Graphing in quadratics in vertex form:

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

opens up/down
skinny/fat
left/right (opp)
up/down

Example 1: Graph each quadratic and identify the vertex.

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

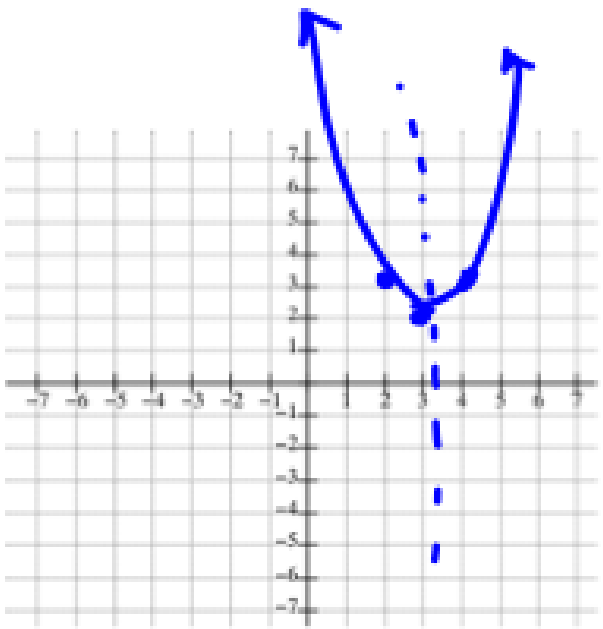
right 3 up 2

$x = 4$

$(4-3)^2 + 2$

$1^2 + 2$

$1 + 2 = 3$ $(4, 3)$



b) $y = 2x^2 - 5$

skinny

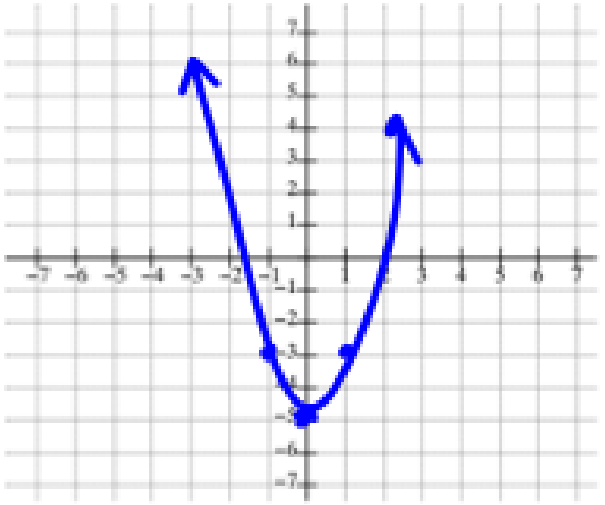
down 5

$x = 1$

$2(1)^2 - 5$

$2(1) - 5$

$2 - 5 = -3$



c) $y = -\frac{1}{2}(x+4)^2$

$-\frac{1}{2}$ open down

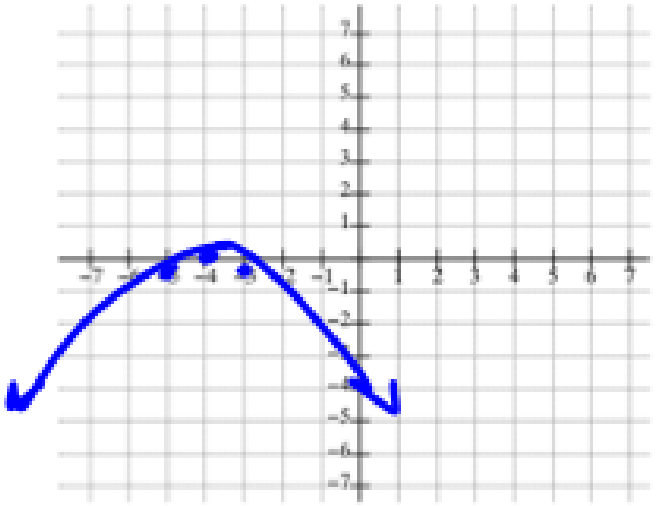
$\frac{1}{2}$ fat

left 4

$-\frac{1}{2}(-3+4)^2$

$-\frac{1}{2}(1)^2$

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



$(-3, -\frac{1}{2})$

Graphing quadratics in intercept form:

Intercept Form: $y = a(x - p)(x - q)$

OPP

To find the vertex:

1. Find the line of symmetry. $x = h$
2. Plug h in for both x's and solve for y.

Example 2: Graph each quadratic and identify the vertex.

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

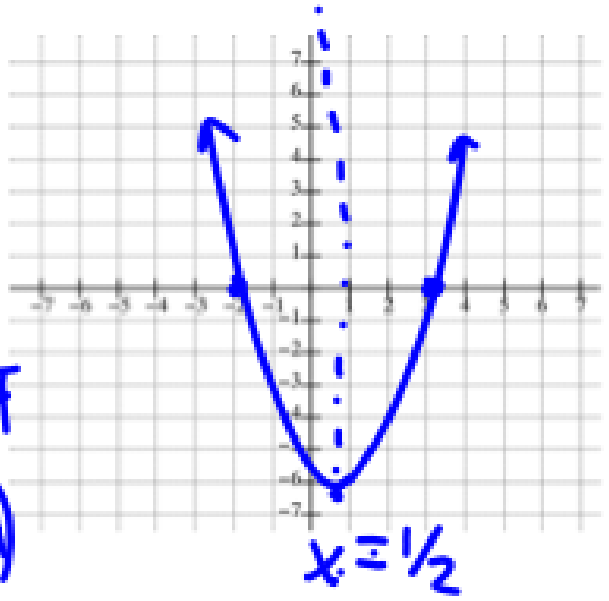
$x = 1/2$

$\left(\frac{1}{2} - 3\right)\left(\frac{1}{2} + 2\right)$

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

$\left(-\frac{5}{2}\right)\left(\frac{5}{2}\right) = -\frac{25}{4} = -6\frac{1}{4}$

$\left(\frac{1}{2}, -6\frac{1}{4}\right)$



b) $y = -3x(x + 4)$

$-3(x-0)(x+4)$

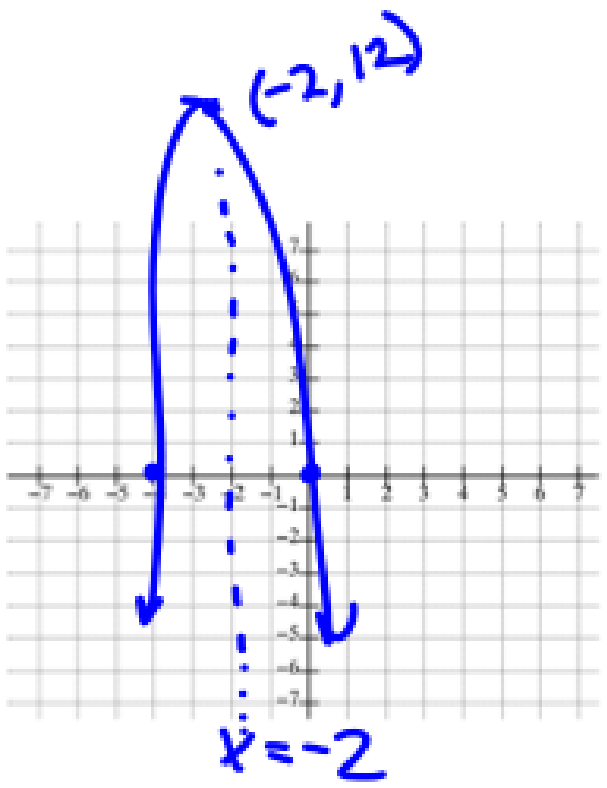
$x = -2$

$-3(-2)(-2+4)$

$6(2)$

12

$(-2, 12)$



c) $y = 0.25(x - 2)(x + 2)$

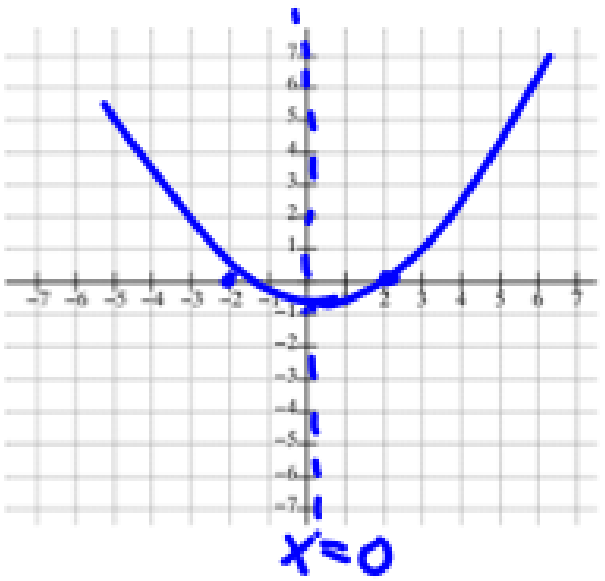
~~0.25~~

$\frac{1}{4}(0-2)(0+2)$

$\frac{1}{4}(-2)(2)$

$\frac{1}{4}(-4) = -1$

$(0, -1)$



Graphing quadratics in standard form:

Standard Form: $y = ax^2 + bx + c$

Rewrite in vertex form by **completing the square**.

Example 3: Rewrite each quadratic in vertex form then graph.

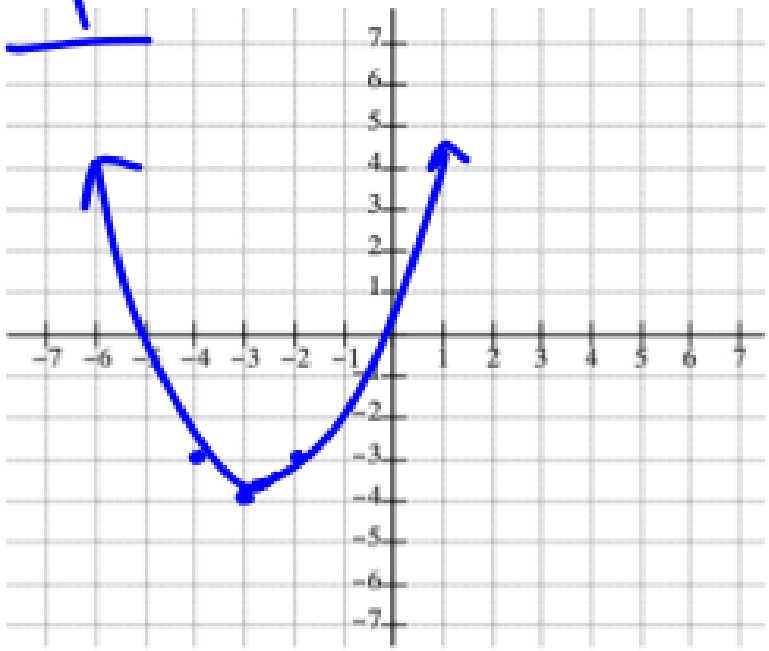
a) $y = x^2 + 6x + 5$

$y = (x^2 + 6x + \underline{9}) + 5 - \underline{9}$

$\left(\frac{6}{2}\right)^2$

$(x+3)(x+3)$

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



Example 3: Rewrite each quadratic in vertex form then graph.

b) $y = x^2 + 8x + 10$

$y = (x^2 + 8x + \underline{16}) + 10 - \underline{16}$

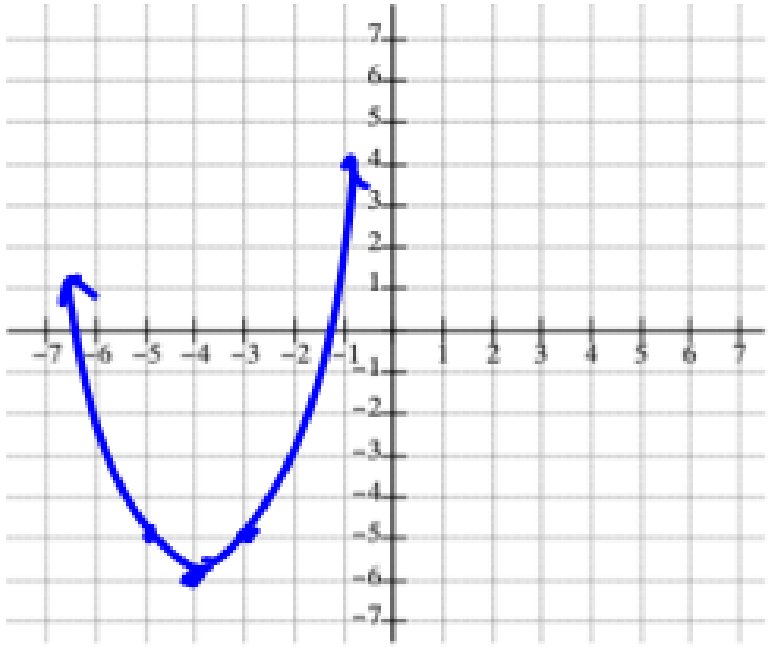
$y = (x+4)^2 - 6$

$x = -5$

$(-5+4)^2$

$(-1)^2$

$1 - 6 = -5$



Example 3: Rewrite each quadratic in vertex form then graph.

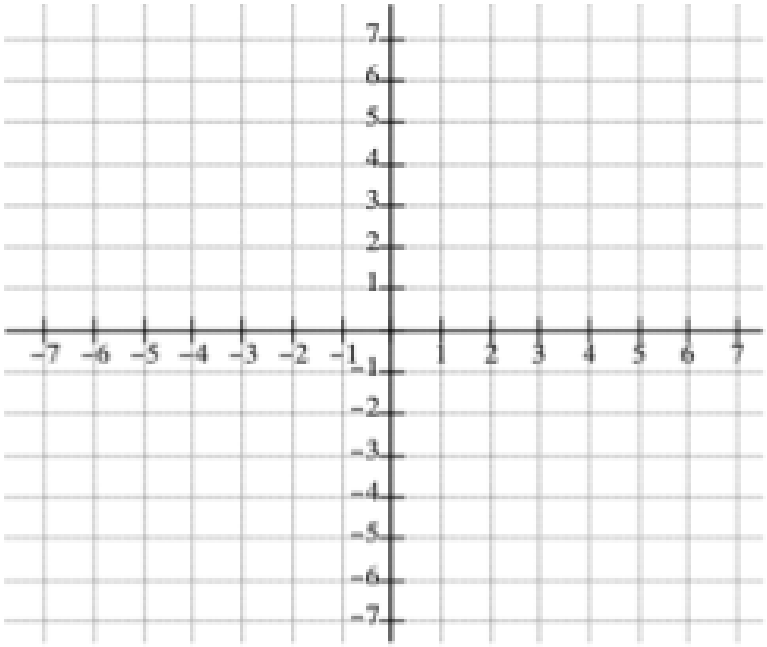
c) $y = 3x^2 - 12x + 24$

$3x^2 - 12x + \_\_\_) + 24 - \_\_\_$

$y = 3(x^2 - 4x + 4) + 24 - 12$

$y = 3(x-2)^2 + 12$

(2, 12)



Example 3: Rewrite each quadratic in vertex form then graph.

d) $y = -2x^2 + 10x - 9$