7-1 Reteaching

Zero and Negative Exponents

For every nonzero number a, $a^0 = 1$.

For every nonzero number a and integer n, $a^{-n} = \frac{1}{a^n}$. In other words, when the exponent is negative, raise the reciprocal of the base to the opposite of the exponent.

Problem

What is the simplified form of each expression?

a. $3.9^0 = 1$ Since the exponent is 0 but the base of the expression is 3.9, which is not 0, the expression has a value of 1.

b. $9^{-2} = \frac{1}{9^2}$ The exponent is negative, so raise the reciprocal of 9, or $\frac{1}{9}$, to the exponent –(–2), or 2.

$= \frac{1}{81}$ Simplify.

Problem

What is the simplified form of $\frac{7b^{-3}}{a^2}$ using only positive exponents?

$\frac{7b^{-3}}{a^2} = \frac{7}{a^2} \cdot b^{-3}$ Rewrite the expression as a product of factors with positive exponents and factors with negative exponents.

$= \frac{7}{a^2} \cdot \frac{1}{b^3}$ Rewrite the factor with the negative exponent by raising the reciprocal of the base to a positive exponent.

$= \frac{7}{a^2 b^3}$ Simplify by multiplying.

Exercises

Write each expression as an integer, a simple fraction, or an expression that contains only positive exponents. Simplify.

1. 2.3^{0}

2. 10^{-4}

3. $2a^{-5}$

4. 113.7^{0}

5. 19^{-1}

6. $\dfrac{3^{-3}}{p}$

7. $(7q)^{-1}$

8. $\left(-\dfrac{7}{8}\right)^{-2}$

9. $1.8c^{0}$

10. $(-9.7)^{0}$

Write each expression so that it contains only positive exponents. Simplify.

11. -6^{-3}

12. $-2rs^{-5}$

13. $7x^{-8}y^{0}$

14. $\left(\dfrac{5a}{3b}\right)^{-2}$

15. $(-8v)^{-2}w^{3}$

16. $\dfrac{2^{-3}}{m^{0}n^{-1}}$

17. $(3xy)^{0}z$

18. $\dfrac{-3^{-3}}{uv^{-2}}$