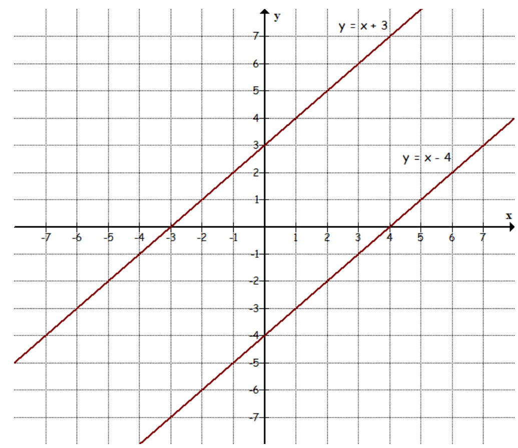
Name: ____ Date: ______________________

Factored Form Investigation

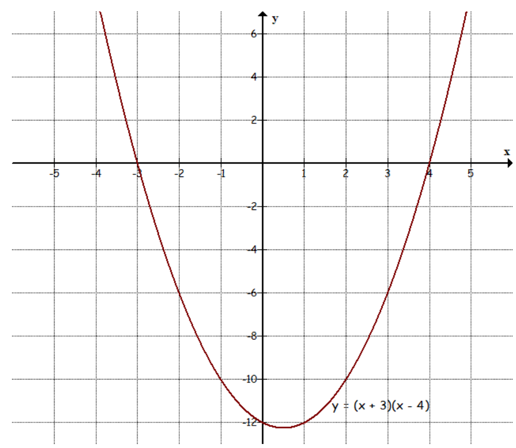
First you'll find the roots of an equation in factored form from its graph.

$$y = a(x - r_1)(x - r_2)$$

Step 1: On the grid to the right are the graphs of the equations $y = x + 3$ and $y = x - 4$. What is the x-intercept of each equation



Step 2: On the grid to the right is the graph of $y = (x + 3)(x - 4)$. Describe the graph. Where are the x-intercepts of this graph?



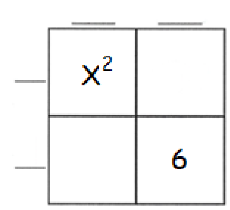
The equation $y = (x + 3)(x - 4)$ is called the **factored form** of the equation because it is expressed as a product of one or more polynomials. Its equivalent general form equation is $y = x^2 - x - 12$. The factored form of a polynomial equation provides an effective way to determine the values of x that make the equation equal to 0 because of the **zero-product property** as defined below.

Zero Product Property

If $ab = 0$, then either $a = 0$ or $b = 0$.

Now you'll learn how to find the roots (x-intercepts) from the general form.

Step 3: Complete the rectangle diagram whose sum is $x^2 + 5x + 6$. A few parts of the diagram have been labeled to get you started.



Step 4: Write the multiplication expression of the rectangle diagram in factored form.

Step 5: Find the roots of the equation $0 = x^2 + 5x + 6$ from its factored form.

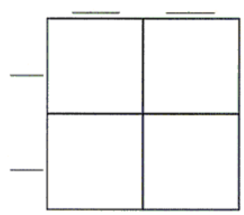
Step 6: Rewrite each equation in factored form by completing a rectangle diagram. Then find the roots of each. Check your work by making a graph.

a. $0 = x^2 + 7x + 10$

_____ + _____ = _____

_____ * _____ = _____

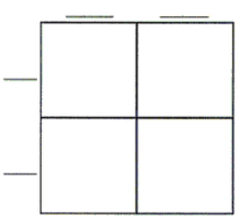
b. $0 = x^2 + 6x - 16$



_____ + _____ = _____

_____ * _____ = _____

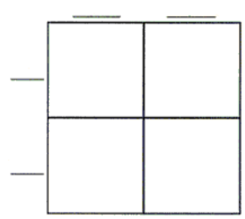
c. $0 = x^2 - 2x - 48$



_____ + _____ = _____

_____ * _____ = _____

d. $0 = x^2 - 11x + 28$



_____ + _____ = _____

_____ * _____ = _____

Step 7: Write the function $f(x) = x^2 - 12x$ in factored form. Determine the zeros of the function.