SM2 HANDOUT 5-1 (Factor Simple Trinomials)

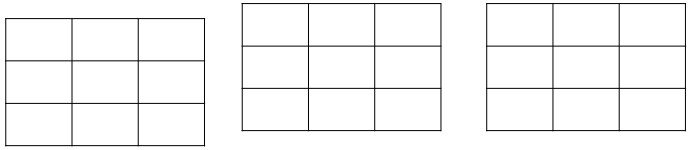
Multiplying Binomials $(x-3)(x+4)$ x^2+x-12

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"

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

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

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

$= x^2+5x+6$

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?**

$(x+4)(x+5) \quad = x^2 + (\_\_\_\_\_)x + (\_\_\_\_\_)$

$= \_\_\_\_\_$

$(x-6)(x+1) \quad = x^2 + (\_\_\_\_\_)x + (\_\_\_\_\_)$

$= \_\_\_\_\_$

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:

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

$(x+\_\_)(x+\_\_)$ 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 the following:

$x^2 + 10x + 21 \quad = \_\_\_\_\_$

$x^2 - 6x - 16 \quad = \_\_\_\_\_$

$x^2 - 9x + 18 \quad = \_\_\_\_\_$

$x^2 + 3x + 2 \quad = \_\_\_\_\_$

$2x^2+4x+2$ Always factor out the common factor first.

$2(x^2+2x+1)$ Now factor the trinomial.

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

Your turn:

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

$3x^2+9x+6$ = _____

$4x^2-20x-48$ = _____

x^2-1 "the difference of two squares"

x^2+0x-1 Two numbers multiplied = (-1) and added = 0

$(-1)(+1)$

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

Conjugate pair (of binomials)

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

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

Which of the following are conjugate pairs?

$(x-4)(x+4)$ Yes, they are.

$(5-x)(5+x)$ _____

$(3x+2)(3x+2)$ _____

$(x-\sqrt{5})(x+\sqrt{5})$ _____

$(3x+2)(3x+2)$ _____

$(2x-7)(2x+7)$ _____

$x^2 - 2$ We can call this the "difference of two squares"

$x^2 + 0x - 2$ Two numbers multiplied = (-2) and added = 0

$(-\sqrt{2})(+\sqrt{2})$

$(x-\sqrt{2})(x+\sqrt{2})$

Your turn: Multiply the conjugate pairs.

$(x-\sqrt{2})(x+\sqrt{2})$ _____

$(x-\sqrt{3})(x+\sqrt{3})$ _____

Can we use this as a pattern in order to factor the difference of two squares?

$(x-\sqrt{4})(x+\sqrt{4})$ _____ A "nice" one.

$(x-\sqrt{a})(x+\sqrt{a}) = x^2 - a$

$(x-\sqrt{17})(x+\sqrt{17})$ _____

Your turn: factor the following binomials

$x^2 - 9 = (x-\sqrt{9})(x+\sqrt{9})$

$= (x-3)(x+3)$

$x^2 - 6 = (x-\sqrt{6})(x+\sqrt{6})$

Multiply this out: $(x+i)(x-i)$

$x^2 - xi + xi - i^2$

Inverse property of addition!

i squared = -1

$x^2 - (-1)$

$x^2 + 1$

Multiply: $(x+i\sqrt{2})(x-i\sqrt{2})$ $x^2 + 2$

What about the sum of two squares?

$x^2 + 1 = (x-i)(x+i)$

$x^2 + 2 =$ _____

$x^2 + 3 = ?$ _____

Can you see the pattern?

$x^2 + 4 = ?$ _____

$x^2 + a = (x-i\sqrt{a})(x+i\sqrt{a})$

$x^2 + 7 = ?$ _____