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5.3 Factoring Polynomials

How to Factor

Here are a few guidelines to follow when factoring polynomials:

1) Always ask yourself if you can first remove a GCF

2) After removing the GCF, ask yourself if you can factor using **strategy 1 (ac and b) or strategy 2 (grouping).** If you can't then the polynomial is **"prime"** which means it cannot be factored. If you can, then continue.

Example 1: Factor Trinomials of the Form $ax^2 + bx + c$, $a = 1$

Factor $x^2+12x + 20$

Step 1: Ask yourself if you can remove a GCF

Step 2: There are two strategies for this type of polynomial (the leading coefficient a is 1) Choose the strategy you are most comfortable with and factor.

Strategy 1 (Using ac and b)

- Ask yourself "what two numbers multiply to 20 and add to 12?" (Note: 20 is ac and 12 is b)
- The answer is _____. Therefore, your factors are _____.

You can verify by multiplying these binomials out. Note: if the signs in the trinomial are **+ / +,** the binomials will both be_____.

1. Factor if possible.

a) $x^2 + 5x + 4$ b) $x^2 + 4x + 6$ c) $x^2 + 7x + 10$

Example 2:

Factor $x^2-2x - 48$

Step 1: Ask yourself if you can remove a GCF

Step 2: Ask yourself "what two numbers multiply to –48 and add to –2?"

- The answer is _____. Therefore, your factors are _____.

You can verify by multiplying these binomials out. Note: if the signs in the trinomial are **– / – or +/–** , the signs in the binomials will be **one _____ and one _____**.

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2. Factor if possible.

a) $x^2 - 3x - 28$ b) $x^2 + 7x - 30$

Example 3:

Factor $x^2 - 14x + 45$

Step 1: Ask yourself if you can remove a GCF

Step 2: Ask yourself "what two numbers multiply to 45 and add to –14?"

- The answer is _____. Therefore, your factors are _____.

You can verify by multiplying these binomials out. Note: if the signs in the trinomial are **–/+** , both signs in the binomials will be_____.

3. Factor if possible.

a) $x^2 - 8x + 7$

Example 4: Factor Trinomials of the Form $ax^2 + bx + c$, $a > 1$

Factor $6x^2 + 13x - 5$

Step 1: Ask yourself if you can remove a GCF

Step 2: Ask yourself "what two numbers multiply to –30 and add to 13?"

- The answer is_____ . In THIS case, you need to factor by **GROUPING (Strategy 2).**

Strategy 2 (Grouping)

Factor $6x^2 + 13x - 5$

- Can be written as $6x^2 - 2x + 15x - 5$
- _____
- _____

Done! Note: You can use the grouping strategy with all types of trinomials (Example 1 and 2).

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4. Factor, if possible.

a) $3x^2 + 8x + 4$ b) $6x^2 – 5xy + y^2$ c) $24x^2 – 30x – 9$

Example 5: Apply Factoring

The world famous Devil's Cauldron is the 4^{th} hole at the Banff Springs Golf Course. The approximate height of the ball during a shot can be represented by the formula:

$h = -5t^2 + 25t + 30$

Where t = time in seconds, and h = height of the ball, in meters

a) Write the formula in factored form.

b) What is the height of the golf ball after 2.5 s?

Homework:

P. 234 # 1-7 (pick 3), #8, # 9-12 (pick 2), #15, 16