

Lesson 5 Reteach

Negative Exponents

Any nonzero number to the zero power is 1. Any nonzero number to the negative n power is the multiplicative inverse of the number to the n th power.

Example 1

Write each expression using a positive exponent.

a. 7^{-3}

$$7^{-3} = \frac{1}{7^3} \quad \text{Definition of negative exponent}$$

b. a^{-4}

$$a^{-4} = \frac{1}{a^4} \quad \text{Definition of negative exponent}$$

Example 2

Evaluate each expression.

a. 5^{-4}

$$5^{-4} = \frac{1}{5^4} \quad \text{Definition of negative exponent}$$

$$= \frac{1}{625} \quad 5^4 = 5 \cdot 5 \cdot 5 \cdot 5$$

b. $(-3)^{-5}$

$$(-3)^{-5} = \frac{1}{(-3)^5} \quad \text{Definition of negative exponent}$$

$$= \frac{1}{-243} \quad (-3)^5 = (-3) \cdot (-3) \cdot (-3) \cdot (-3) \cdot (-3)$$

Example 3

Write $\frac{1}{6^5}$ as an expression using a negative exponent.

$$\frac{1}{6^5} = 6^{-5} \quad \text{Definition of negative exponent}$$

Example 4

Simplify. Express using positive exponents.

a. $x^{-3} \cdot x^5$

$$\begin{aligned} x^{-3} \cdot x^5 &= x^{(-3)+5} && \text{Product of Powers} \\ &= x^2 && \text{Add the exponents.} \end{aligned}$$

b. $\frac{w^{-5}}{w^{-7}}$

$$\begin{aligned} \frac{w^{-5}}{w^{-7}} &= w^{-5-(-7)} && \text{Quotient of Powers} \\ &= w^2 && \text{Subtract the exponents.} \end{aligned}$$

Exercises

Write each expression using a positive exponent.

1. a^{-8}

2. 6^{-3}

3. n^{-4}

Evaluate each expression.

4. 7^{-2}

5. 9^{-3}

6. $(-2)^{-5}$

Write each fraction as an expression using a negative exponent.

7. $\frac{1}{5^7}$

8. $\frac{1}{3^6}$

9. $\frac{1}{x^8}$

Simplify. Express using positive exponents.

10. $4^{-2} \cdot 4^{-4}$

11. $r^{-3} \cdot r^5$

12. $\frac{h^{-2}}{h^4}$

Lesson 5 Skills Practice

Negative Exponents

Write each expression using a positive exponent.

1. 4^{-5}

2. 5^{-7}

3. m^{-9}

4. s^{-6}

5. f^{-3}

6. $(-2)^{-6}$

7. $(-4)^{-3}$

8. w^{-12}

Evaluate each expression.

9. $(-5)^{-5}$

10. 3^{-2}

11. 8^{-3}

12. $(-9)^{-4}$

Write each fraction as an expression using a negative exponent.

13. $\frac{1}{12^3}$

14. $\frac{1}{81}$

15. $\frac{1}{t^6}$

16. $\frac{1}{8^8}$

Simplify. Express using positive exponents.

17. $2^{-6} \cdot 2^3$

18. $s^{-5} \cdot s^7$

19. $\frac{m^8}{m^{-4}}$

20. $\frac{10^8}{10^9}$

21. $y^{-3} \cdot y^3$

22. $s^{-5} \cdot s^7$

23. $\frac{x^6}{x^{-3}}$

24. $\frac{6^{-4}}{6^8}$

25. $\frac{3^5}{3^{-3}}$

26. $\frac{e^{-3}}{e^{-2}}$

27. $\frac{n^{-6}}{n^4}$

28. $\frac{j^{-2}}{j^{-2}}$