

**Graphing  
Parabolas**

**Standard Form of a Parabola:**  $y = ax^2 + bx + c$

1a. How does "a" affect the graph of the parabola?

*a determines if the graph opens up or down.  
if  $a > 0$  then  $\uparrow$ .  
if  $a < 0$  then  $\downarrow$ .*

1b. How does "c" affect the graph of the parabola?

*c is the y-intercept of the graph.*

2. Graph:  $y = x^2 - 2x - 6$

**a. Find the axis of symmetry**

axis:  $x = \frac{-b}{2a}$

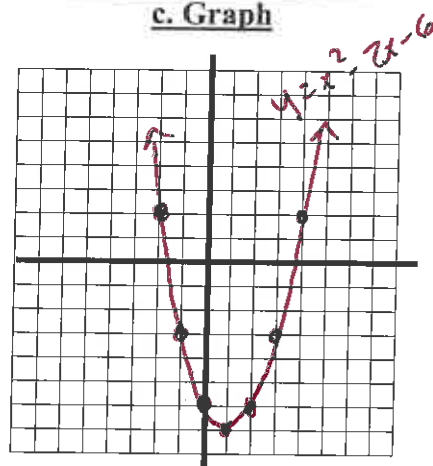
$x = \frac{-(-2)}{2(1)} = \frac{2}{2} = 1$

$x = 1$

**b. Make a Table**

x	y
-2	2
-1	-3
0	-6
axis $\rightarrow$ 1	-7
2	-6
3	-3
4	2

**c. Graph**



3. Graph:  $y = x^2 - 3x$

**a. Find the axis of symmetry**

$x = \frac{-b}{2a}$

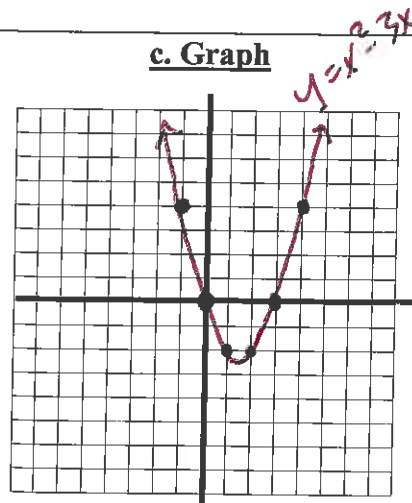
$x = \frac{-(-3)}{2(1)} = \frac{3}{2}$

$x = \frac{3}{2}$

**b. Make a Table**

x	y
-1	4
0	0
1	-2
$\frac{3}{2}$	-2.25
2	-2
3	0
4	4

**c. Graph**



## Vertex Form of a Parabola: $y = a(x-h)^2 + k$

The point  $(h, k)$  is the vertex of the parabola. (vertex is on the axis of symmetry)

4. Graph:  $y = (x+3)^2 - 1$

a. Find the axis of symmetry	b. Make a Table	c. Graph																
vertex = $(-3, -1)$  axis is $x = -3$	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr><td>-6</td><td>8</td></tr> <tr><td>-5</td><td>3</td></tr> <tr><td>-4</td><td>0</td></tr> <tr><td>-3</td><td>-1</td></tr> <tr><td>-2</td><td>0</td></tr> <tr><td>-1</td><td>3</td></tr> <tr><td>0</td><td>8</td></tr> </tbody> </table>	x	y	-6	8	-5	3	-4	0	-3	-1	-2	0	-1	3	0	8	
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5. Write  $y = x^2 - 2x - 6$  in Vertex Form by Completing the Square. State the coordinates of the vertex.

$$y + 6 = x^2 - 2x$$

$$(-1)^2 + y + 6 = x^2 - 2x + (-1)^2$$

$$1 + y + 6 = (x - 1)^2$$

$$y + 7 = (x - 1)^2$$

$$y = (x - 1)^2 - 7$$

vertex is  $(1, -7)$

6. Solve the system of equations by graphing.

$$\begin{cases} y = x + 4 \\ y = -x^2 - 2x + 8 \end{cases}$$

line  
Slope =  $\frac{1}{1}$   
 $b = 4$

parabola

x	y
-4	0
-3	5
-2	8
-1	9
0	8
1	5
2	0

axis:  
 $x = \frac{-(-2)}{2(-1)}$   
 $= \frac{2}{-2}$   
 $x = -1$

