Math-3A

Lesson 2-3 Factoring Quadratics with Lead Coefficient Not = 1, Complex Conjugates

Factor the quadratic expressions.

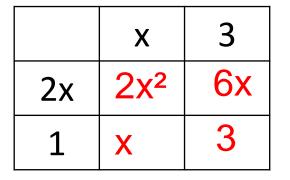
$$3x^3 + 15x^2 - 42x \qquad 5x^3 - 25x^2 - 20x$$

What if there is no common factor AND the lead coefficient is NOT equal to 1? $a_{x}x^{2} + bx + c$

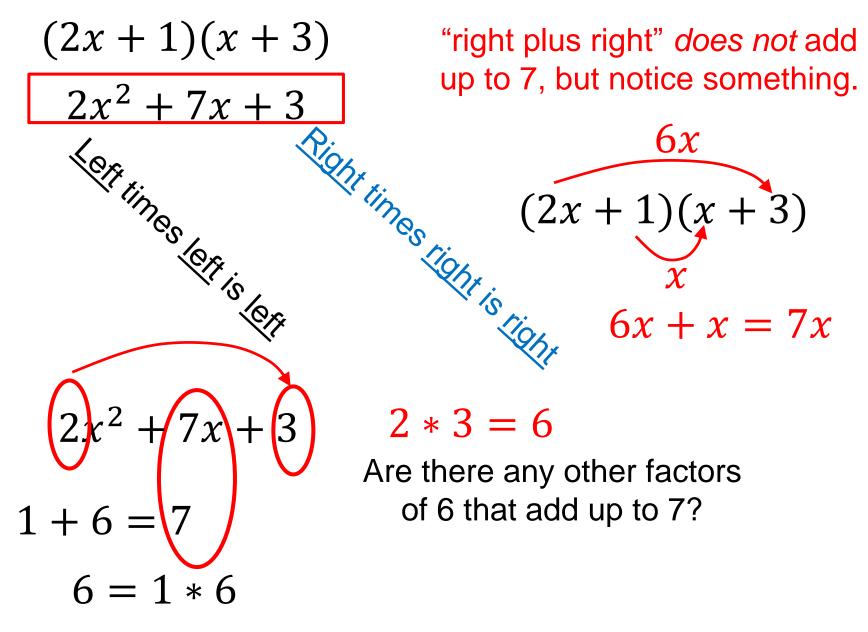
(These come from multiplying binomials that also do not have lead coefficients of 1.) (2x + 1)(x + 3)

Use the "box method" to multiply the binomials

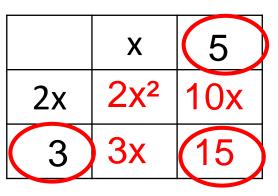
$$2x^2 + 7x + 3$$



Notice a nice pattern when you multiply this out ("simplify")



These are all of the terms in "the box"



30 = 10 * 3

10 + 3

2*15 = 30

Are there any <u>other</u> factors of 30 that add up to 13?

This tells us to break $\underline{13x}$ into $\underline{10x + 3x}$

$$2x^{2} + 13x + 15$$
$$2x^{2} + 10x + 3x + 15$$

What is the bottom-left term in the box?

 $x^{*}(\underline{3}) = 3x$

What is the top-right term in the box?

 $2x^{*}(5) = 10x$

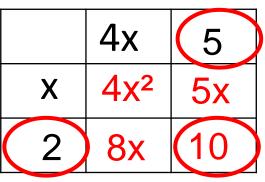
Final check: 3*5 = 15?

Factored form:

 $2x^2 + 13x + 15$

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

These are all of the terms in "the box"



This tells us to break $\underline{13x}$ into $\underline{8x + 5x}$

 $4 \times 1() = 4()$

8 + 5

40 = 8 * 5

3x +

Other factors of 40

that add up to 13?

$$4x^{2} + 13x + 10$$
$$4x^{2} + 8x + 5x + 10$$

Factored form:

$$4x^2 + 13x + 10$$

 $\rightarrow (x + 2)(4x + 5)$

Since $4x^2$ can be factored 2 ways, look for the common factors of the 1st row.

'x' is the common factor of $4x^3$ and 5x Look for the common factors of the 1st column

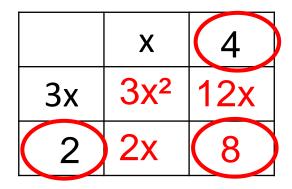
'4x' is the common factor of $4x^3$ and 8x

$$4x^{*}(\underline{2}) = 8x$$

$$x^{*}(5) = 5x$$

Final check: 2*5 = 10?

These are all of the terms in "the box"



24 = 2 * 12

 $3x^2 + 14x$

This tells us to break $\underline{14x}$ into $\underline{2x + 12x}$

 $3x^2 + 14x + 8$

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

3 * 8 = 24

2 + 12 = 14 <u>Other</u> factors of 24 that add up to 14?

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

What is the bottom-left term in the box?

What is the top-right term in the box?

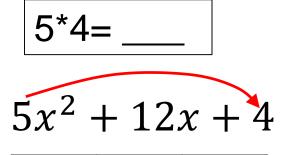
 $3x^{*}(\underline{4}) = 12x$

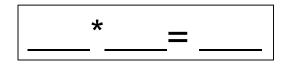
Final check: $2^*4 = 8$?

Factored form:

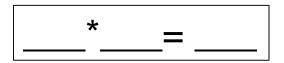
 $3x^2 + 14x + 8$

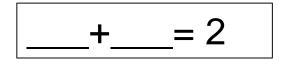
 $\rightarrow (3x+2)(x+4)$

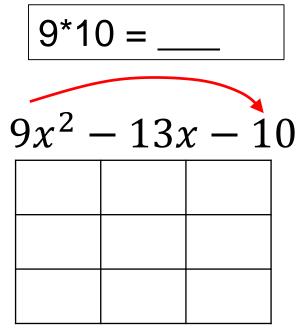


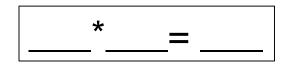


$$11^*(-9) = _____{11x^2 + 2x - 9}$$









$$12*5 = _$$

 $12x^2 - 16x + 5$

