Factoring

Factors of Construction

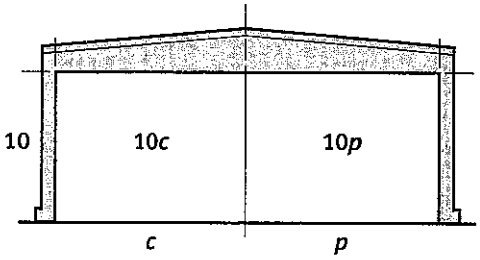
Lesson 26-1 Factoring by Greatest Common Factor (GCF)

Learning Targets:

- Identify the GCF of the terms in a polynomial.
- Factor the GCF from a polynomial.

SUGGESTED LEARNING STRATEGIES: Look for a Pattern, Think-Pair-Share, Discussion Groups, Note Taking

Factor Steele Buildings is a company that manufactures prefabricated metal buildings that are customizable. All the buildings come in square or rectangular designs. Most office buildings have an entrance area or great room, large offices, and cubicles. The diagram below shows the front face of one of their designs. The distance c represents space available for large offices, and p represents the space available for the great room.



1. To determine how much material is needed to cover the front wall of the building, represent the total area as a product of a ***monomial*** and a ***binomial***.

2. Represent the same area from Item 1 as a sum of two monomials.

3. **Make use of structure.** What property can be used to show that the two quantities in Items 1 and 2 are equal?

4. Factor Steele Buildings inputs the length of the large office space c into an expression that gives the area of an entire space: $6c^2 + 12c - 9$. Determine the ***greatest common factor (GCF)*** of the terms in this polynomial. Explain your choice.

My Notes

MATH TERMS

A **monomial** is a number, a variable, or a product of numbers and variables with whole-number exponents. For example, 4, $-9x$, and $5xy^2$ are all monomials. A **binomial** is a sum or difference of two monomials.

MATH TERMS

The **greatest common factor (GCF)** of the terms in a polynomial is the greatest monomial that divides into each term without a remainder.

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My Notes

MATH TERMS

A **factor** is any of the numbers or symbols that when multiplied together form a product. For example, 2 and x are factors of $2x$ because 2 and x are multiplied to get $2x$. *Factor* can be used as a noun or a verb.

To ***factor*** a number or expression means to write the number or expression as a product of its ***factors***.

Example A

To Factor a Monomial (the GCF) from a Polynomial	
Steps to Factoring	**Example**
• Determine the GCF of all terms in the polynomial.	$6x^3 + 2x^2 - 8x$ GCF $= 2x$
• Write each term as the product of the GCF and another factor.	$2x(3x^2) + 2x(x) + 2x(-4)$
• Use the Distributive Property to factor out the GCF.	$2x(3x^2 + x - 4)$

Try These A

Find the greatest common factor of the terms in each polynomial. Then write each polynomial with the GCF factored out.

a. $36y - 24$

b. $4x^5 - 6x^3 + 10x^2$

c. $15t^2 + 10t - 5$

Check Your Understanding

5. Identify the GCF of the terms in the polynomial $21x^3 + 14x^2 + 35x$.

Factor a monomial (the GCF) from each polynomial.

6. $36x + 9$

7. $6x^4 + 12x^2 - 18x$

8. $125n^6 + 250n^5 + 25n^3$

9. $3x^3 + 9x^2 + 6x$

10. $\frac{2}{3}y^4 + \frac{1}{3}y^3 - \frac{4}{3}y^2$

11. $4x^2y^2 + 12xy^2 - 8x^2y - 4xy$

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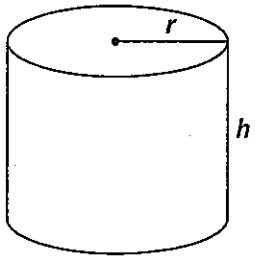
My Notes

LESSON 26-1 PRACTICE

Use the cylinder for Items 12–15.



The surface area of a cylinder is given by the formula $SA = 2\pi r^2 + 2\pi rh$, where r is the radius and h is the height.

12. Factor a monomial (the GCF) from the formula.

13. Suppose the radius of the cylinder is y and the height is $y + 2$. Rewrite the formula in this case, using multiplication and exponent rules as needed to simplify the expression.

14. Factor the expression from Item 13 completely.

15. **Construct viable arguments.** Answer each of the following questions and justify your responses.

a. If the radius of a cylinder doubles, what happens to the GCF of its surface area?

b. What happens to the GCF of the cylinder's surface area if its radius is squared?

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