

$y = -2 + 3\cos\left[\frac{2\pi}{3}x\right]$ Find the first three (+) values of x for which $y = 1$

$$1 = -2 + 3\cos\left(\frac{2\pi}{3}x\right)$$

$$\text{period} = \frac{2\pi}{(2\pi/3)} = 2\pi \cdot \frac{3}{2\pi} = 3$$

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

$$1 = \cos\left(\frac{2\pi}{3}x\right)$$

$$\cos^{-1}(1) = \frac{2\pi}{3}x$$

$$0 \pm 2\pi n = \frac{2\pi}{3}x$$

$$x = (0 \pm 2\pi n) \frac{3}{2\pi}$$

$$x = 0 \pm 3n \quad x = 0, 3, 6, 9, 12$$

Remember that these functions are periodic and that isolating for x will yield multiple answers.

REMEMBER:

$$\cos^{-1} \frac{x}{r} = \left\{ \begin{array}{l} \text{calculator } \pm 2\pi n \\ -\text{calculator } \pm 2\pi n \end{array} \right\}$$

$$\sin^{-1} \frac{y}{r} = \left\{ \begin{array}{l} \text{calculator } \pm 2\pi n \\ \pi - \text{calculator } \pm 2\pi n \end{array} \right\}$$

So if, for example, $x = \left\{ \begin{array}{l} 1 \pm 6n \\ -3 \pm 6n \end{array} \right\}$, this means there is an infinite number of answers, namely

$$x = \left\{ \begin{array}{l} \dots -11, -5, 1, 7, 13, \dots \\ \dots -15, -9, -3, 9, 15, \dots \end{array} \right\}$$

It is likely specific solutions will be solicited.

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$$\left. \begin{array}{l} y = 2 + 5\sin\left[\frac{\pi}{7}(x+1)\right] \\ y = 4 \end{array} \right\}$$

$$4 = 2 + 5\sin\left[\frac{\pi}{7}(x+1)\right]$$

$$\frac{2}{5} = \sin\left[\frac{\pi}{7}(x+1)\right]$$

$$\sin^{-1}\left(\frac{2}{5}\right) = \frac{\pi}{7}(x+1)$$

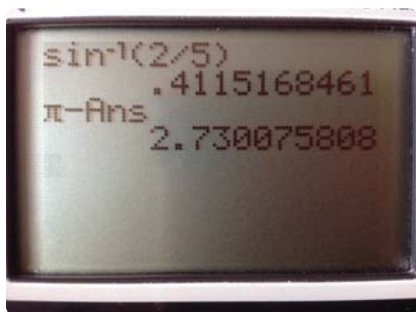
$$\frac{7}{\pi} \sin^{-1}\left(\frac{2}{5}\right) = x+1$$

$$\frac{7}{\pi} \sin^{-1}\left(\frac{2}{5}\right) - 1 = x$$

$$\frac{7}{\pi} \left\{ \begin{array}{l} 0.412 \pm 2\pi n \\ \pi - 0.412 \pm 2\pi n \end{array} \right\} - 1 = x$$

$$\left. \begin{array}{l} (0.917 \pm 14n) - 1 \\ (6.083 \pm 14n) - 1 \end{array} \right\} = x$$

just remember that this will always be the period of the function



$$\left. \begin{array}{l} (-0.083 \pm 14n) \\ (5.083 \pm 14n) \end{array} \right\} = X$$

$$x = -0.083, 5.083, 13.917, 19.083, 27.917, 33.083, 41.917 \dots$$

The diagram illustrates the sequence $x = -0.083, 5.083, 13.917, 19.083, 27.917, 33.083, 41.917 \dots$. Four blue arrows, each labeled '+14', indicate the constant difference between consecutive terms. The arrows are positioned above the first two terms, between the second and third terms, between the fourth and fifth terms, and between the sixth and seventh terms.