

LESSON 8-2

Multiplying and Factoring

PRODUCT OF A POLYNOMIAL AND A MONOMIAL

A. $6y(4y^2 - 9y - 7) = \underline{6y \cdot 4y^2 - 6y \cdot 9y - 6y \cdot 7}$ (Distributive)
 $= \underline{24y^3 - 54y^2 - 42y}$ (Multiply coefficients and add exponents)
 $=$ _____ (Simplify)

B. $-2x^2(3x^2 + 7x + 10) = \underline{-2x^2 \cdot 3x^2 + -2x^2 \cdot 7x + -2x^2 \cdot 10}$ (Distributive)
 $= \underline{-6x^4 + 14x^3 + -20x^2}$ (Multiply coefficients and add exponents)
 $= \underline{-6x^4 + 14x^3 - 20x^2}$ (Simplify)
 (NO DOUBLE SIGNS)

Change subtraction to addition

C. What is the simplified form of $x^2(3x^3 + 2x^2 + 8)$?

a) $3x^5 + 2x^4 - 8x^2$

b) $3x^5 - 2x^4 + 8x^2$

c) $3x^6 - 2x^4 + 8x^2$

d) $3x^6 + 2x^4 - 8x^2$

$x^2 \cdot 3x^3 + x^2 \cdot 2x^2 + x^2 \cdot 8$
 $3x^{\square} + 2x^{\square} + 8x^{\square}$

Simplify

FINDING THE GREATEST COMMON FACTOR

D. What is the greatest common factor of $3x^4 - 9x^2 - 12x$? (TYPO! ☹️)

$3x^4$ $3 \cdot x \cdot x \cdot x \cdot x$

$9x^2$ $3 \cdot 3 \cdot x \cdot x$

$12x$ $3 \cdot 2 \cdot 2 \cdot x$

GCF: $3 \cdot x = 3x$

Find the prime factors of each term and multiply the factors common to all terms.

E. What is the GCF of the terms of $6x^3 + 12x^2 + 18x$?

$6x^3$ $2 \cdot 3 \cdot x \cdot x \cdot x$

$12x^2$ $2 \cdot 2 \cdot 3 \cdot x \cdot x$

$18x$ $2 \cdot 3 \cdot 3 \cdot x$

GCF: $2 \cdot 3 \cdot x = 6x$

PRACTICE: (Try these on your own)

Simplify each product:

1. $7x(x+4) =$ _____
 $=$ _____

2. $3m^2(10+m) =$ _____
 $=$ _____

3. $4x(2x^3 - 7x^2 + x) =$ _____
 $=$ _____

Find the GCF of the terms of each polynomial

4. $12x + 20$
 $12x:$ _____
 $20:$ _____
 GCF = _____

5. $45b + 27$
 $45b:$ _____
 $27:$ _____
 GCF = _____

6. $4x^2 + 12x - 28$
 $4x^2 =$ _____
 $12x =$ _____
 $28 =$ _____
 GCF = _____

FACTORING OUT A MONOMIAL:

F. What is the factored form of $9x^6 + 15x^4 + 12x^2$?

$9x^6 = \underline{3 \cdot 3 \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x}}$

$15x^4 = \underline{3 \cdot 5 \cdot \cancel{x} \cdot \cancel{x} \cdot x \cdot x}$

$12x^2 = \underline{2 \cdot 2 \cdot 3 \cdot \cancel{x} \cdot \cancel{x}}$

GCF = $\underline{3 \cdot x \cdot x = 3x^2}$

$9x^6 + 15x^4 + 12x^2 = \underline{3x^2(3x^4) + 3x^2(5x^2) + 3x^2(4)}$
 $= \underline{3x^2(3x^4 + 5x^2 + 4)}$

Find the prime factors of each term and find the GCF

(I've highlighted the factors not used in the GCF)

Factor **or** the GCF from each term of the polynomial.

G. What is the factored form of $6x^3 - 15x^2 + 12x$?

$6x^3 = \underline{2 \cdot 3 \cdot \cancel{x} \cdot x \cdot x}$

$15x^2 = \underline{3 \cdot 5 \cdot \cancel{x} \cdot x}$

$12x = \underline{2 \cdot 2 \cdot 3 \cdot \cancel{x}}$

GCF = $\underline{3x}$

$6x^3 - 15x^2 + 12x = \underline{3x(2x^2) - 3x(5x) + 3x(4)}$
 $= \underline{3x(2x^2 - 5x + 4)}$

Oops; these examples were accidentally left off when the materials went to the print shop. Please put them on the blank side of the handouts for Lesson 8-2.

Factor (Try these on your own.)

7. $9t - 3$

8 $12j^3 + 28$

9. $72x^2 - 63x$

10. $12k^3 - 9k^2 + 6$

11. $30n^3 + 18n^2 + 54n$

12. $32z^4 - 80z^3 + 112z^2$

13. $12n^4 + 16n^3 + 20n^2$

14. $24y^5 + 36y^4 + 42y^2$

15. $7q^5 + 21q^3 - 49q$