

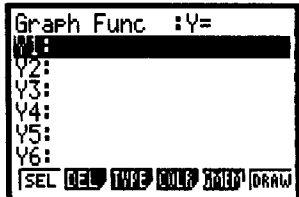
Intercepts are Best

Linear Equations
Solving
Graphing
Substitution
Using Intercepts



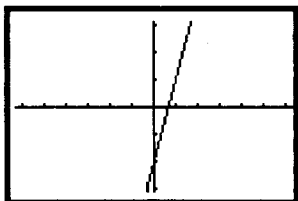
Graphing Equations

Enter the GRAPH Menu. The G-Func screen is shown below.



While Y1 is highlighted:
Press 3
X, θ , T key
- key
2
EXE
F6 (DRAW).

The resulting graph is shown below.



? represents a high level question

Resizing the Graph Window

Press Shift key
F3 (V-WIN)
Highlight Xmin,
Xmax, Ymin, or
Ymax.
Enter desired value
EXE key
Repeat steps to
alter min or max
values for X or Y.

Standards: Problem Solving, Communication, Reasoning, Algebra, and Functions.

Materials: CFX-9850G or CFX-9850Ga PLUS

Calculator Menus: RUN and GRAPH

How many times have you been asked to check your solutions? For example:

Solving the equation

$$\begin{aligned} 2X - 3 &= -15 \\ 2X &= -12 && \text{add 3 from both sides} \\ X &= -6 && \text{Divide both sides by 2} \end{aligned}$$

Checking the solution

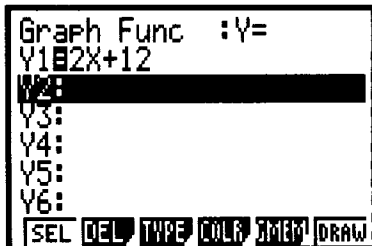
$$\begin{aligned} 2(-6) - 3 &= -15 \\ -12 - 3 &= -15 \\ -15 &= -15 \end{aligned}$$

Rewrite the original equation:

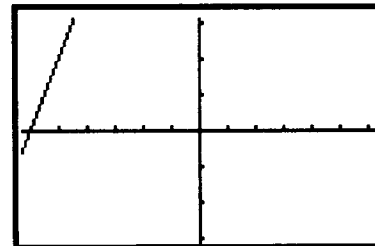
$$\begin{aligned} 2X - 3 &= -15 && \text{original equation} \\ 2X + 12 &= 0 && \text{add 15 to both sides} \\ 2X + 12 &= Y && \text{substitute Y for 0} \end{aligned}$$

Graph the equation on your calculator.

From the main menu, go to the GRAPH (5) menu. In the G-Func Screen, enter $2X + 12$ in for Y1 and press EXE. Press F6 (DRAW) to draw the graph.



Graph Function Screen
Figure 1



Graph of $Y = 2X + 12$
Figure 2

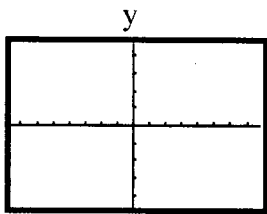
With the graph on the screen, press the left arrow twice to get a better graphical representation of the equation.

The point where a line crosses the X-axis is the **X-intercept**.

What is the X-intercept for the above line? **A.** _____

? What do you notice about the X-intercept above and the solution for the equation $2X + 12 = 0$? **B.**

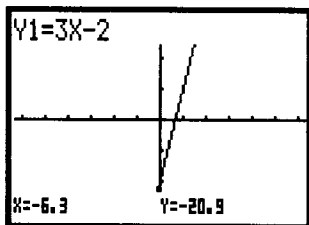
Intercepts are Best



The Cartesian Plane is named after Rene Descartes (1596-1650 AD). The x-axis is the horizontal axis and the y-axis is the vertical axis. The Cartesian Plane is sometimes called the Coordinate Plane.

Tracing a Graph

You can approximate the x-intercept by using the TRACE function. While the graph is on the screen, press F1. Press the right arrow until the Y value on the bottom of the screen gets close to zero. (You may not always get zero for Y but this will give you a very close approximation.)



Zooming In or Out

While the graph is on the screen:

Press F2 (ZOOM)
F4 (OUT) zoom out
or
F3 (IN) zoom in

Repeat the process you have the desired graph window.

Solve $5X - 17 = 13$ by graphing.

- Set equation equal to zero by subtracting 13 from each side of the equation.

$$5X - 30 = 0$$

- Substitute Y for 0 yielding $5X - 30 = Y$.

- Enter $5X - 30$ for Y1 as shown in Figure 3.

- Graph.

Notice that the line is barely on the graph screen as shown in Figure 4. To get a better view, press F2 for Zoom then F4 (Out). The resulting graph is shown in Figure 5.

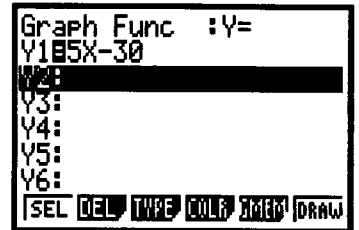


Figure 3

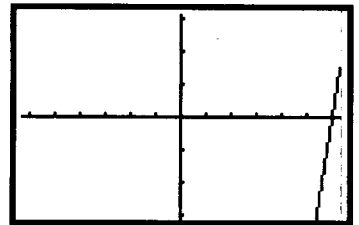


Figure 4

What is the X-intercept of the line? **C.** _____

Solve the equation for X.

What is the solution for $5X - 17 = 13$? **D.** _____

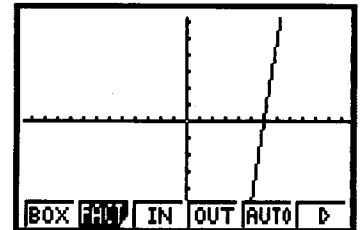


Figure 5

Find the x-intercept the following equations by graphing.

$$2X + 6 = 7$$

$$4X - 7 = -19$$

$$4X - 6 = 10$$

E. _____

F. _____

G. _____



Find the X-intercept(s) for the equations in **H-J** by graphing. (Hint: set each equation equal to zero, replace zero with Y, and graph. Look for the X-intercepts).

$$X^2 = 4$$

$$X^2 + 4X + 3 = 0$$

$$X^2 - 3X - 10 = 0$$

H. _____

I. _____

J. _____

Describe the shape of the graphs in problems H - J.

K.



How many times does each graph in **H-J** cross the X-axis? **L.** _____

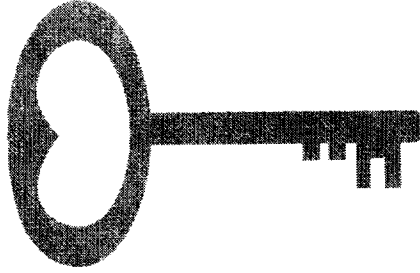
What do you notice about the X-coordinates of the x-intercepts for the corresponding equations? **M.**

Give 2 useful reasons for graphing equations:

N.

O.

Solution Key

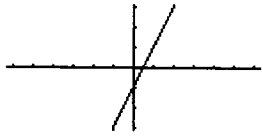


Intercepts are Best

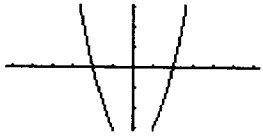
A. (-6,0)

C. (6,0)

E. $\frac{1}{2}$



H. -2, 2



K. Parabolas

M. The X-coordinate is also the solution for the equation when 0 is substituted for Y.

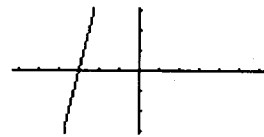
N. - O. Answers may vary.

B.

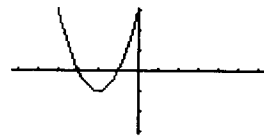
D.

The X-intercept is the same as the solution for the equation, -6.

F. -3

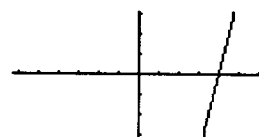


I. -3, -1



L. Twice

G. 4



J. -2, 5

