

Lesson 3 Reteach

Multiply and Divide Monomials

The **Product of Powers** rule states that to multiply powers with the same base, add their exponents.

Example 1

Simplify. Express using exponents.

a. $2^3 \cdot 2^2$

$$2^3 \cdot 2^2 = 2^{3+2}$$

The common base is 2.

$$= 2^5$$

Add the exponents.

b. $2s^6(7s^7)$

$$2s^6(7s^7) = (2 \cdot 7)(s^6 \cdot s^7)$$

Commutative and Associative Properties

$$= 14(s^{6+7})$$

The common base is s .

$$= 14s^{13}$$

Add the exponents.

The **Quotient of Powers** rule states that to divide powers with the same base, subtract their exponents.

Example 2Simplify $\frac{k^8}{k}$. Express using exponents.

$$\frac{k^8}{k^1} = k^{8-1}$$

The common base is k .

$$= k^7$$

Subtract the exponents.

Example 3Simplify $\frac{(-2)^{10} \cdot 5^6 \cdot 6^3}{(-2)^6 \cdot 5^3 \cdot 6^2}$.

$$\frac{(-2)^{10} \cdot 5^6 \cdot 6^3}{(-2)^6 \cdot 5^3 \cdot 6^2} = \left(\frac{(-2)^{10}}{(-2)^6}\right) \cdot \left(\frac{5^6}{5^3}\right) \cdot \left(\frac{6^3}{6^2}\right)$$

Group by common base.

$$= (-2)^4 \cdot 5^3 \cdot 6^1$$

Subtract the exponents.

$$= 16 \cdot 125 \cdot 6 \text{ or } 12,000$$

Simplify.

Exercises

Simplify. Express using exponents.

1. $5^2 \cdot 5^5$

2. $e^2 \cdot e^7$

3. $2a^5 \cdot 6a$

4. $4x^2(-5x^6)$

5. $\frac{7^9}{7^3}$

6. $\frac{v^{14}}{v^6}$

7. $\frac{15w^7}{5w^3}$

8. $\frac{10m^8}{2m}$

9. $\frac{2^5 \cdot 3^7 \cdot 4^3}{2^1 \cdot 3^4 \cdot 4}$

10. $\frac{4^{15} \cdot (-5)^6}{4^{12} \cdot (-5)^4}$

11. $\frac{6^7 \cdot 7^6 \cdot 8^5}{6^5 \cdot 7^5 \cdot 8^4}$

12. $\frac{(-3)^6 \cdot 10^5}{(-3)^4 \cdot 10^3}$

Lesson 3 Skills Practice

Multiply and Divide Monomials

Simplify. Express using exponents.

1. $5^9 \cdot 5^3$

2. $3^8 \cdot 3$

3. $c \cdot c^6$

4. $m^5 \cdot m^2$

5. $3x \cdot 4x^4$

6. $(2h^7)(7h)$

7. $-5d^6(8d^6)$

8. $(6k^5)(-k^4)$

9. $(-w)(-10w^3)$

10. $-7z^4(-3z^8)$

11. $bc^3(b^2c)$

12. $3a^4 \cdot 6a^2$

13. $3m^3n^2(8mn^3)$

14. $7t^5(-6t^3)$

15. $(3ab^2)(a^2c^5)$

16. $(9p^4)(-8p^2)$

17. $\frac{2^9}{2^3}$

18. $\frac{3^8}{3^4}$

19. $\frac{5^9}{5^2}$

20. $\frac{8^7}{8}$

21. $\frac{b^{12}}{b^5}$

22. $\frac{12n^5}{4n^2}$

23. $\frac{14m^3}{7m^2}$

24. $\frac{9r^8}{3r^4}$

25. $\frac{24t^9}{6t^3}$

26. $\frac{18y^6}{2y}$

27. $\frac{a^4c^6}{a^2c}$

28. $\frac{5^{10}}{5^2}$

Simplify.

29. $\frac{4^8 \cdot 5^3 \cdot 7^6}{4^6 \cdot 5^2 \cdot 7^5}$

30. $\frac{(-2)^9 \cdot (-3)^7 \cdot 4^3}{(-2)^5 \cdot (-3)^5 \cdot 4^1}$

31. $\frac{3^{10} \cdot (-6)^3}{3^7 \cdot (-6)^2}$

32. $\frac{9^3 \cdot 10^{12}}{9^6 \cdot 10^6}$