

8.5

Factor $x^2 + bx + c$

A decorative horizontal bar consisting of several parallel lines in shades of yellow and gold, extending across the width of the slide.

Review:

- Multiplying two binomials results in a trinomial.

▫ EX: $(3x + 2)(x - 4)$ ← binomials

$$3x^2 - \underline{12}x + \underline{2}x - 8$$

$$3x^2 - 10x - 8 \quad \leftarrow \text{trinomial}$$

- Therefore, we will factor a trinomial into two binomials.

To factor a polynomial:

- Step 1: Look for a common monomial.
- Step 2: If you have a trinomial, factor it into two binomials.
 - The 1st terms in each binomial must multiply to get the 1st term in the trinomial.
 - The 2nd term in each binomial must add to get the 2nd terms coefficient in the trinomial and must multiply to get the 3rd term in the trinomial.
 - NOTE: Pay attention to signs (+/-).

NOTEBOOK EXAMPLE #1

EX: Factor the trinomial.

- $x^2 + 3x + 2$ $(x + 1)(x + 2)$ \longrightarrow Think: What multiplies to get x^2 :
x and x
- $t^2 + 9t + 14$ $(t + 7)(t + 2)$ What multiplies to get 2
but adds to get 3:
1 and 2
- $x^2 - 4x + 3$ $(x - 1)(x - 3)$
- $t^2 - 8t + 12$ $(t - 6)(t - 2)$
- $m^2 + m - 20$ $(m + 5)(m - 4)$
- $w^2 + 6w - 16$ $(w + 8)(w - 2)$
- $x^2 - 4xy + 4y^2$ $(x - 2y)(x - 2y)$
- $m^2 - mn - 42n^2$ $(m - 7n)(m + 6n)$

★ FOIL to check:

$$(x+1)(x+2)$$
$$x^2 + \underline{2x} + \underline{1x} + 2$$
$$x^2 + 3x + 2 \checkmark$$

NOTEBOOK EXAMPLE #2

EX: Solve the equation (by factoring).

- $x^2 - 2x = 24$
- $x^2 - 2x - 8 = 7$
- $s(s + 1) = 72$

$$\begin{aligned} * x^2 - 2x &= 24 \\ -24 \quad -24 \\ x^2 - 2x - 24 &= 0 \\ (x - 6)(x + 4) &= 0 \end{aligned}$$

$$\begin{array}{l} x - 6 = 0 \\ +6 \quad +6 \\ \boxed{x = 6} \end{array} \quad \begin{array}{l} x + 4 = 0 \\ -4 \quad -4 \\ \boxed{x = -4} \end{array}$$

$$\begin{aligned} * x^2 - 2x - 8 &= 7 \\ -7 \quad -7 \\ x^2 - 2x - 15 &= 0 \\ (x - 5)(x + 3) &= 0 \end{aligned}$$

$$\begin{array}{l} x - 5 = 0 \\ +5 \quad +5 \\ \boxed{x = 5} \end{array} \quad \begin{array}{l} x + 3 = 0 \\ -3 \quad -3 \\ \boxed{x = -3} \end{array}$$

$$* s(s + 1) = 72$$

$$\begin{aligned} s^2 + s &= 72 \\ -72 \quad -72 \end{aligned}$$

$$s^2 + s - 72 = 0$$

$$(s + 9)(s - 8) = 0$$

$$\begin{array}{l} s + 9 = 0 \\ -9 \quad -9 \\ \boxed{s = -9} \end{array} \quad \begin{array}{l} s - 8 = 0 \\ +8 \quad +8 \\ \boxed{s = 8} \end{array}$$