NAME

Module 12 Simplifying Algebraic Expressions by Factoring Polynomials

Lesson 1 Factoring by Removing the Greatest Common Factor

Factor, if possible.

1. $3x + 6$

3(x + 2)

2. $5y - 25$

5(y − 5)

3. $8z - 12$

4(2z − 3)

4. $15m - 35$

5(3m − 7)

5. $14m^4 - 7m^2$

$7m^2(2m^2 - 1)$

6. $5t^3 + 10t^2$

$5t^2(t + 2)$

7. $12a^5 - 6a^3$

$6a^3(2a^2 - 1)$

8. $2b^4 + 8b^2$

$2b^2(b^2 + 4)$

9. $8t^4 - 12t^2 + 16$

$4(2t^4 - 3t^2 + 4)$

10. $3a^2 - 12a - 6$

$3(a^2 - 4a - 2)$

11. $4c^2 + 7c - 3$

No common monomial factor

12. $18r^3 + 24r^2 + 12r$

$6r(3r^2 + 4r + 2)$

13. $16x^3 - 8x^2 + 4x$

$4x(4x^2 - 2x + 1)$

14. $15f^4 - 10f^2 + 25f$

$5f(3f^3 - 2f + 5)$

15. $x^2y - y^2x$

$xy(x - y)$

16. $21c^2d^2 - 12cd^3$

$3cd^2(7c - 4d)$

17. $2m^2n^4 - 5pq$

No common monomial factor

18. $30p^3q^4 - 40pq^3$

$10pq^3(3p^2q - 4)$

19. $8x^2y^2 - 32xy^3 + 16y^2$

$8y^2(x^2 - 4xy + 2)$

20. $14a^4b - 21a^3b^2 + 28a^2b^3$

$7a^2b(2a^2 - 3ab + 4b^2)$

21. $9y^3z - 3yz^3 + 18z$

$3z(3y^3 - yz^2 + 6)$

22. $12r^3t^2 + 18r^2s^3 + 36s^2t$

$6(2r^3t^2 + 3r^2s^3 + 6s^2t)$

23. $56q^4r^3 + 14q^3r^5 - 42q^2r^4$

$14q^2r^3(4q^2 + qr^2 - 3r)$

24. $92cd^5 - 115c^2d^2 - 46c^5d^3$

$23cd^2(4d^3 - 5c + 2c^4d)$

Journal

1. Find the prime factors of $12x^2y^5$ and $60x^4y^3$. Use the prime factors to find the GCF of the expressions.
2. Explain how factoring a polynomial is like using the Distributive Property and multiplying in reverse.
3. Lester and Michael have both factored the polynomial $12x^2 + 16x$. Lester factored it as $4x(3x + 4)$, and Michael factored it as $2x(6x + 8)$. Who is correct and why?
4. Explain how to factor $30x^3y + 20xy^3 - 5xy$.
5. Write a trinomial of one variable of the fourth degree and factor it. The trinomial must have a common monomial factor.

Cumulative Review

Simplify.

1. $(x - 2)(x + 2)$ $x^2 - 4$

2. $(a - 3)^2$ $a^2 - 6a + 9$

3. $(3c - 1)(c + 2)$ $3c^2 + 5c - 2$

4. $(s + 1)(s - 4)$ $s^2 - 3s - 4$

5. $(3m - 4)(3m + 4)$ $9m^2 - 16$

6. $(4d + 3)(d - 5)$ $4d^2 - 17d - 15$

7. $(m + 5)^2$ $m^2 + 10m + 25$

8. $(5g + 2)(g - 4)$ $5g^2 - 18g - 8$

9. $(k - 6)(k - 2)$ $k^2 - 8k + 12$

10. $(n + 5)(n + 8)$ $n^2 + 13n + 40$

Possible Journal Answers

1. The prime factorization of $12x^2y^5$ is $2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y \cdot y$. The prime factorization of $60x^4y^3$ is $2 \cdot 2 \cdot 3 \cdot 5 \cdot x \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y$. The common factors are 2, 2, 3, x, x, y, y, y. The product of these factors is $12x^2y^3$, which is the GCF of the two expressions.
2. The Distributive Property is usually written as $a(b + c) = ab + ac$, but it can also be written as $ab + ac = a(b + c)$. This is the case when factoring. The factor that is distributed during multiplication is removed when the process is reversed and the polynomial is factored.
3. Lester is correct. Although both boys found a common factor and factored the polynomial, only Lester found the greatest common factor.
4. Find the GCF, $5xy$. Divide each term by $5xy$ to get $6x^2 + 4y^2 - 1$. The answer is $5xy(6x^2 + 4y^2 - 1)$.
5. A possible answer is $16x^4 - 12x^3 + 8x^2$. This trinomial factors as $4x^2(4x^2 - 3x + 2)$.