

2.2 Factoring Trinomials

Review Examples: Multiply the following.

a) $(x+3)(x+5)$

b) $(n-7)(n-4)$

c) $(t-2)(t+9)$

d) Look at your answers. How do the numbers in your answer relate to the numbers in the factors?

Factoring a Trinomial of the Form $x^2 + bx + c$:

1. **Always check for a GCF first!** If there is a GCF, factor it out.
2. Find two numbers that multiply to c and add to b .
3. Rewrite the middle term bx as **1st #** $\cdot x$ + **2nd #** $\cdot x$.
4. Factor the resulting polynomial by grouping.
5. If there are no numbers that multiply to c and add to b , the polynomial is prime.

Shortcut (only works if there's no number in front of the first term).

1. Find two numbers that multiply to c and add to b .
2. The factored form of $x^2 + bx + c$ is **$(x + 1st \#)(x + 2nd \#)$** .

Examples: Factor the following polynomials.

a) $x^2 + 11x + 30$

b) $m^2 - 8m + 12$

c) $-5g^2 + 25g - 30$

d) $t^2 + 6t - 40$

Review Examples: Multiply the following.

a) $(2x+3)(5x+4)$

b) $(3v-1)(v+2)$

c) $(4c-3)(7c-2)$

Factoring a Trinomial of the Form $ax^2 + bx + c$ by Grouping:

1. Always check for a GCF first! If there is a GCF, factor it out.
2. Multiply $a \cdot c$.
3. Find two numbers that multiply to your answer ($a \cdot c$) and add to b .
4. Rewrite the middle term bx as **1st #** $\cdot x$ + **2nd #** $\cdot x$
5. Factor the resulting polynomial by grouping.
6. If there are no numbers that multiply to $a \cdot c$ and add to b , the polynomial is prime.

Examples: Factor the following polynomials.

a) $9h^2 + 9h + 2$

b) $2z^2 - 11z + 12$

c) $12y^2 + 30y - 72$

d) $4x^2 - 2xy - 12y^2$

Solve by factoring. (Find the x-intercepts)

a) $q^2 - q - 56 = 0$

b) $4h^3 - 16h^2 + 12h = 0$

c) $4n^2 - 20n + 25 = 0$

d) $3x^2 + 19x = -15$