

Lesson 1-8

Example 1

Simplify each expression, using the properties for exponents.

a. $a^{12} \div a^{-4}$

b. $b^3 \cdot b^{-4}$

c. $(a^2)^{-4}$

Solution

$$\begin{aligned} \text{a. } a^{12} \div a^{-4} &= a^{12 - (-4)} \\ &= a^{16} \end{aligned}$$

$$\begin{aligned} \text{b. } b^3 \cdot b^{-4} &= b^{3 + (-4)} \\ &= b^{-1} \end{aligned}$$

$$\begin{aligned} \text{c. } (a^2)^{-4} &= a^{2(-4)} \\ &= a^{-8} \end{aligned}$$

Example 2

Evaluate x^{-4} when $x = 3$.

Solution

$$x^{-4} = 3^{-4} = \frac{1}{3^4} = \frac{1}{81}$$

Example 3

CHEMISTRY The mass of an oxygen atom is $2.66 \cdot 10^{-23}$ gram (g).
What is the approximate mass of 1 million oxygen atoms?

Solution

The mass of an oxygen atom is $2.66 \cdot 10^{-23}$ g. Recall, 1 million = $1 \cdot 10^6$.
The mass of 1 million oxygen atoms
 = 1 million \times the mass of 1 oxygen atom
 = $(1 \cdot 10^6)(2.66 \cdot 10^{-23})$ g
 = $(1 \cdot 2.66)(10^6 \cdot 10^{-23})$ g
 = $2.66 \cdot 10^{-17}$ g

Example 4

MEASUREMENT Find the number of millimeters in 3 kilometers.

Solution

$$3 \text{ km} \cdot \frac{10^3 \text{ m}}{1 \text{ km}} \cdot \frac{1 \text{ mm}}{10^{-3} \text{ m}} = 3 \cdot 10^6 \text{ mm}$$