

# Multiplying and Dividing Powers

(Pages 341–345)

<b>Product of Powers</b>	You can multiply powers with the same base by adding exponents. For any number $a$ , and all integers $m$ and $n$ , $a^m \cdot a^n = a^{m+n}$ .
<b>Quotient of Powers</b>	You can divide powers with the same base by subtracting exponents. For all integers $m$ and $n$ and any nonzero number $a$ , $\frac{a^m}{a^n} = a^{m-n}$ .
<b>Zero Exponent</b>	For any nonzero number $a$ , $a^0 = 1$ .

## EXAMPLES

Simplify each expression.

**A**  $4x^2(5x^3)$

$$\begin{aligned} 4x^2(5x^3) &= (4 \cdot 5)(x^2x^3) \\ &= 20x^{2+3} \\ &= 20x^5 \end{aligned}$$

**B**  $\frac{a^6b^9}{a^2b^5}$

$$\begin{aligned} \frac{a^6b^9}{a^2b^5} &= \left(\frac{a^6}{a^2}\right)\left(\frac{b^9}{b^5}\right) \\ &= (a^{6-2})(b^{9-5}) \\ &= a^4b^4 \end{aligned}$$

### Try These Together

1. Simplify  $3g^3(-6g^2h)$ .

*HINT: Add exponents.*

2. Simplify  $\frac{x^5y^2z}{x^3y^2}$ .

*HINT: Subtract exponents. Any nonzero number raised to the zero power is equal to 1.*

## PRACTICE

Simplify each expression.

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

4.  $(g^2h)(gh^4)$

5.  $(c^5d)(c^3d^5)$

6.  $\frac{a^2b^9}{a^2b^8}$

7.  $(2m^2n^8)(2mn^9)$

8.  $8^3 \cdot 8^6$

9.  $g^5(g^3s^3)$

10.  $(3abc)(6ab^2c^2)$

11.  $\frac{16x^6y^7z^8}{-2x^4y^4z^0}$

12.  $(xy)(xz)(yz)$

13.  $\frac{4r^2}{2r^2}$

14.  $\frac{-42k^6}{-7k^5}$

15.  $\frac{63a^2b}{-9a}$

16.  $(-2xy)(6y^8)$

17.  $m^0(m^2n)$

18.  $\frac{c^4d^3}{c^4d^3}$

19.  $\left(\frac{1}{3}p^3\right)(9pr^2)$

20.  $\frac{28a^3b^7c^2}{-4a^2b^5c}$

21.  $\frac{-30x^2y^3z}{-15x^2yz}$

22.  $\frac{-18rs^2t^4}{3st}$



23. **Standardized Test Practice** Simplify  $(a^2b)(ab^2)$ .

**A**  $ab$

**B**  $a^3b^3$

**C**  $a^4b$

**D**  $a^2b^2$

Answers: 1.  $-18g^5h$  2.  $x^2z$  3.  $a^{10}$  4.  $g^3h^5$  5.  $c^8d^6$  6.  $b$  7.  $4m^3n^{17}$  8.  $8^9$  9.  $g^8s^3$  10.  $18a^2b^3c^3$  11.  $-8x^2y^3z^8$  12.  $x^2y^2z^8$  13. 2 14.  $6k$  15.  $-7ab$  16.  $-12xy^9$  17.  $m^2n$  18. 1 19.  $3p^4r^2$  20.  $-7ab^2c$  21.  $2y^2$  22.  $-6rst^3$  23. B