SM3-A Lesson 11-9 (Review Quadratics)

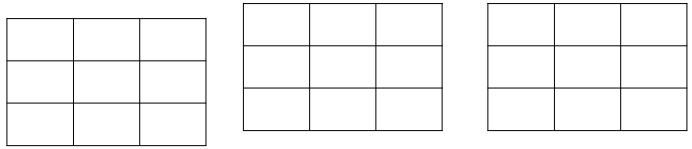
Multiplying Binomials $(x-3)(x+4)$ x^2+x-12

The "Box Method"

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

Standard Form Quadratic Expression

$(x-1)(x+5)$ $(x+2)(x+6)$ $(x-4)(x+4)$



$(x+2)(x+3)$ multiply

x^2

"left times left is the left term"

$(x+2)(x+3)$ "right times right is the right term"

$x^2 \quad +6$

$(x+2)(x+3)$ "inner"

$x^2+2x \quad +6$

$(x+2)(x+3)$ "outer"

$x^2+2x+3x+6 = x^2+(2+3)x+(2*3)$

x^2+5x+6

Left times left is left

$(\_\_+\_\_)(\_\_+\_\_)$

$(x+\_\_)(x+\_\_)$ Right times right is right

$(x+\_\_)(x+\_\_)$ Right plus right is middle

$(x+2)(x+3)$ **What are the factors of 6 that add up to 5?**

Try the following:

$x^2-3x-4 \quad = (x-4)(x+1)$

$(x+\_\_)(x+\_\_)$ Right times right is right

$(x+\_\_)(x+\_\_)$ Right plus right is middle

$(-4)(1)=-4$

$(-4)+(1)=-3$

What are the factors of -4 that add up to -3?

Try the following:

$x^2 + 8x + 15 = (x+3)(x+5)$

$(x+\_\_)(x+\_\_)$ Right times right is right

$(x+\_\_)(x+\_\_)$ Right plus right is middle

$(3)(5) = 15$

$3+5=8$

What are the factors of 15 that add up to 8?

Factor

$x^2 + 10x + 21$

$x^2 - 6x - 16$

$x^2 - 9x + 18$

$2x^2 + 4x + 2$

$6x^2 + 24x + 18$

Conjugate pair (of binomials)

two binomials whose terms are exactly the same except +/- for one pair of terms

$(x-1)(x+1)$ $x^2 - 1$ "the difference of two squares"

$x^2 - 9$ $(x-3)(x+3)$

$4x^2 - 9$ $(2x-3)(2x+3)$

$16x^2 - 25$ $(4x-5)(4x+5)$

$36x^4 - 49x^2$ $(6x^2-7x)(6x^2+7x)$

$2*15 = 30$

$2x^2 + 13x + 15$

$10+3=13$

$30 = 10*3$

Are there any *other* factors of 30 that add up to 13?

This tells us to break 13x into 10x + 3x

$2x^2 + 13x + 15$

$2x^2 + 10x + 3x + 15$

These are all of the terms in "the box"

	x	5
2x	$2x^2$	10x
3	3x	15

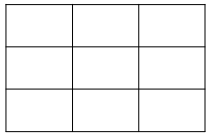
$2x^2 + 13x + 15$

$\rightarrow (2x+3)(x+5)$

Factor

5*4= ___

$5x^2 + 12x + 4$

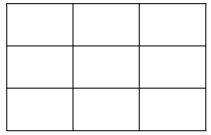


___*___= ___

___+___= 12

11*(-9) = ___

$11x^2 + 2x - 9$



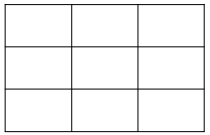
___*___= ___

___+___= 2

Factor

9*10 = ___

$9x^2 - 13x - 10$

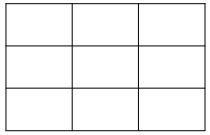


___*___= ___

___+___= -13

12*5 = ___

$12x^2 - 16x + 5$



___*___= ___

___+___= -16

Find the X-intercepts from the Vertex Form Equations

$y = -2(x-3)^2 + 4$ Set y = 0 (y-value of an x-int. is 0)

$0 = 4(x-5)^2 - 8$ Add 8 (left/right)

$8 = 4(x-5)^2$ Divide by 4 (left/right)

$2 = (x-5)^2$

$2 = (\_\_\_\_)^2$ What number, squared, equals 2?

$2 = \left(\sqrt{2}\right)^2 \quad 2 = \left(-\sqrt{2}\right)^2$

$\pm\sqrt{2} = x - 5$ Add 5 (left/right)

$x = 5 \pm \sqrt{2}$

Find the X-intercepts from the Vertex Form Equations

$y = (x-5)^2$

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

$y = -(x+2)^2 + 5$

What is the vertex form equation?

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

a = 2 b = 16

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

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

Vertex: $(-4, f(-4))$

What is the y-coordinate of the vertex?

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

$f(-4) = -8$ Vertex: $(-4, -8)$

What is the Vertex form equation?

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

What is the vertex form equation?

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

a = 1 b = -6

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

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

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

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 $= (3, 5)$ $y = (x - 3)^2 + 4$

Convert the following *non-factorable* standard form equations into vertex form. Find the x-intercepts.

$y = x^2 - 2x - 12$

$y = x^2 + 20x + 99$

$y = x^2 - 14x + 50$