**QUADRATIC FUNCTION AND THEIR GRAPHS**

Graph each parabola.  Label the vertex, axis of symmetry, and find at least four other points.

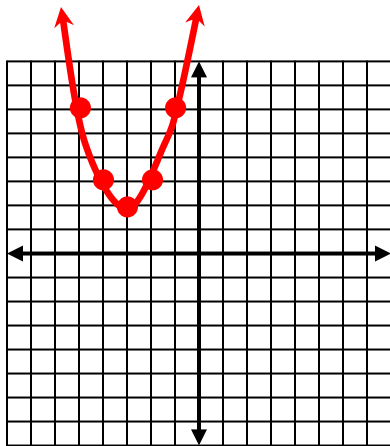**Method #1** (the one you learned in Algebra II)

Examples:

Complete the square

"Vertex Form"

$y = a(x - h)^2 + k$

Vertex = (h,k)

Axis of sym:     x = h

Other coordinates

| x | y |
|---|---|

1)      $y = x^2 + 6x + 11$

$y = x^2 + 6x +$ ___ $+ 11 -$ ___

$y = x^2 + 6x + 9 + 11 - 9$

$y = (x + 3)(x + 3) + 2$

$y = (x + 3)^2 + 2$

Vertex = (-3, 2)

2)      $y = -2x^2 + 4x$

Divide by (-2) first!

$y/-2 = x^2 - 2x$

$y/-2 = x^2 - 2x +$ ___ $-$ ___

$y/-2 = x^2 - 2x + 1 - 1$

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

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

Multiply by (-2) last!

Vertex = (1, 2)

Graphs for #1-2:
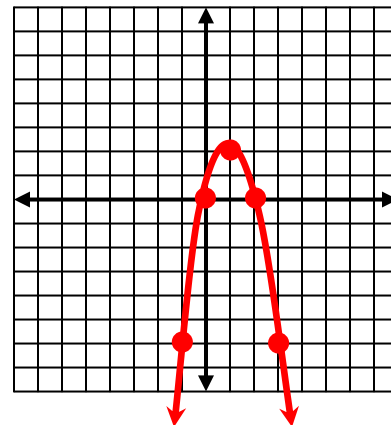


| x | y |
|----|---|
| -3 | 2 |
| -2 | 3 |
| -1 | 6 |



| x | y |
|---|----|
| 1 | 2 |
| 2 | 0 |
| 3 | -6 |

**Method #2** (axis of symmetry formula)

Examples:

The formula:     $x = \dfrac{-b}{2a}$

Vertex = (x, ?)

Axis of symmetry:      x = x

Other coordinates

| x | y |
|---|---|

3)      $y = 2x^2 - 8x + 5$

$x = \dfrac{-(-8)}{2(2)} = \dfrac{8}{4} = 2$

plug the 2 in to get the "y"

$y = 2(2)^2 - 8(2) + 5$
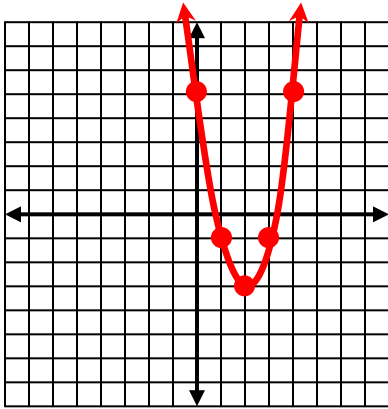
$y = -3$

Vertex = (2, -3)

4)      $y = 7 - 3x^2$

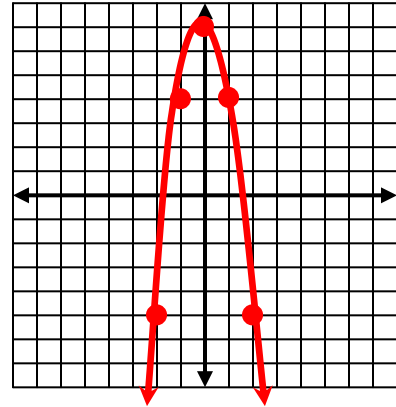$x = \dfrac{0}{2(-3)} = \dfrac{0}{-6} = 0$

$y = 7 - 3(0)^2$

$y = 7$

Vertex = (0, 7)

Graphs for #3-4:

| x | y |
|---|---|
| 2 | -3 |
| 1 | -1 |
| 0 | 5 |

| x | y |
|---|---|
| 0 | 7 |
| 1 | 4 |
| 2 | -5 |