

Lesson 10-6

Example 1 Divide Powers

Simplify. Express using exponents.

$$\frac{8^5}{8^3}$$
$$\frac{8^5}{8^3} = 8^{5-3} \quad \text{The common base is 8.}$$
$$= 8^2 \quad \text{Simplify.}$$

Example 2 Divide Powers

Simplify. Express using exponents.

$$\frac{a^{12}}{a^7}$$
$$\frac{a^{12}}{a^7} = a^{12-7} \quad \text{The common base is } a.$$
$$= a^5 \quad \text{Simplify.}$$

Example 3 Use Negative Exponents

Simplify. Express using positive exponents.

$$\frac{4^6}{4^{-2}}$$
$$\frac{4^6}{4^{-2}} = 4^{6-(-2)} \quad \text{Quotient of Powers}$$
$$= 4^{6+2} \text{ or } 4^8 \quad \text{Simplify.}$$

Example 4 Use Negative Exponents

Simplify. Express using positive exponents.

$$\frac{m^{-5}}{m^{-9}}$$
$$\frac{m^{-5}}{m^{-9}} = m^{-5-(-9)} \quad \text{Quotient of Powers}$$
$$= m^{-5+9} \text{ or } m^4 \quad \text{Simplify.}$$

Example 5 Standards Example

$$\frac{3^2 \cdot 5^5 \cdot 6^3}{3^3 \cdot 5^2 \cdot 6^4} =$$

A $6\frac{47}{50}$

B $62\frac{1}{2}$

C 250

D 450

Read the Item

You are asked to divide one monomial by another.

Solve the Item

$$\frac{3^4 \cdot 5^5 \cdot 6^3}{3^3 \cdot 5^2 \cdot 6^4} = \left(\frac{3^4}{3^3}\right) \left(\frac{5^5}{5^2}\right) \left(\frac{6^3}{6^4}\right)$$

Group by common base.

$$= 3^1 \cdot 5^3 \cdot 6^{-1}$$

Subtract the exponents.

$$= 3 \cdot 125 \cdot \frac{1}{6}$$

$$6^{-1} = \frac{1}{6}$$

$$= \frac{375}{6} \text{ or } 62\frac{1}{2}$$

Simplify.

The answer is B.

Example 6 Real-World Example

CHARITY Last year Natasha raised $\$2^9$ for various charity organizations. This year she plans to raise $\$2^{11}$. How many times greater is the amount Natasha plans to raise for charity this year than the amount she raised last year?

To find how many times greater, divide 2^{11} by 2^9 .

$$\frac{2^{11}}{2^9} = 2^{11-9} \text{ or } 2^2$$

Quotient of Powers

Natasha plans to raise 2^2 or 4 times more money for charity this year than last year.