


Functions and Applications

Chapter 2: The Algebra of Quadratic Expressions

2.2 Factoring Polynomials: Common Factoring



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Learning Goals:

- Factoring algebraic expressions is the opposite of expanding. Expanding involves multiplying, while factoring involves looking for the expressions to multiply. For example:

$$\begin{array}{c} \xrightarrow{\text{expanding}} \\ 2x(3x - 5) = 6x^2 - 10x \\ \xleftarrow{\text{factoring}} \end{array}$$

- One way to factor a polynomial is to look for the greatest common factor of its terms as one of its factors. For example, $6x^2 + 2x - 4$ can be factored as $2(3x^2 + x - 2)$, since 2 is the greatest common factor of each term.



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Common Factoring:


Given a Trinomial: $4x^2 + 8x + 24$

We can factor out a common value, as long as it is a factor of 4, 8 and 24.

$$\begin{aligned} &4x^2 + 8x + 24 \\ &= 4(x^2 + 2x + 6) \end{aligned}$$

This works because $4/4 = 1$, $8/4 = 2$, $24/4 = 6$

Check that the factoring was correct by re-distributing the 4



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Common Factor the Following:

$$\begin{array}{|l} 3x^2 + 18x + 24 \\ \hline 6x^2 + 2x + 24 \\ \hline -5x^2 + 30x - 45 \end{array}$$



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Use common factoring to simplify the following equation

$$n(n + 1) + 3(n + 1) + (n - 2)(n + 1)$$

Just treat $(n + 1)$ like it is the number '2':

$$\begin{aligned} &2n + 2(3) + 2(n-2) \\ &=2(n + 3 + (n-2)) \end{aligned}$$



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Example:

Factor $2x^2 - 6x$.



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Use common factoring to simplify the following equation

$$n(n + 1) + 3(n + 1) + (n - 2)(n + 1)$$

This equation works the same way, simply remove every instance of $(n + 1)$.

$$\begin{aligned} &n(n + 1) + 3(n + 1) + (n - 2)(n + 1) \\ &=(n + 1)(n + 3 + (n-2)) \end{aligned}$$



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Example:

Factor $3x(x + 1) - 2(x + 1)$.



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Homework:

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