Date: _____

## 3.3 Factored Form of a Quadratic Relation

| Factored Form: | **y = a(x - r)(x - s)** |
|---|---|

In a quadratic relation in factored form:

- 'a' tells you the direction of opening (+ → up; - → down)
- (x, y) is any point on the parabola
- r and s are the zeros (r, 0) and (s, 0)

ex/ y = -3(x - 2)(x + 3) opens down and has zeros at (2, 0) and (-3, 0). Why does the sign change????

Practice Problems:

1) Without graphing, determine the direction of opening, the zeros, and the equation of the axis of symmetry for the parabola represented by y = 4(x - 1)(x + 4).

To find the zeros:

x - r = 0, so x = r

x - s = 0, so x = s

*Change the sign!

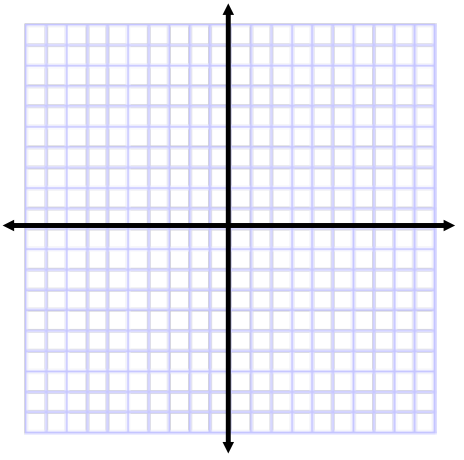
2) Without graphing, determine the direction of opening and the zeros for the parabola represented by y = - (x + 1)(x + 1).

What does it mean when r = s?

## Sketching a Quadratic Relation in Factored Form

To sketch a graph given a relation in factored form:
- find the zeros and the vertex;
- plot these three points;
- draw a smooth curve through the three points;
- label it with the equation.

ex/ Sketch the graph of $y = -\frac{1}{2}(x - 2)(x - 4)$



## Finding an Equation in Factored Form

When you are given the zeros and any other point on the parabola, you can write a relation to represent the parabola in factored form by solving for 'a'.

ex 1/ Find a relation in factored form for a parabola with zeros at -2 and 6 that passes through (1, 4).

****Remember that your final equation has an 'x' and a 'y' in it!****

ex 2/ A ball is thrown from a roof that is 6 m above the ground. It reaches a maximum height of 13 m above the ground 3 seconds after it is thrown. The ball follows a parabolic path and hits the ground 7 seconds after it is thrown.

a) Draw an accurate sketch.
b) Write a relation to represent the path of the ball.
c) Find the height of the ball after 5 seconds.