MBF 3C: UNIT 5 – Factoring and Expanding with Quadratics
Lesson 7: Zeros and the Axis of Symmetry

More about the parabola!

1. Fill in the table for each parabola equation. BE CAREFUL! Some information is not given by certain equations!

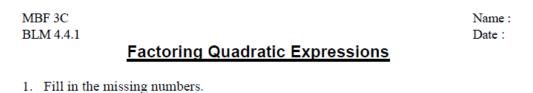| Equation	$y = 2(x - 5)(x + 9)$	$y = -(x + 2)^2 + 6$	$y = 4(x+2)(x + 8)$
Zeros			
Direction of Opening			
Axis of Symmetry			
Step Pattern			
Vertex			

2. A cannonball is shot into the air. Its height can be described by the equation $h = -3(t - 1)(t - 9)$ where h is height in feet and t is time in seconds.

(a) What are the zeroes of this relation? _____ and _____

(b) What do the zeroes mean in this situation?

(c) What is the axis of symmetry and what does it represent?

(d) Use the axis of symmetry to find the vertex and explain what the vertex means for the cannonball.

3. The equation $P = -0.5(n - 500)(n - 10)$ describes a company's profit P, based on how many units are sold, n. What are the break even points of the company, and how many units must be sold to make a maximum profit?

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Question 1	Building Reward		*Question 2*	Building Reward	
	S: 2	M: 3		S: 2	M: 3

What are the zeroes of

$$y = (x - 4)(x + 8) \ ?$$

What are the zeroes of

$$y = -2(x - 5)(x + 17) \ ?$$

Question 3	Building Reward		*Question 4*	Building Reward	
	S: 3	M: 5		S: 2	M: 3

What is the axis of symmetry of

$$y = (x - 5)(x + 13) \ ?$$

What is the axis of symmetry of

$$y = 3(x - 4)^2 + 8 \ ?$$

Question 5	Building Reward		*Question 6*	Building Reward	
	S: 10	M: 10		S: 7	M: 7

What are the zeroes of

$$y = 2(x + 3)^2 - 8 \ ?$$

What is the vertex of

$$y = (x - 4)(x + 8) \ ?$$

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Factoring Quadratic Expressions

1. Fill in the missing numbers.

   (a) $(x - 3)(x + 4) = x^2 + x + \underline{\hspace{0.5cm}}$

   (b) $(x - 6)(x + 2) = x^2 + \underline{\hspace{0.5cm}} x + \underline{\hspace{0.5cm}}$

   (c) $(x + \underline{\hspace{0.5cm}})(x + 2) = x^2 + 5x + 6$

   (d) $(x + 3)(x + \underline{\hspace{0.5cm}}) = x^2 - 6x - 27$

   (e) $(x + \underline{\hspace{0.5cm}})(x + \underline{\hspace{0.5cm}}) = x^2 + 9x + 14$

2. Factor each expression.

(a) $x^2 - 3x - 4$	(b) $x^2 - 11x + 28$	(c) $x^2 + 7x + 12$
(d) $x^2 - 4x - 32$	(e) $x^2 - 13x + 42$	(f) $x^2 - 4x + 4$

3. Connecting to prior lessons, by factoring standard form, we can change a parabola's equation into factored form!

   Given the equation: $y = x^2 + 8x + 15$

   (a)   state the y – intercept _____

   (b)   write the expression in factored form $y =$ _____

   (c)   the zeros of the parabola are _____ and _____

   (d)   the vertex of the parabola is _____
          (hint: the vertex is located halfway between the zeros)

   (e)   the axis of symmetry of the parabola is _____