

Math-2A

Lesson 7-7

Review Quadratic Equation

Multiplying Binomials The “Box Method”

$$(x - 3)(x + 4)$$

	x	4
x	x^2	$4x$
-3	$-3x$	-12

$$x^2 + 4x - 3x - 12$$

$$x^2 + x - 12$$

$$(x - 3)(x + 4)$$

Left times left is left

Right plus right is middle

Right times right is right

$$(x - 1)(x + 5)$$

	x	5
x	x^2	$5x$
-1	$-x$	-5

$$x^2 + 5x - x - 5$$

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

$$1 * 20 = 20$$

These are all of the terms in "the box"

$$x^2 + 9x + 20$$

$$4 + 5 = 9$$

Other factors of 20
that add up to 9?

$$20 = 4 * 5$$

This tells us to break
9x into 4x + 5x

$$x^2 + 9x + 20$$

$$x^2 + 4x + 5x + 20$$

	x	4
x	x^2	$4x$
5	$5x$	20

What is the common
factor of the first row?

$$x * (x + 4)$$

Fill in the table.

$$x^2 + 9x + 20$$

$$\rightarrow (x + 4)(x + 5)$$

Factor the following quadratic expressions:

$$x^2 + 11x + 30 \rightarrow (x + 5)(x + 6)$$

$$x^2 - 10x - 24 \rightarrow (x - 12)(x + 2)$$

$$x^2 - 8x + 15 \rightarrow (x - 5)(x - 3)$$

Standard Form Quadratic Equation

$$y = ax^2 + bx + c$$

$$y = x^2 + 11x + 30$$

$$y = (x + 5)(x + 6)$$

$$y = x^2 - 10x - 24$$

$$y = (x - 12)(x + 2)$$

$$y = x^2 - 8x + 15$$

$$y = (x - 5)(x - 3)$$

Intercept Form Quadratic Equation

$$y = a(x - p)(x - q)$$

The Zero Product Property: Zero multiplied by any number equals zero (elementary school definition).

The Zero Product Property: If two numbers are multiplied together and the product equals zero, then one or both of the factors must equal zero.

$$A * B = 0$$

→ either $A = 0$ or $B = 0$ or both A and B equal zero.

$$0 = (x + 6)(x - 1)$$

$$0 = A * B$$

Zero Product Property: either
 $x + 6 = 0$ or $x - 1 = 0$

$$y = (x + 4)(x - 2)$$

The y-value of an x-intercept always equals Zero

$$0 = (x + 4)(x - 2)$$

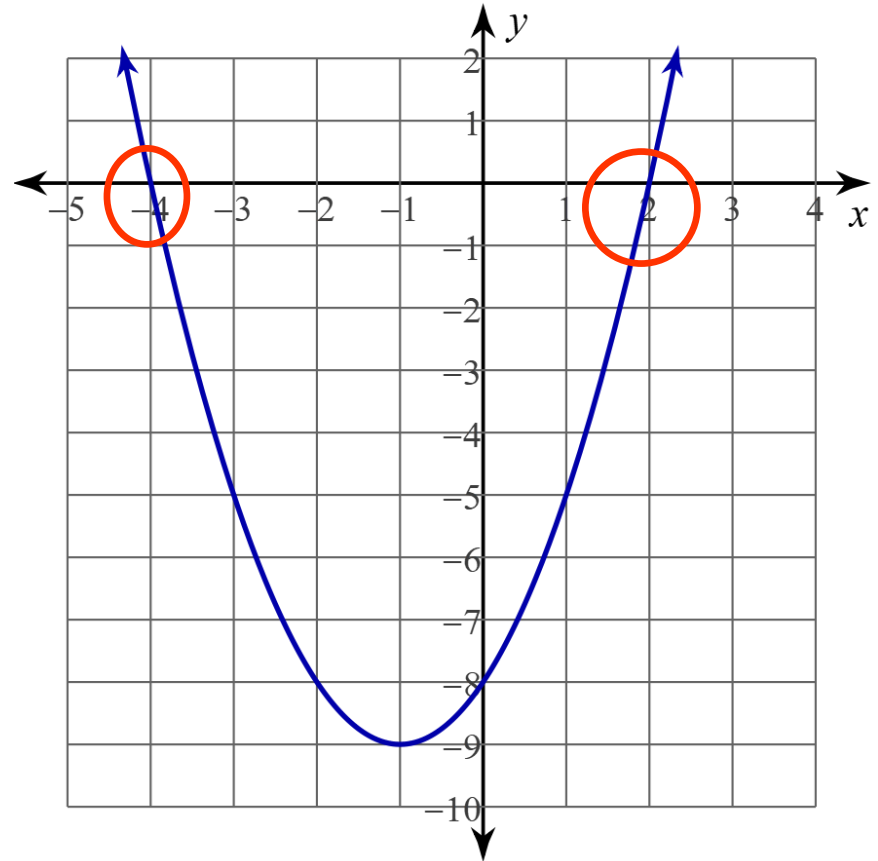
$$0 = A * B$$

Zero Product Property: either
 $(x + 4) = 0$ or $(x - 2) = 0$

$$x + 4 = 0 \quad x - 2 = 0$$

$$x = -4 \quad x = +2$$

Notice the shape
of the parabola.



$$2x^2 + 4x + 2$$

Always factor out the
common factor first.

$$2(x^2 + 2x + 1)$$

Now factor the trinomial.

$$2(x + 1)(x + 1)$$

$$6x^2 + 24x + 18$$

$$6(x^2 + 4x + 3)$$

$$6(x + 1)(x + 3)$$

$$3 * 8 = 24$$

These are all of the terms in "the box"

$$3x^2 + 14x + 8$$

	x	4
3x	$3x^2$	$12x$
2	$2x$	8

$$2 + 12 = 14$$

Other factors of 24 that add up to 14?

$$24 = 2 * 12$$

What is the bottom-left term in the box?

$$x * (\underline{2}) = 2x$$

This tells us to break $14x$ into $2x + 12x$

What is the top-right term in the box?

$$3x * (\underline{4}) = 12x$$

$$3x^2 + 14x + 8$$

Final check: $2 * 4 = 8$?

Factored form:


$$3x^2 + 14x + 8$$

$$\rightarrow (3x + 2)(x + 4)$$

$$3x^2 + 2x + 12x + 8$$

Factor


$$5 * 4 = \underline{\quad}$$

$$5x^2 + 12x + 4$$


$$\underline{\quad} * \underline{\quad} = 20$$

$$\underline{\quad} + \underline{\quad} = 12$$

$$11 * (-9) = \underline{\quad}$$

$$11x^2 + 2x - 9$$


$$\underline{\quad} * \underline{\quad} = -99$$

$$\underline{\quad} + \underline{\quad} = 2$$

Factor


$$9 \cdot 10 = \underline{\quad}$$


$$9x^2 - 13x - 10$$

$$\underline{\quad} * \underline{\quad} = -90$$

$$\underline{\quad} + \underline{\quad} = -13$$

$$12 \cdot 5 = \underline{\quad}$$


$$12x^2 - 16x + 5$$

$$\underline{\quad} * \underline{\quad} = 60$$

$$\underline{\quad} + \underline{\quad} = -16$$

What is the x-coordinate of the vertex?

$$y = 2x^2 + 16x + 24$$

$$a = 2$$

$$b = 16$$

$$\text{Vertex: } (-4, f(-4))$$

$$\text{x-coord. of vertex} = \frac{-b}{2a}$$

$$\frac{-b}{2a} = \frac{-16}{2(2)} = -4$$

What is the y-coordinate of the vertex?

$$f(-4) = 2(-4)^2 + 16(-4) + 24$$

$$f(-4) = -8$$

$$\text{Vertex: } (-4, -8)$$

What is the Vertex form equation?

$$\text{VSF} = 2, \text{ vertex} = (-4, -8)$$

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

What is the x-coordinate of the vertex?

$$y = x^2 - 6x + 13$$

$$a = 1$$

$$b = -6$$

Vertex: $(3, f(3))$

$$\text{x-coord. of vertex} = \frac{-b}{2a}$$

$$\frac{-b}{2a} = \frac{-(-6)}{2(1)} = 3$$

What is the y-coordinate of the vertex?

$$f(3) = (3)^2 - 6(3) + 13$$

$$f(3) = 4$$

Vertex: $(3, 4)$

What is the Vertex form equation?

VSF = 1, vertex = $(3, 5)$

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

Forms of the Quadratic Equation

