

Study Guide and Intervention

7NS2.3, 7AF2.1, 7AF2.2

Multiplying Monomials

The **Product of Powers Property** states that to multiply powers that have the same base, add the exponents: $a^n \cdot a^m = a^{n+m}$.

Example Multiply. Express using exponents.

$$\begin{aligned} 1 \quad 2^3 \cdot 2^2 \\ 2^3 \cdot 2^2 &= 2^{3+2} \\ &= 2^5 \end{aligned}$$

The common base is 2.
Add the exponents.

$$\begin{aligned} 2 \quad -2s^6(-7s^7) \\ -2s^6(-7s^7) &= (-2 \cdot -7)(s^6 \cdot s^7) \\ &= (14)(s^{6+7}) \\ &= 14s^{13} \end{aligned}$$

Commutative and Associative Properties
The common base is s .
Add the exponents.

$$\begin{aligned} 3 \quad n^5 - n^{-3} \\ n^5 - n^{-3} &= n^{5-3} \\ &= n^2 \end{aligned}$$

The common base is n .
Subtract the exponents.

Exercise

Multiply. Express using exponents.

1. $3^4 \cdot 3^1$ **3^5**

2. $5^2 \cdot 5^5$ **5^7**

3. $e^2 \cdot e^7$ **e^9**

4. $2a^5 \cdot 6a$ **$12a^6$**

5. $-3t^3 \cdot 2t^8$ **$-6t^{11}$**

6. $4x^2(-5x^6)$ **$-20x^8$**

7. $-6t^4 \cdot -3t^5$ **$18t^9$**

8. $\left(\frac{3}{4}\right)^{-3} \cdot \left(\frac{3}{4}\right)^6$ **$\frac{27}{64}$**

9. $-6m^2 \cdot 4m$ **$-24m^3$**

10. $3s^6(-9s^{-2}h^2)$ **$-27s^4h^2$**

11. $9a^2(-6a^{-5})$ **$-54a^{-3}$**

12. $-2e^4z^{-4}(6e^{-6})$
 $-12e^{-2}z^{-10}$

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Dividing Monomials

The Quotient of Powers Property states that to divide powers that have the same base, subtract the exponents: $a^n \div a^m = a^{n-m}$.

Example Divide. Express using exponents.

$$\begin{aligned} 1 \quad & \frac{k^8}{k} \\ & \frac{k^8}{k} = k^{8-1} \\ & = k^7 \end{aligned}$$

The common base is k .
Subtract the exponents.

$$\begin{aligned} 2 \quad & \frac{28g^{12}}{-4g^3} \\ & \frac{28g^{12}}{-4g^3} = \left(\frac{28}{-4}\right)\left(\frac{g^{12}}{g^3}\right) \\ & = (-7)(g^{12-3}) \\ & = -7g^9 \end{aligned}$$

Commutative and Associative Properties

The common base is g .
Subtract the exponents.

$$\begin{aligned} 3 \quad & \frac{5^8}{5^{-5}} \\ & \frac{5^8}{5^{-5}} = 5^{8-(-5)} \\ & = 5^{13} \end{aligned}$$

Quotient of Powers.

Simplify.

Exercise

Divide. Express using exponents.

1. $\frac{2^8}{2^6}$ 2^2

2. $\frac{7^9}{7^3}$ 7^6

3. $\frac{v^{14}}{v^6}$ v^8

4. $\frac{15w^7}{5w^2}$ $3w^5$

5. $\frac{21z^{10}}{7z^9}$ $3z$

6. $\frac{10m^8}{2m}$ $5m^7$

7. $\frac{(-12)^3}{(-12)^3}$ 1

8. $\frac{c^{20}}{c^{13}}$ c^7

9. $\frac{1^8}{1^6}$ 1^2 or 1

10. $\frac{x^{-2}}{x^{-4}}$ x^2

11. $\frac{100^7}{100^6}$ 100^1 or 100

12. $\frac{4^{-2}}{4^6}$ 4^{-8}