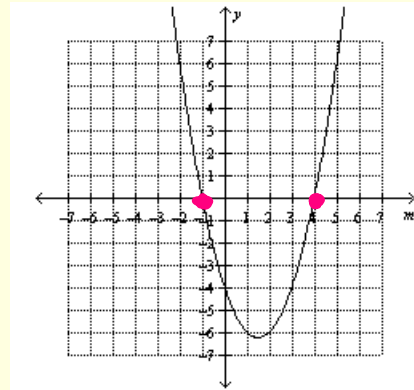


## 9.3 PART 1 SOLVING QUADRATIC FUNCTIONS BY GRAPHING

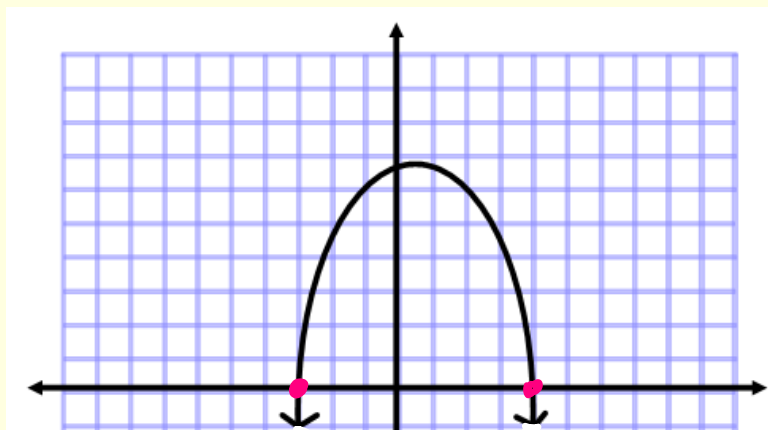
The **x-intercepts** (where the graph crosses the x-axis), are the solutions of a quadratic function that is graphed.



What are the solutions of the graph above of  $y = x^2 - 3x - 4$ ?

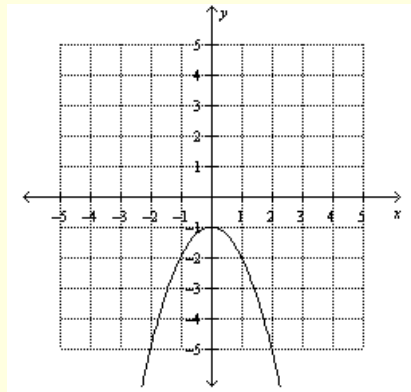
$$x = -1, 4$$

What are the solutions of the graph below?



$$x = -3, x = 4$$

What are the solutions  
of the graph below?



no solution

**EXAMPLES:** 1. Use a graph to estimate the solutions of  $x^2 - x = 2$ . Check your solutions algebraically.

Step 1: Write the equation in standard form.

$$\begin{array}{r} x^2 - x = 2 \\ \quad \quad -2 \quad -2 \\ \hline x^2 - x - 2 = 0 \end{array}$$

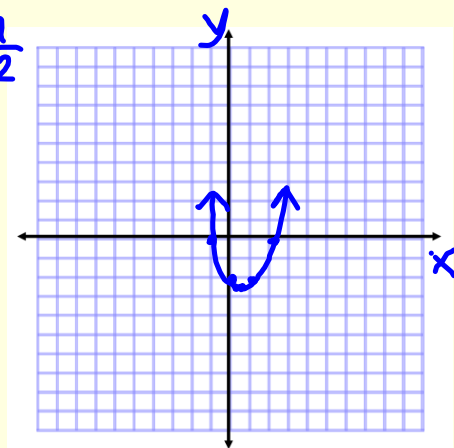
Step 2: Sketch the graph of the quadratic function.

$$x = \frac{-b}{2a} = \frac{1}{2(1)} = \frac{1}{2} \text{ a.o.s. } x = \frac{1}{2}$$

x	y
-1	$(-1)^2 - (-1) - 2 = 0$
0	$(0)^2 - (0) - 2 = -2$
1/2	$(1/2)^2 - (1/2) - 2 = -9/4$
1	$(1)^2 - (1) - 2 = -2$
2	$(2)^2 - (2) - 2 = 0$

Step 3: Estimate the values of the x-intercepts.

$$x = -1, 2$$



**EXAMPLES:** 2. Use a graph to estimate the solutions of  $x^2 + 1 = 2x$ . Check your solutions algebraically.

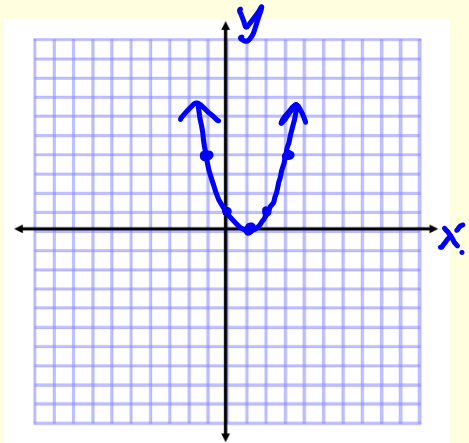
Step 1: Write the equation in standard form.

$$\begin{array}{r} x^2 + 1 = 2x \\ -2x \quad -2x \\ \hline x^2 - 2x + 1 = 0 \end{array}$$

Step 2: Sketch the graph of the quadratic function.

$$x = \frac{-b}{2a} = \frac{2}{2(1)} = \frac{2}{2} = 1 \quad \text{a.o.s. } x=1$$

x	y
-1	$(-1)^2 - 2(-1) + 1 = 4$
0	$(0)^2 - 2(0) + 1 = 1$
1	$(1)^2 - 2(1) + 1 = 0$
2	$(2)^2 - 2(2) + 1 = 1$
3	$(3)^2 - 2(3) + 1 = 4$



Step 3: Estimate the values of the x-intercepts.

$$x = 1$$

**EXAMPLES:** 3. Use a graph to estimate the solutions of  $-x^2 + 4x = 8$ . Check your solutions algebraically.

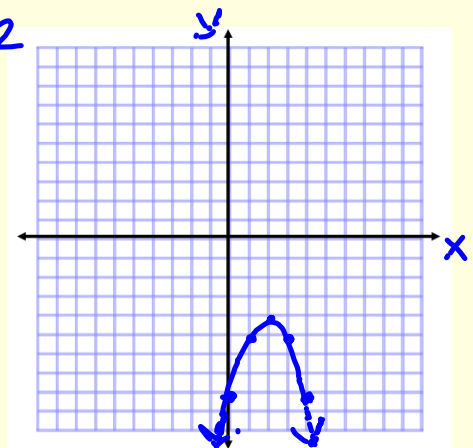
Step 1: Write the equation in standard form.

$$\begin{array}{r} -x^2 + 4x = 8 \\ -8 \quad -8 \\ \hline -x^2 + 4x - 8 = 0 \end{array}$$

Step 2: Sketch the graph of the quadratic function.

$$x = \frac{-b}{2a} = \frac{-4}{2(-1)} = \frac{-4}{-2} = 2 \quad \text{a.o.s. } x=2$$

x	y
0	$-(0)^2 + 4(0) - 8 = -8$
1	$-(1)^2 + 4(1) - 8 = -5$
2	$-(2)^2 + 4(2) - 8 = -4$
3	$-(3)^2 + 4(3) - 8 = -5$
4	$-(4)^2 + 4(4) - 8 = -8$



Step 3: Estimate the values of the x-intercepts.

no solution