**INTERCEPT FORM OF A QUADRATIC**

**Intercept form of a Quadratic** \( y = a(x - p)(x - q) \)

This form helps you find the \( x \)-intercepts, also called zeros and solutions, from the equation. To do this replace the \( y \)-value with zero and then solve for the variable \( x \).

**Example #1** – Find the zeros given each of the following quadratic equations.

a) \( y = (x+6)(x+2) \)  
   b) \( y = 2(x+3)(x-1) \)  
   c) \( y = -\frac{1}{2}(x-3)(x+1) \)  
   d) \( f(x) = 5(x-3)^2 \)

**Example #2** – Find the zeros for each of the following quadratic equations by writing each equation in intercept form first.

a) \( y = x^2 + 9x + 18 \)  
   b) \( y = 8x^2 - 50x \)  
   c) \( x^2 - 18x + 81 = 0 \)  
   d) \( y = 6x^2 + 3x - 30 \)

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*Note: The technique of solving a quadratic only holds true if the expression is set equal to zero.*
Finding the Axis of Symmetry from Standard Form

Find the x-intercepts.

Average the distance between the x-intercepts to find the x-coordinate of the vertex using $x = \frac{p+q}{2}$.

Find the y-coordinate of the vertex by substituting in the x-coordinate of the vertex.

Example #3 – Find the zero(s), axis of symmetry and vertex given each quadratic equation.

a) $2x^2 + 10x + 12 = 0$  
b) $f(x) = 5x^2 + 4x - 1$  
c) $x^2 - 6x - 24 = 3$

Zero(s): ________________  
Zero(s): ________________  
Zero(s): ________________

Axis of Symmetry: _______  
Axis of Symmetry: _______  
Axis of Symmetry: _______

Vertex: ___________  
Vertex: ___________  
Vertex: ___________

Remember: the axis of symmetry is half way between the two x-intercepts because parabolas are _________.

Example #4 – Write the equation of the parabola in intercept form whose zeros are at -2 and 5, and passes through the point (6,2).
1. Find the zeros given each of the following quadratic equations.
   a) \(49x^2 - 16 = 0\)  
   b) \(y = x^2 - 9\)  
   c) \(3m^2 - 3m = 0\)  
   d) \(y = x^2 + 10x + 25\)  
   e) \(y = x^2 - 7x + 6\)  
   f) \(3t^2 - 8t + 7 = 2\)  

2. Write the equation of the parabola in intercept form whose zeros are at -2 and 5, and passes through the point (3,9).

3. Find the \(x\)-intercepts, axis symmetry and vertex of each of the following.
   a) \(y = -2(x - 2)(x + 4)\)  
   b) \(y = -x^2 + 6x - 8\)  
   c) \(y = 2x^2 - 28x + 90\)  

Zero(s): ____________  
Axis of Symmetry: ______  
Vertex: ____________  
Zero(s): ____________  
Axis of Symmetry: ______  
Vertex: ____________  
Zero(s): ____________  
Axis of Symmetry: ______  
Vertex: ____________