\pi}{3} - x\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{2\pi}{3}, 0, \frac{\pi}{3}, \frac{2\pi}{3} \right\}.$$

Solution 14 *L'ensemble des solutions de l'équation*

$$\sin(4x) = \sin\left(-3x - \frac{\pi}{3}\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{19\pi}{21}, -\frac{2\pi}{3}, -\frac{13\pi}{21}, -\frac{\pi}{3}, -\frac{\pi}{21}, \frac{5\pi}{21}, \frac{11\pi}{21}, \frac{17\pi}{21} \right\}.$$

Solution 15 *L'ensemble des solutions de l'équation*

$$\sin\left(-x - \frac{\pi}{4}\right) = \sin\left(\frac{3\pi}{4} - 2x\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{5\pi}{6}, -\frac{\pi}{6}, \frac{\pi}{2}, \pi \right\}.$$

Solution 16 *L'ensemble des solutions de l'équation*

$$\sin\left(-2x - \frac{3\pi}{4}\right) = \sin\left(\frac{2\pi}{3} - x\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{13\pi}{36}, \frac{11\pi}{36}, \frac{7\pi}{12}, \frac{35\pi}{36} \right\}.$$

Solution 17 *L'ensemble des solutions de l'équation*

$$\sin\left(-x - \frac{\pi}{3}\right) = \sin\left(x + \frac{\pi}{3}\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{ -\frac{\pi}{3}, \frac{2\pi}{3} \right\}.$$

Solution 18 *L'ensemble des solutions de l'équation*

$$\sin\left(-4x - \frac{2\pi}{3}\right) = \sin(-x)$$

sur $]-\pi; \pi]$ est

$$S = \left\{-\frac{8\pi}{9}, -\frac{11\pi}{15}, -\frac{\pi}{3}, -\frac{2\pi}{9}, \frac{\pi}{15}, \frac{4\pi}{9}, \frac{7\pi}{15}, \frac{13\pi}{15}\right\}.$$

Solution 19 *L'ensemble des solutions de l'équation*

$$\sin\left(-2x - \frac{\pi}{3}\right) = \sin\left(-4x - \frac{3\pi}{4}\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{-\frac{49\pi}{72}, -\frac{25\pi}{72}, -\frac{5\pi}{24}, -\frac{\pi}{72}, \frac{23\pi}{72}, \frac{47\pi}{72}, \frac{19\pi}{24}, \frac{71\pi}{72}\right\}.$$

Solution 20 *L'ensemble des solutions de l'équation*

$$\sin\left(x - \frac{2\pi}{3}\right) = \sin\left(\frac{\pi}{3} - 3x\right)$$

sur $]-\pi; \pi]$ est

$$S = \left\{-\frac{3\pi}{4}, -\frac{2\pi}{3}, -\frac{\pi}{4}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{3\pi}{4}\right\}.$$