SM2 HANDOUT 5-3 (Factor Quadratic Equations; Lead Coefficient not equal to '1')

$y = 3x^2 + 15x - 42$ ____________________

$y = 5x^2 - 15x - 20$ ____________________

What if there is no common factor AND the lead coefficient is NOT equal to 1? $y = ax^2 + bx + c$

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

$\boxed{y = (2x+1)(x+3)}$

____

Use the "box method" to multiply the binomials

Notice a nice pattern when you multiply these binomials

$y = (2x+1)(x+3)$

$\boxed{y = 2x^2 + 7x + 3}$

"right plus right" *does not* add up to 7, but notice something.

$6x$

$(2x+1)(x+3)$

x

$6x + x = 7x$

$2x^2 + 7x + 3$

$1 + 6 = 7$

$6 = 1 * 6$

$2 * 3 = 6$

Are there any other factors of 6 that add up to 7?

Multiply 1st times Last $2 * 15 = 30$

$2x^2 + 13x + 15$

$10 + 3 = 13$

$30 = 10 * 3$

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	2x²	10x
3	3x	15

Standard form:

$2x^2 + 13x + 15$

Intercept form:

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

Multiply 1st times Last

$4x^2 + 13x + 10$ $4 * 10 = 40$

$8 + 5 = 13$

Other factors of 40 that add up to 13?

$40 = 8 * 5$

This tells us to break 13x into 8x + 5x

$4x^2 + 13x + 10$

$4x^2 + 8x + 5x + 10$

These are all of the terms in "the box"

	4x²	5x
	8x	10

Standard form:

____

Intercept form:

____

Multiply 1st times Last

These are all of the terms in "the box"

$3x^2 + 14x + 8$ $\quad 3 * 8 = 24$

$2 + 12 = 14$ Other factors of 24 that add up to 14?

$24 = 2 * 12$

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

$3x^2 + 14x + 8$

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

Standard form:

Intercept form:

Factor

9*10 = ____

$9x^2 - 13x - 10$

____*____ = ____

____+____ = -13

12*5 = ____

$12x^2 - 16x + 5$

____*____ = ____

____+____ = -16

Factor

____*____ = ____

$6x^2 - 5x - 6$

____*____ = ____

____+____ = _____

____*____ = ____

$8x^2 - 2x - 3$

____*____ = ____

____+____ = ____

Factor

____*____ = ____

$7x^2 - 12x - 4$

____*____ = ____

____+____ = _____

____*____ = ____

$6x^2 - 29x + 9$

____*____ = ____

____+____ = ____

Standard form

$y = 2x^2 + 7x + 3$ y-intercept? $(0, 3)$

Intercept form

$y = (2x + 1)(x + 3)$ x-intercepts?

According to the zero product property, if: $x + 3 = 0$

$-3 \quad -3$

$x = -3$

then: $y = 0$

then one x-intercept is: $(-3, 0)$

And if: $2x + 1 = 0$ then: $y = 0$

$-1 \quad -1$

$2x = -1$

$\div 2 \quad \div 2$

$\mathrm{x} = -\frac{1}{2}$

The other x-intercept is: $(-\frac{1}{2}, 0)$

Standard form

$y = 6x^2 - 5x - 6$ y-intercept?

Intercept form

$y = (3x + 2)(2x - 3)$ x-intercepts?

$y = 8x^2 - 2x - 3$ y-intercept?

Intercept form

$y = (2x + 1)(4x - 3)$ x-intercepts?

Standard form

$y = 7x^2 - 12x - 4$ y-intercept?

Intercept form

$y = (7x + 2)(x - 2)$ x-intercepts?

$y = 6x^2 - 29x + 9$ y-intercept?

Intercept form

$y = (2x - 9)(3x - 1)$ x-intercepts?