

Graphing Technology Lab

Solving Trigonometric Equations

Casio FX-9750G

The graph of a trigonometric function is made up of points that represent all values that satisfy the function. To solve a trigonometric equation, you need to find all values of the variable that satisfy the equation. You can use a Casio FX-9750G graphing calculator to solve trigonometric equations by graphing each side of the equation as a function and then locating the points of intersection.

ACTIVITY 1 Real Solutions

Use a graphing calculator to solve $\sin x = 0.4$ if $0^\circ \leq x < 360^\circ$.

Clear the calculator memory first.

Select MEM from the main menu; \blacktriangledown RESET $\boxed{\text{F1}}$.

Step 1 Enter and graph related equations. Rewrite the equation as two equations, $Y1 = \sin x$ and $Y2 = 0.4$. Then graph the two equations. Because the interval is in degrees, set your calculator to degree mode.

KEYSTROKES: $\boxed{\text{MENU}}$ $\boxed{5}$ $\boxed{\text{SHIFT}}$ $\boxed{[\text{SETUP}]}$ \blacktriangledown \blacktriangledown \blacktriangledown \blacktriangledown \blacktriangledown \blacktriangledown
 $\boxed{\text{F1}}$ $\boxed{\text{EXE}}$ $\boxed{\text{SIN}}$ $\boxed{\text{X},\theta,\text{T}}$ $\boxed{\text{EXE}}$ $\boxed{0.4}$ $\boxed{\text{EXE}}$ $\boxed{\text{F6}}$

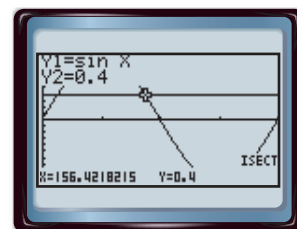
Set the viewing window.

KEYSTROKES: $\boxed{\text{SHIFT}}$ $\boxed{[\text{V-Window}]}$ $\boxed{0}$ $\boxed{\text{EXE}}$ $\boxed{360}$ $\boxed{\text{EXE}}$ $\boxed{90}$ $\boxed{\text{EXE}}$ $\boxed{(-)}$ $\boxed{1}$ $\boxed{\text{EXE}}$ $\boxed{1}$
 $\boxed{1}$ $\boxed{\text{EXE}}$ $\boxed{0.1}$ $\boxed{\text{EXE}}$ $\boxed{\text{EXE}}$ $\boxed{\text{F6}}$

Step 2 Approximate the solutions. Based on the graph, you can see that there are two points of intersection in the interval $0^\circ \leq x < 360^\circ$. Use the G-Solv feature to determine the x -values at which the two graphs intersect.

Press $\boxed{\text{SHIFT}}$ $\boxed{[\text{G-Solv}]}$ $\boxed{\text{F5}}$ then use \blacktriangleright \blacktriangleleft to move between points.

The solutions are $x \approx 23.58^\circ$ and $x \approx 156.4^\circ$.



$[0, 360]$ scl: 90 by $[-1, 1]$ scl: 0.1

ACTIVITY 2 No Real Solutions

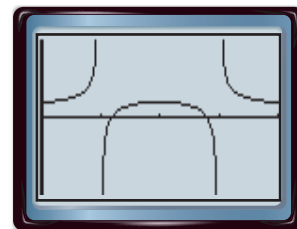
Use a graphing calculator to solve $\tan^2 x \cos x + 3 \cos x = 0$ if $0^\circ \leq x < 360^\circ$.

Step 1 Enter and graph related equations. The related equations to be graphed are $Y1 = \tan^2 x \cos x + 3 \cos x$ and $Y2 = 0$.

KEYSTROKES: $\boxed{\text{EXIT}}$ \blacktriangleup $\boxed{\text{F2}}$ $\boxed{\text{F2}}$ \blacktriangleup $\boxed{\text{F2}}$ $\boxed{\text{F1}}$ $\boxed{(}$ $\boxed{\text{TAN}}$ $\boxed{\text{X},\theta,\text{T}}$ $\boxed{)}$
 $\boxed{x^2}$ $\boxed{\text{COS}}$ $\boxed{\text{X},\theta,\text{T}}$ $\boxed{+}$ $\boxed{3}$ $\boxed{\text{COS}}$ $\boxed{\text{X},\theta,\text{T}}$ $\boxed{\text{EXE}}$ $\boxed{0}$ $\boxed{\text{EXE}}$

Set the viewing window and graph.

KEYSTROKES: $\boxed{\text{SHIFT}}$ $\boxed{[\text{V-Window}]}$ $\boxed{0}$ $\boxed{\text{EXE}}$ $\boxed{360}$ $\boxed{\text{EXE}}$ $\boxed{90}$ $\boxed{\text{EXE}}$ $\boxed{(-)}$ $\boxed{15}$ $\boxed{\text{EXE}}$ $\boxed{15}$
 $\boxed{\text{EXE}}$ $\boxed{1}$ $\boxed{\text{EXE}}$ $\boxed{\text{EXE}}$ $\boxed{\text{F6}}$



$[0, 360]$ scl: 90 by $[-15, 15]$ scl: 1