

**10.3**

# **Quotient of Powers Property**

# 8-2 Exponent Properties with Quotients

---

## *Example 1*

$$\frac{x^5}{x^3}$$

## *Example 2*

$$\frac{n^7}{n^3}$$

**The Quotient of Powers Property:**

\_\_\_\_\_ base & \_\_\_\_\_ the exponents.

# Practice

Simplify

$$1) \frac{x^9}{x^5}$$

$$2) \frac{x^8}{x^3}$$

$$3) \frac{x^{16}}{x^9}$$

$$4) \frac{x^{17}}{x^8}$$

$$5) \frac{8^{10}}{8^4}$$

$$6) \frac{4^7}{4^6}$$

# Practice

Simplify

$$7) \frac{x^{24}}{x^{16}}$$

$$8) \frac{1}{(-5)^4} \bullet (-5)^{11}$$

$$9) \frac{x^3 y}{x^2}$$

$$10) \frac{3^4 \bullet 3^2}{3^3}$$

$$11) \frac{5^6 \bullet 5^2}{5^4}$$

$$12) \frac{z^6}{z^2} \cdot \frac{z^8}{z^5}$$

$$13) \frac{a^{10}}{a^6} \cdot \frac{a^7}{a^4}$$

$$14) \frac{d^5}{d} \bullet \frac{d^9}{d^8}$$

$$15) \frac{2^{15}}{2^3 \bullet 2^5}$$

Solve for the missing exponent...

$$16) \frac{12^9}{12^?} = 12^5$$



**10.3 Practice A**

Simplify the expression. Write your answer as a power.

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

2.  $\frac{10^{11}}{10^3}$

3.  $\frac{(-4)^5}{(-4)^4}$

4.  $\frac{(5.6)^{15}}{(5.6)^9}$

5.  $\frac{p^{13}}{p^{11}}$

6.  $\frac{(-0.7)^{25}}{(-0.7)^{12}}$

7.  $\frac{s^{28}}{s^7}$

8.  $\frac{\pi^6}{\pi}$

9. A personal computer developed in the 1980s had approximately  $2^{18}$  bytes of memory. Today a laptop has 1 gigabyte =  $2^{30}$  bytes of memory. How many times more memory does today's laptop have than the personal computer from the 1980s?

Simplify the expression. Write your answer as a power.

10.  $\frac{6^3 \cdot 6^7}{6^4}$

11.  $\frac{3^4 \cdot 3^5}{3 \cdot 3^2}$

12.  $\frac{(-0.5)^8 \cdot (-0.5)^5}{(-0.5)^6 \cdot (-0.5)^2}$

13.  $\frac{m^{14}}{m^{10}} \cdot \frac{m^5}{m^2}$

Simplify the expression.

14.  $\frac{5^4 \cdot n^4}{5^2}$

15.  $\frac{x^5 \cdot z^4}{x^2 \cdot z^2}$

16.  $\frac{c^6 \cdot d^{10} \cdot 2^6}{d^5 \cdot 2^3}$

17.  $\frac{a^{12}b^8}{a^{10}b^5}$

Find the value of  $x$  in the equation without evaluating the power.

18.  $\frac{5^9}{5^x} = 625$

19.  $\frac{3^7 \cdot 3^x}{3^6} = 9$