# 5.4: Graphing from Intercept Form

(or factored form)

What is an intercept? (x) Spot where the graph crosses the x-axis

The 2nd method to graph a quadratic function is to use intercept form. This form is beneficial because once a quadratic is in intercept form you can quickly find the X intercepts!

**INTERCEPT FORM:** $y = a(x-p)(x-q)$ p & q are x-intercepts

* x-intercepts are the solutions if you set the equation equal to 0

Let's practice graphing a parabola from intercept form:

How to find the Vertex in Intercept Form:

x: Halfway between two x-intercepts

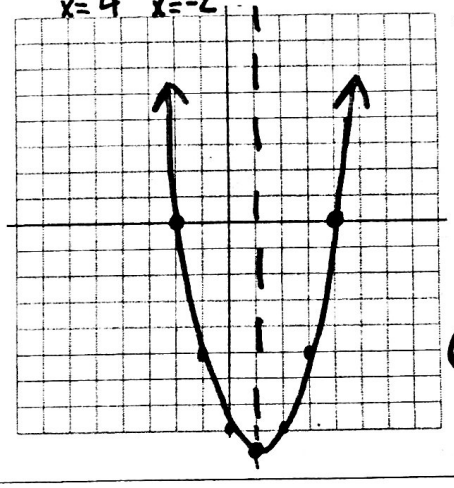
y: Plug the x-coordinate into the equation

* You can also use the a-value to find more points once you have the vertex

*Graph* $y = (x-4)(x+2)$

$0 = (x-4)(x+2)$

$x=4 \quad x=-2$



Vertex

$x = 1$

$y = (1-4)(1+2)$

$= (-3)(3)$

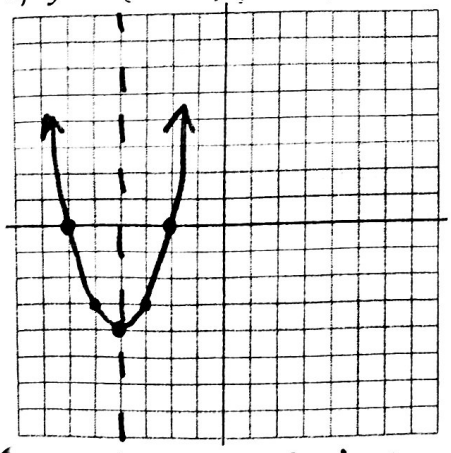
$= -9$

$(1,-9)$

$a=1$ (use pattern from 5.3)

*Example 1: Graph the following quadratic equations*

a) $y = (x+2)(x+6)$



x-int

$(x+2) \rightarrow (-2,0)$

$(x+6) \rightarrow (-6,0)$

Vertex

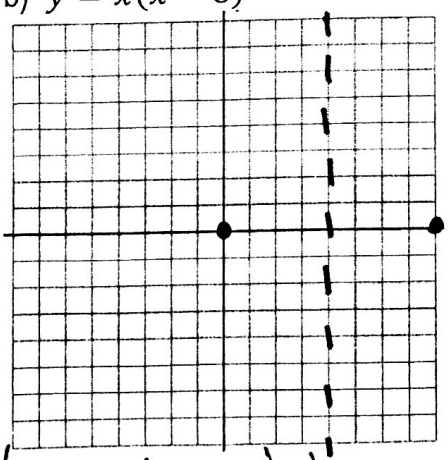
$x = -4$

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

$= (-2)(2) = -4$

$(-4,-4)$

b) $y = x(x-8)$



x-int

$(0,0)$

$(8,0)$

Vertex

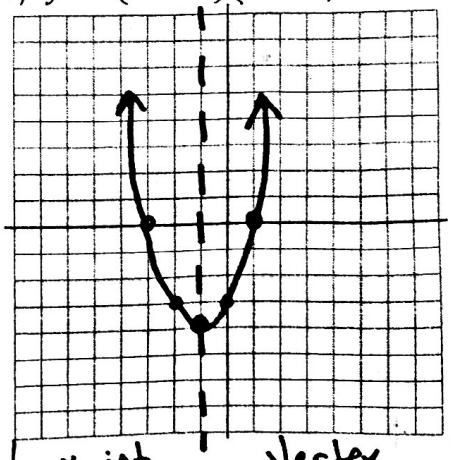
$x = 4$

$y = 4(4-8)$

$= 4(-4) = -16$

$(4,-16)$

c) $y = (x-1)(x+3)$



x-int

$(1,0)$

$(-3,0)$

Vertex

$x = -1$

$y = (-1-1)(-1+3)$

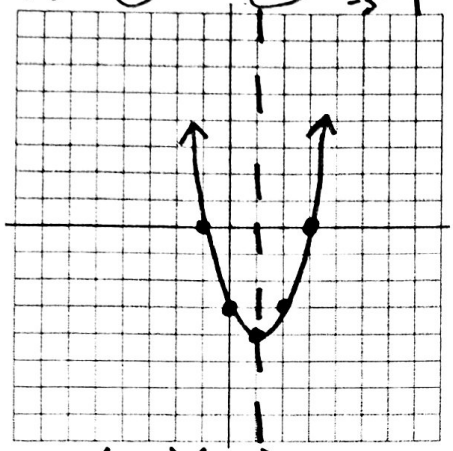
$= (-2)(2) = -4$

$(-1,-4)$

Sometimes, however, you won't be given the equation in factored form. If you factor the equation first, you can graph it using the same steps as above.

*Example 2: Graph the following quadratic equations*

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



$y = (x-3)(x+1)$ $a=1$

$x=3$ $x=-1$

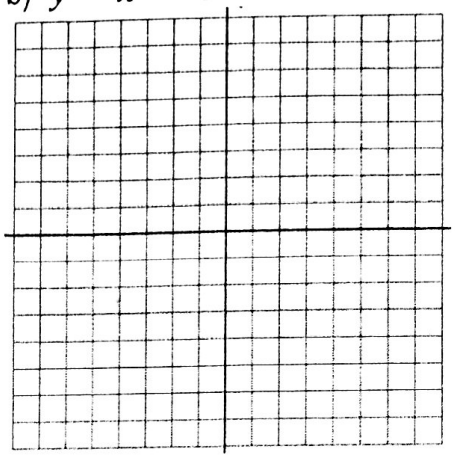
Vertex

$x=1$ $y=(1-3)(1+1)$

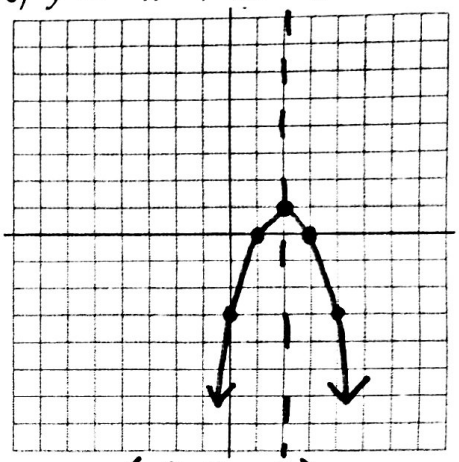
$= (-2)(2) = -4$

$(1,-4)$

b) $y = x^2 - 8x + 15$



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



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

$y = -(x-3)(x-1)$ $a=-1$

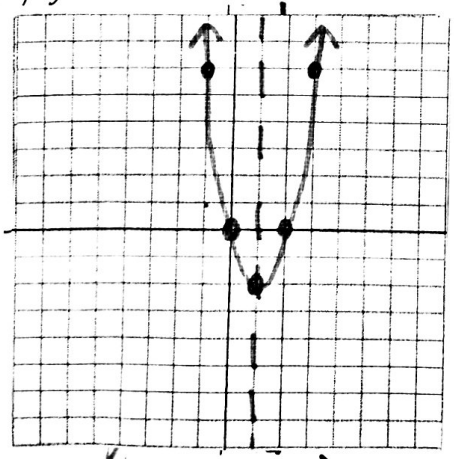
$x=3$ $x=1$

Vertex

$x=2$ $y=-(2-3)(2-1)$

$= -(-1)(1) = 1$ $(2,1)$

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



$y = 2x(x-2)$

$x=0$ $x=2$

Vertex

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

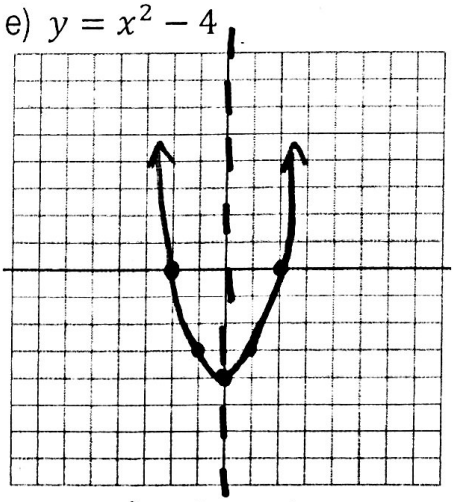
$= 2(1)(-1) = -2$

$(1,-2)$

$a=2$ $1a = 1(2) = 2$ over 1, up 2

$3a = 3(2) = 6$ over 1, up 6

e) $y = x^2 - 4$



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

$x=-2$ $x=2$

Vertex

$x=0$ $y=(0+2)(0-2)$

$= (2)(-2) = -4$

$(0,-4)$

$a=1$

f) $y = -2x^2 - 12x - 16$