NAME _____ DATE _____ PERIOD _____

9-2 Factoring Using the Distributive Property *(Pages 481—486)*

A polynomial is in factored form, or **factored**, when it is expressed as the product of monomials and polynomials. You can use the Distributive Property to express a polynomial in factored form. It is also possible to use the Distributive Property to factor some polynomials containing four or more terms into the product of two polynomials. This is called **factoring by grouping**.

Examples

a. Factor $9a^2b^5 - 3ab^2 + 6ab$.

$9a^2b^5 = (3) \cdot 3 \cdot (a) \cdot a \cdot (b) \cdot b \cdot b \cdot b \cdot b$

$3ab^2 = (3) \cdot (a) \cdot (b) \cdot b$

$6ab = 2 \cdot (3) \cdot (a) \cdot (b)$ *The GCF is 3ab.*

Use the Distributive Property to express the polynomial as the product of the GCF and the remaining factor of each term.

$9a^2b^5 - 3ab^2 + 6ab$

$= 3ab(3ab^4) - 3ab(b) + 3ab(2)$

$= 3ab(3ab^4 - b + 2)$

You can check this answer by using the Distributive Property. $3ab(3ab^4 - b + 2) = 9a^2b^5 - 3ab^2 + 6ab$

b. Factor $8wy + 12xy + 10wz + 15xz$.

Use the Associative Property to group together pairs of terms that have common factors.

$8wy + 12xy + 10wz + 15xz$

$= (8wy + 12xy) + (10wz + 15xz)$

Factor each pair of terms using its GCF. The GCF of the first two terms is 4y, and the GCF of last two terms is 5z.

$= 4y(2w + 3x) + 5z(2w + 3x)$

This polynomial has two terms: $4y(2w + 3x)$ and $5z(2w + 3x)$. These terms have a common factor of $2w + 3x$. Use the Distributive Property to factor this polynomial.

$= (4y + 5z)(2w + 3x)$

Check this answer by using the FOIL method.

Practice

Complete. In exercises with two blanks, both blanks represent the same expression.

1. $12x + 9y = 3(\_?\_ + 3y)$

2. $4abc + 8abc^2 = \_?\_(1 + 2c)$

3. $(x^2 + 2xy) + (6kx + 12ky) = x(\_?\_) + 6k(\_?\_)$

4. $(12a^2 - 20ab) + (9ay - 15by) = 4a(\_?\_) - 3y(\_?\_)$

Factor each polynomial.

5. $7b^2 + 42b$

6. $15m^2n - 27mn^2$

7. $10xz^2 + 30z^6$

8. $8s^3 + 24s^2q$

9. $16g + 14gh^2$

10. $36k^5 + 24k^3 - 18k$

11. $6y^3 - 21y^2 - 4y + 14$

12. $3x^3 + x^2 + 6x + 2$

13. $4w^3 + 3wz - 8w^2 - 6z$

14. Geometry The area of a rectangle is represented by $10x^3 + 15x^2 + 4x + 6$. Its dimensions are represented by binomials in x that have prime number coefficients. What are the dimensions of the rectangle?

15. **Standardized Test Practice** Factor the polynomial $4wf + 8w$.

A $4(wf + 2)$ **B** $4w(f + 2)$ **C** $4w(f + 8)$ **D** $w(4f + 8)$

Answers: **1.** $4x$ **2.** $4abc$ **3.** $x + 2y$ **4.** $3a - 5b$ **5.** $7b(b + 6)$ **6.** $3mn(5m - 9n)$ **7.** $10z^2(x + 3z^4)$ **8.** $8s^2(s + 3q)$ **9.** $2g(8 + 7h^2)$ **10.** $6k(6k^4 + 4k^2 - 3)$ **11.** $(2y - 7)(3y^2 - 2)$ **12.** $(3x + 1)(x^2 + 2)$ **13.** $(w - 2)(4w^2 + 3z)$ **14.** $2x + 3$, $5x^2 + 2$ **15.** B