Reading and Graphing Simple Quadratics

Definitions:
A ***Quadratic Equation*** is a two-variable equation with an x^2 in it.
Factors are the constituent parts of a quadratic written in $(x + a)(a + b)$ -form.
Roots are the <u>x-intercepts</u> of a parabola.

Formulas:
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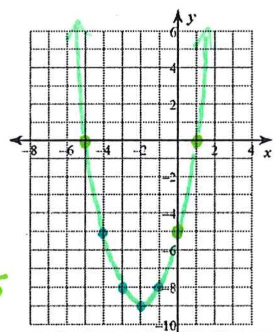
Example #1:

$y = x^2 + 4x - 5$

(X+5)(X-1)

x = -5 , x = 1   c = -5



1-3-5-7 Pattern

Our first step was to find the factors for the quadratic. Since 5 times -1 is '-5' and since 5 plus -1 in '4,' our factors are (x+4) and (x-1).

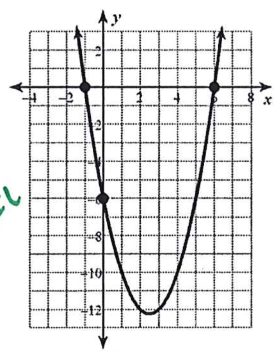
Example #2:

x = -1 , x = 6

(X+1)(X-6)

$x^2 - 6x + 1x - 6$ FOIL

y = $x^2 - 5x - 6$



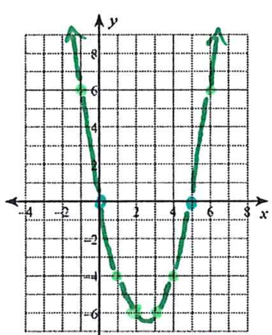
The two roots I see are at x = -1 and x = 6. My job is first to find the roots, then to turn them into factors, and then to use the FOIL, multiplying for Firsts, Outers, Inners, and Lasts. Lastly, I combine my like-terms.

Example #3:

$y = x^2 - 5x + 0$

(X+0)(X-5)

x = 0 , x = 5   c = 0



2-4-6-8 Pattern

We have and unusual quadratic here in that the c-value, the y-intercept is '0' and one of the factors can be viewed as a one-part number. Our factors will be (x+0)(x-5) or just x(x-5). Our roots look like opposites as x=0 and x=5.

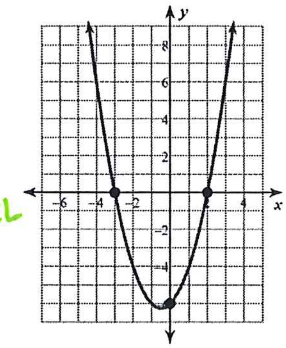
Example #4:

x = -3 , x = 2

(X + 3)(X − 2)

x² − 2x + 3x − 6 FOIL

y = X² + 1x − 6



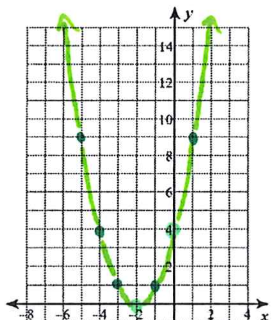
Once again I begin by identifying my roots, turning them into factors, and FOIL-ing the factors. My last step is to combine like-terms.

Example #5:

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

(X + 2)(X + 2)

x = −2 , x = −2 c = 4



1-3-5-7 Pattern

This is a special graph as well. When factoring we found that we had two copies of the same factor and that both roots are in the same place. We had to be careful to choose the pattern but as it turns out whenever there is only one root, we graph with the 1-3-5-7 pattern.

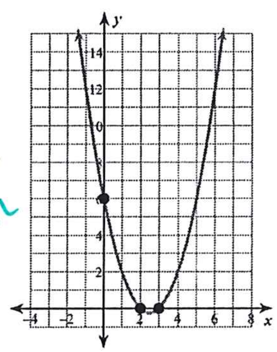
Example #6:

x = 2 , x = 3

(X − 2)(X − 3)

X² − 3x − 2x + 6 FOIL

y = X² − 5x + 6



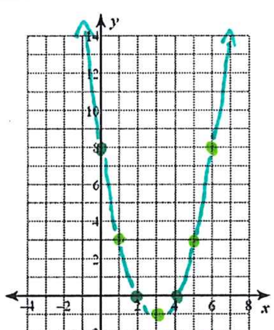
Item 6 is just like the other evens. I began by identifying my roots, converting them into factors, FOIL-ing the factors, and them I combine like-terms.

Example #7:

$y = x^2 - 6x + 8$

(X − 2)(x − 4)

x = 2 , x = 4 c = 8



1-3-5-7 Pattern

This example caused me to find the factors (x-4) and (x-2) since they multiplied to a positive, '8' but added to a negative, '-6.' I found that I had to carefully choose my pattern since I did not have a root right next to the y-axis. As with the other examples, I began by factoring, then finding the roots, then graphing the roots and the y-intercept with a fitting pattern.

Example #8:

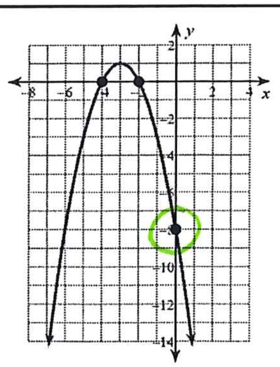
x = −4 , x = −2

(x + 4)(x + 2)

x² + 2x + 4x + 8

y = X² + 6x + 8

y = − X² − 6x − 8



Eight seems to be a special case. My roots are x=-4 and x=-2, making the factors (x+4) and (x+2). When I FOIL, I find that my formula should be $y = x^2 + 6x + 8$. Since the c-value is '8' the y-intercept should be at '8' as well. We notice also that the parabola is upside-down. This tells us that we have multiplied by a '-1' which switch every value in the tri-nomial from $y = x^2 + 6x + 8$ to $y = -x^2 - 6x - 8$.