

4-6

Multiplying and Dividing Monomials

(Pages 175–179)

You can multiply and divide numbers with exponents (or powers) if they have the same base.

Multiplying and Dividing Powers	<ul style="list-style-type: none"> To find the product of powers <i>that have the same base</i>, add their exponents. $a^m \cdot a^n = a^{m+n}$ To find the quotient of powers <i>that have the same base</i>, subtract their exponents. $a^m \div a^n = a^{m-n}$
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Examples

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

Follow the pattern of $a^m \cdot a^n = a^{m+n}$. Notice that both factors have the same base, 2. Therefore 2 is also the base of the answer.

$2^5 \cdot 2^3 = 2^{5+3}$ or 2^8

b. Find $\frac{b^8}{b^2}$.

Follow the pattern of $a^m \div a^n = a^{m-n}$. Notice that both factors have the same base, b. Therefore the base of the answer is also b.

$\frac{b^8}{b^2} = b^{8-2}$ or b^6

Try These Together

1. Find $x \cdot x^3$. Express your answer in exponential form.

HINT: $x = x^1$

2. Find $\frac{9^{10}}{9^6}$. Express your answer in exponential form.

HINT: The answer will have a base of 9.

Practice

Find each product or quotient. Express your answer in exponential form.

3. $m^4 \cdot m^3$

4. $(p^{12}q^5)(p^3q^3)$

5. $(2y^7)(5y^2)$

6. $(12x^7)(x^{11})$

7. $8^6 \div 8^2$

8. $\frac{15^7}{15^2}$

9. $n^{18} \div n^9$

10. $\frac{x^3y^{10}}{x^3y^4}$

11. $\frac{r^{50}}{r}$

12. $\frac{9m^{11}}{3m^5}$

13. $\frac{12t^4}{4t^3}$

14. $(x^8 \cdot x^7) \div x^3$

Find each missing exponent.

15. $(y^?) (y^4) = y^{10}$

16. $\frac{20^{15}}{20^?} = 20^5$

17. **History** The Italian mathematician Pietro Cataldi, born in 1548, wrote exponents differently from the way they are written today. For example, he wrote 5¢ for $5x^2$ and 5§ for $5x^3$. How do you think he would have written the answer to $6x^3 \cdot x^4$?

18. **Standardized Test Practice** Simplify the expression $p^6q^4r^{10} \cdot p^2qr^5$.

A $p^8q^5r^{15}$

B $p^3q^4r^2$

C $p^8q^4r^{15}$

D $p^4q^3r^5$

Answers: 1. x^4 2. 9^4 3. m^7 4. $p^{15}q^8$ 5. $10y^9$ 6. $12x^{18}$ 7. 84 8. 15^5 9. n^9 10. y^6 11. r^{49} 12. $3m^6$ 13. $3t$ 14. x^{12} 15. 6 16. 10 17. 6¢ 18. A