Algebra 1   8.6
Factor trinomials
Solve quadratic equations by factoring
quadratic
EWE   (opp)
"Factor"
Zero product property

$$(\quad)(\quad) = 0$$

activity: x-factor
            whiteboards

$$\underline{\quad} = 0 \qquad \underline{\quad} = 0$$

$$x^2 + 6x + 9$$

$$(\quad)(\quad)$$

look at patterns...

$$(x+6)(x+5) = x^2 + 11x + 30$$
$$(x+3)(x+4) \qquad = x^2 + 7x + 12$$
$$(x+2)(x+5) = x^2 + 7x + 10$$

$$(x-6)(x+2) = x^2 - 4x - 12$$

$$\begin{array}{cc} 1 & 12 \\ \boxed{2} & \boxed{6} \\ 3 & 4 \end{array}$$

$$(x+7)(x+3) = x^2 + 10x + 21$$
$$(x-5)(x-2) = x^2 - 7x + 10$$

$$(x-1)(x-4) = x^2 - 5x + 4$$

$$\begin{array}{cc} 2 & 2 \\ 1 & 4 \end{array}$$

$$(x+2)(x+4) = x^2 + 6x + 8$$
$$(x+5)(x+7) = \boxed{x^2 + 12x + 35}$$

$$\begin{array}{c} 35 \\ 5 \diagup\!\!\!\!\diagdown 7 \\ 12 \end{array}$$

Example 1 *b* and *c* are Positive

Factor $x^2 + 9x + 20.$ $= (x+5)(x+4)$

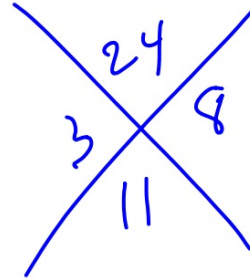$$\begin{array}{c} 20 \\ 5 \quad\times\quad 4 \\ 9 \end{array}$$
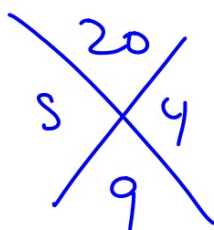
$$\begin{array}{r} x + 5 \\ x + 4 \\ \hline 4x + 20 \\ x^2 + 5x \\ \hline \end{array}$$

Factor each polynomial.

1A. $d^2 + 11d + 24$ $= (d + 3)(d + 8)$

1 24
2 12
3 8
4 6

24

3   8

11

1B. $9 + 10t + t^2$

rewrite in standard form first

$t^2 + 10t + 9$

$\begin{array}{c} 9 \\ 1 \diagup\!\!\!\!\diagdown 9 \\ 10 \end{array}$

$(t+1)(t+9)$

$\updownarrow$

$(t+9)(t+1)$

$\frac{1}{2}\ \frac{12}{6}$
$3\ \ 4$

Example 2 *b* is Negative and *c* is Positive

Factor $x^2 - 8x + 12$. Confirm your answer

$(x-2)(x-6)$

12 / -2 $\times$ -6 / -8

$x - 2$
$x - 6$

$x^2 \ \ \begin{matrix} -6x & 12 \\ -2x \end{matrix}$

What does "confirm your answer" mean?

2B. $w^2 - 11w + 28$

$$(w-7)(w-4)$$

2A. $21 - 22m + m^2$ standard form

$m^2 - 22m + 21$

$(m - 21)(m - 1)$

Example 3 *c* is Negative

Factor each polynomial.

a. $x^2 + 2x - 15$

1 15
35

$(x-3)(x+5)$

-15
-3 ✕ 5
2

-15
5 ✕ -3
2

b. $x^2 - 7x - 18$

3A. $y^2 + 13y - 48$

3B. $r^2 - 2r - 24$