# 9-2: MULTIPLYING AND FACTORING

*Lesson Objectives:*

- *Multiplying a polynomial by a monomial*
- *Factor a monomial from a polynomial*

## 1 Distributing a Monomial

You can use the Distributive Property for multiplying powers with the same base when multiplying by a monomial.

**EXAMPLE 1: MULTIPLYING A MONOMIAL AND A TRINOMIAL**
Simplify each expression.

1. $-2g^2\left(3g^3+6g-5\right)$
2. $4b\left(5b^2+b+6\right)$
3. $-7h\left(3h^2-8h-1\right)$
4. $2x^3\left(x^2-6x+5\right)$

5. $4x^3\left(x-3\right)$
6. $-x^2\left(-2x^2+3x-2\right)$
7. $4d^3\left(2d^2-3d+7\right)$
8. $4\left(x^2-3\right)-x\left(x+1\right)$

## 2 Factoring a Monomial From a Polynomial

Factoring a polynomial reverses the multiplication process. To factor a monomial from a polynomial, first find the greatest common factor (GCF) of its terms.

**EXAMPLE 2: FINDING THE GREATEST COMMON FACTOR**
Find the GCF of each.

9. $22,44$
10. $14,35$
11. $16,24$
12. $57,95$

13. $75, 50$

14. $90, 45$

15. $20, 60$

16. $36, 48$

17. $36y^2, 21y^3$

18. $33b^2, 22b^2$

19. $33x, 44x^2y^2$

20. $49x^2y^2, 21y^3$

21. $15x^2, 12, 48x$

22. $10v^3, 45v^3, 35v$

23. $45xy^3, 18xy^2, 18x^2y$

24. $24y^2, 36y, 24x^2y$

To factor a polynomial completely, you must factor until there are no common factors other than 1.

**EXAMPLE 3: FACTORING OUT THE GCF**
Factor each polynomial completely.

25. $4x^3 + 12x^2 - 16x$

26. $8x^2 - 12x$

27. $5d^3 + 10d^2$

28. $6m^4 - 12m^2 - 24m$

29. $8x + 10$

30. $6h^2 - 8h$

31. $x^3 - 5x^2$

32. $6a^3 - 12a^2 + 14a$

33. $2w^4 + 6w^3 - 4w^2$

34. $18c^4 - 9c^2 + 7c$

35. $16m^3 - 8m^2 + 12m$

36. $108x^3y^2 - 90x^2y^3 + 27xy$

Name _____ ***8-2 Practice Worksheet*** Period _____

**Simplify each product.**

1. $9k(7k+4)$
2. $-p^2(p-11)$
3. $-5c^3(9c^2-8c-5)$
4. $-4x^6(10x^3+3x^2-7)$

**Find the GCF of the terms of each polynomial.**

5. $6a^2-8a$
6. $x^3+7x^2-5x$
7. $9x^3-6x^2+12x$

**Factor each polynomial.**

8. $v^2+4v$
9. $2t^2-10t^4$
10. $6p^6+24p^5+18p^3$
11. $13ab^3+39a^2b^4$
12. $7g^2k^3-35g^5k^2$
13. $9m^{12}-36m^7+81m^5$

**Simplify. Write in standard form.**

14. $x^2(x+1)-x(x^2-1)$
15. $4t(3t^2-4t)-t(7t)$

16. Factor $n^2-n$

Suppose *n* is an integer. Is $n^2-n$ *always, sometimes,* or *never* even?