Using the Graphing Calculator to Solve Equations

(Intersection Technique)

Solve the equation: $x^2 + 2x - 3 = 4x + 5$

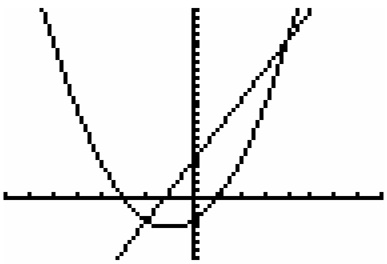
Method 1 Using the Intersection of 2 Graphs

Press $\boxed{\text{Y=}}$ on your graphing calculator to **enter your functions**

Let $Y1 = x^2 + 2x - 3$, the left side of the equation
Let $Y2 = 4x + 5$, the right side of the equation

Press $\boxed{\text{WINDOW}}$ on your graphing calculator to set the **graphing window**
Let Xmin = –8 , Xmax = 8 , Xscl = 1 , Ymin = –8 , Ymax = 25 , Yscl = 1 , Xres = 1

Press $\boxed{\text{GRAPH}}$ on your graphing calculator to **graph the 2 functions**
Your graph should look similar to the graph below



Now find the point(s) of intersection

Press $\boxed{2^{nd}}$ $\boxed{\text{CALC}}$ **Intersect** and find the 1st point of intersection of the 2 graphs

$x = -2$ $y = -3 \Rightarrow (-2, -3)$ is a point of intersection of the 2 graphs
$\Rightarrow x = -2$ is a root of the equation

Press $\boxed{2^{nd}}$ $\boxed{\text{CALC}}$ **Intersect** again and find the 2nd point of intersection of the 2 graphs

$x = 4$ $y = 21 \Rightarrow (4,21)$ is a point of intersection of the 2 graphs
$\Rightarrow x = 4$ is a root of the equation

Conclusion: The solution to the equation $x^2 + 2x - 3 = 4x + 5$ is $x = -2$ or $x = 4$

Using the Graphing Calculator to Solve Equations

(Intersection / x-intercept Technique)

Solve the equation: $x^2 + 2x - 3 = 4x + 5$

<u>Method 2 Using the x-intercept(s) of a Graph</u>

First, you must set one side of the equation equal to zero

$$\begin{array}{rcl} x^2 + 2x - 3 & = & 4x + 5 \\ \underline{\quad -4x - 5} & & \underline{-4x - 5} \\ x^2 - 2x - 8 & = & 0 \end{array}$$

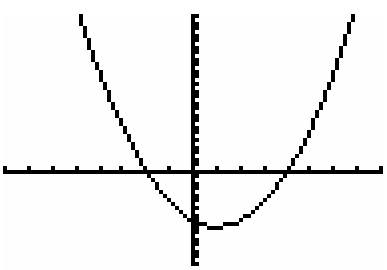
Subtract 4x from both sides of the equation and
Subtract 5 from both sides of the equation.
is the resulting equivalent equation.

Press $\boxed{\text{Y=}}$ on your graphing calculator to **enter your function**

Let $Y1 = x^2 - 2x - 8$, the left side of the equation
Let $Y2 = 0$, the right side of the equation

Press $\boxed{\text{WINDOW}}$ on your graphing calculator to set the **graphing window**
Let Xmin = –8 , Xmax = 8 , Xscl = 1 , Ymin = –15 , Ymax = 25 , Yscl = 1 , Xres = 1

Press $\boxed{\text{GRAPH}}$ on your graphing calculator to **graph the function**
Your graph should look similar to the graph below



Now find the x-intercept(s) of the graph; the intersection of the graphs.

Press $\boxed{2^{nd}}$ $\boxed{\text{CALC}}$ **Intersect** and find the 1st point of intersection of the 2 graphs

$x = -2 \quad y = 0 \quad \Rightarrow (-2,0)$ is a point of intersection of the 2 graphs
$\Rightarrow \ x = -2$ is a root of the equation

Press $\boxed{2^{nd}}$ $\boxed{\text{CALC}}$ **Intersect** again and find the 2nd point of intersection of the 2 graphs

$x = 4 \quad y = 0 \ \Rightarrow (4,0)$ is a point of intersection of the 2 graphs
$\Rightarrow \ x = 4$ is a root of the equation

Conclusion: The solution to the equation $x^2 + 2x - 3 = 4x + 5$ is $x = -2$ or $x = 4$

Using the Graphing Calculator to Solve Equations
(Zero Technique)

Solve the equation: $x^2 + 2x - 3 = 4x + 5$

<u>Method 3 Using the x-intercept(s) of a Graph</u>

First, you must set one side of the equation equal to zero

$$\begin{array}{rcl} x^2 + 2x - 3 & = & 4x + 5 \\ -4x - 5 & & \underline{-4x - 5} \\ \hline x^2 - 2x - 8 & = & 0 \end{array}$$

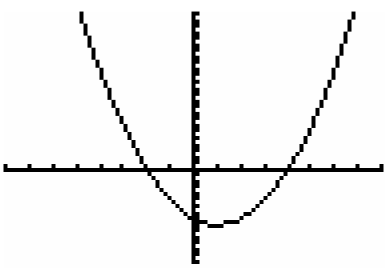
Subtract 4x from both sides of the equation and Subtract 5 from both sides of the equation.

is the resulting equivalent equation.

Press $\boxed{Y=}$ on your graphing calculator to **enter your function**
Let $Y1 = x^2 - 2x - 8$, the left side of the equation

Press $\boxed{\text{WINDOW}}$ on your graphing calculator to set the **graphing window**
Let Xmin = –8 , Xmax = 8 , Xscl = 1 , Ymin = –15 , Ymax = 25 , Yscl = 1 , Xres = 1

Press $\boxed{\text{GRAPH}}$ on your graphing calculator to **graph the function**
Your graph should look similar to the graph below



Now find the x-intercept(s) of the graph, which are the (real) zero(s) of the function

Press $\boxed{2^{nd}}\boxed{\text{CALC}}$ **zero** to find the 1st x-intercept of the graph

$x = -2 \quad y = 0 \Rightarrow x = -2$ is an x-intercept of the graph
$\Rightarrow x = -2$ is a root of the equation

Press $\boxed{2^{nd}}\boxed{\text{CALC}}$ **zero** again to find the 2nd x-intercept of the graph

$x = 4 \quad y = 0 \Rightarrow x = 4$ is an x-intercept of the graph
$\Rightarrow x = 4$ is a root of the equation

Conclusion: The solution to the equation $x^2 + 2x - 3 = 4x + 5$ is $x = -2$ or $x = 4$