

7-1 Study Guide and Intervention

Multiplying Monomials

Monomials A **monomial** is a number, a variable, or the product of a number and one or more variables with nonnegative integer exponents. An expression of the form x^n is called a **power** and represents the product you obtain when x is used as a factor n times. To multiply two powers that have the same base, add the exponents.

Product of Powers	For any number a and all integers m and n , $a^m \cdot a^n = a^{m+n}$.
--------------------------	---

Example 1 Simplify $(3x^6)(5x^2)$.

$$\begin{aligned} (3x^6)(5x^2) &= (3)(5)(x^6 \cdot x^2) && \text{Group the coefficients} \\ & && \text{and the variables} \\ &= (3 \cdot 5)(x^{6+2}) && \text{Product of Powers} \\ &= 15x^8 && \text{Simplify.} \end{aligned}$$

The product is $15x^8$.

Example 2 Simplify $(-4a^3b)(3a^2b^5)$.

$$\begin{aligned} (-4a^3b)(3a^2b^5) &= (-4)(3)(a^3 \cdot a^2)(b \cdot b^5) \\ &= -12(a^{3+2})(b^{1+5}) \\ &= -12a^5b^6 \end{aligned}$$

The product is $-12a^5b^6$.

Exercises

Simplify each expression.

1. $y(y^5)$

2. $n^2 \cdot n^7$

3. $(-7x^2)(x^4)$

4. $x(x^2)(x^4)$

5. $m \cdot m^5$

6. $(-x^3)(-x^4)$

7. $(2a^2)(8a)$

8. $(rs)(rn^3)(n^2)$

9. $(x^2y)(4xy^3)$

10. $\frac{1}{3}(2a^3b)(6b^3)$

11. $(-4x^3)(-5x^7)$

12. $(-3j^2k^4)(2jk^6)$

13. $(5a^2bc^3)\left(\frac{1}{5}abc^4\right)$

14. $(-5xy)(4x^2)(y^4)$

15. $(10x^3yz^2)(-2xy^5z)$

Lesson 7-1

7-1 Study Guide and Intervention *(continued)*

Multiplying Monomials

Simplify Expressions An expression of the form $(x^m)^n$ is called a **power of a power** and represents the product you obtain when x^m is used as a factor n times. To find the power of a power, multiply exponents.

Power of a Power	For any number a and all integers m and n , $(a^m)^n = a^{mn}$.
Power of a Product	For any number a and all integers m and n , $(ab)^m = a^m b^m$.

We can combine and use these properties to simplify expressions involving monomials.

Example Simplify $(-2ab^2)^3(a^2)^4$.

$$\begin{aligned}
 (-2ab^2)^3(a^2)^4 &= (-2ab^2)^3(a^8) && \text{Power of a Power} \\
 &= (-2)^3(a^3)(b^2)^3(a^8) && \text{Power of a Product} \\
 &= (-2)^3(a^3)(a^8)(b^2)^3 && \text{Group the coefficients and the variables} \\
 &= (-2)^3(a^{11})(b^2)^3 && \text{Product of Powers} \\
 &= -8a^{11}b^6 && \text{Power of a Power}
 \end{aligned}$$

The product is $-8a^{11}b^6$.

Exercises

Simplify each expression.

- | | | |
|---|----------------------------|------------------------------|
| 1. $(y^5)^2$ | 2. $(n^7)^4$ | 3. $(x^2)^5(x^3)$ |
| 4. $-3(ab^4)^3$ | 5. $(-3ab^4)^3$ | 6. $(4x^2b)^3$ |
| 7. $(4a^2)^2(b^3)$ | 8. $(4x)^2(b^3)$ | 9. $(x^2y^4)^5$ |
| 10. $(2a^3b^2)(b^3)^2$ | 11. $(-4xy)^3(-2x^2)^3$ | 12. $(-3j^2k^3)^2(2j^2k)^3$ |
| 13. $(25a^2b)^3\left(\frac{1}{5}abf\right)^2$ | 14. $(2xy)^2(-3x^2)(4y^4)$ | 15. $(2x^3y^2z^2)^3(x^2z)^4$ |
| 16. $(-2n^6y^5)(-6n^3y^2)(ny)^3$ | 17. $(-3a^3n^4)(-3a^3n)^4$ | 18. $-3(2x)^4(4x^5y)^2$ |

7-1 Skills Practice**Multiplying Monomials**

Determine whether each expression is a monomial. Write *yes* or *no*. Explain.

1. 11

2. $a - b$

3. $\frac{p^2}{r^2}$

4. y

5. j^3k

6. $2a + 3b$

Simplify.

7. $a^2(a^3)(a^6)$

8. $x(x^2)(x^7)$

9. $(y^2z)(yz^2)$

10. $(l^2k^2)(l^3k)$

11. $(a^2b^4)(a^2b^2)$

12. $(cd^2)(c^3d^2)$

13. $(2x^2)(3x^5)$

14. $(5a^7)(4a^2)$

15. $(4xy^3)(3x^3y^5)$

16. $(7a^5b^2)(a^2b^3)$

17. $(-5m^3)(3m^8)$

18. $(-2c^4d)(-4cd)$

19. $(10^2)^3$

20. $(p^3)^{12}$

21. $(-6p)^2$

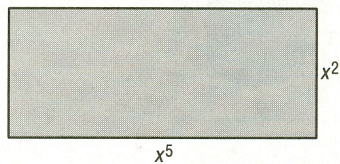
22. $(-3y)^3$

23. $(3pr^2)^2$

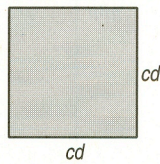
24. $(2b^3c^4)^2$

GEOMETRY Express the area of each figure as a monomial.

25.



26.



27.

