Name _____ Date _____

LESSON 7.2

Study Guide

For use with the lesson "Apply Exponent Properties Involving Quotients"

GOAL **Use properties of exponents involving quotients.**

EXAMPLE 1 Use the quotient of powers property

Simplify the expression.

a. $\frac{7^{13}}{7^8} = 7^{13-8}$

$= 7^5$

b. $\frac{(-1)^6}{(-1)^2} = (-1)^{6-2}$

$= (-1)^4$

c. $\frac{2^3 \cdot 2^9}{2^4} = \frac{2^{12}}{2^4}$

$= 2^{12-4}$

$= 2^8$

d. $\frac{1}{y^7} \cdot y^{18} = \frac{y^{18}}{y^7}$

$= y^{18-7}$

$= y^{11}$

Exercises for Example 1

Simplify the expression.

1. $\frac{12^{15}}{12^6}$

2. $\frac{(-8)^{20}}{(-8)^{16}}$

3. $\frac{13^6 \cdot 13^8}{13^9}$

4. $\frac{1}{w^{16}} \cdot w^{21}$

EXAMPLE 2 Use the power of a quotient property

Simplify the expression.

a. $\left(\frac{m}{n}\right)^5 = \frac{m^5}{n^5}$

b. $\left(\frac{3}{p}\right)^3 = \frac{3^3}{p^3} = \frac{27}{p^3}$

Exercises for Example 2

Simplify the expression.

5. $\left(\frac{b}{c}\right)^7$

6. $\left(-\frac{3}{w}\right)^4$

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LESSON 7.2

Study Guide *continued*

For use with the lesson "Apply Exponent Properties Involving Quotients"

EXAMPLE 3 Use the properties of exponents

Simplify the expression.

a. $\left(\frac{2x^3}{5y^2}\right)^2 = \frac{(2x^3)^2}{(5y^2)^2}$ Power of a quotient property

$= \frac{2^2(x^3)^2}{5^2(y^2)^2}$ Power of a product property

$= \frac{4x^6}{25y^4}$ Power of a power property

b. $\left(\frac{3k^3}{4\ell^5}\right)^2 \cdot \frac{\ell^2}{6k^2} = \frac{3^2(k^3)^2}{4^2(\ell^5)^2} \cdot \frac{\ell^3}{6k^2}$ Power of a quotient property

$= \frac{9k^6}{16\ell^{10}} \cdot \frac{\ell^3}{6k^2}$ Power of a power property

$= \frac{9k^6\ell^3}{96\ell^{10}k^2}$ Multiply fractions.

$= \frac{3k^4}{32\ell^7}$ Quotient of a powers property

Exercises for Example 3

Simplify the expression.

7. $\left(\frac{3s^5}{t^4}\right)^3$

8. $\frac{1}{3m^4} \cdot \left(\frac{3m^2n}{n^2}\right)^3$

EXAMPLE 4 Solve a real world problem

Distances The distance from Earth to the nearest galaxy is about 10^{22} meters. The distance from Earth to the North Star is about 10^{19} meters. How many times further from Earth is the nearest galaxy than the North Star?

Solution

$$\frac{\text{Distance to the nearest galaxy}}{\text{Distance to the North Star}} = \frac{10^{22}}{10^{19}} = 10^{22-19} = 10^3$$

The nearest galaxy is about 10^3 times further than the North Star.

Exercise for Example 4

9. The distance from the sun to Saturn is 10^{12} meters. The distance from the sun to Venus is 10^{11} meters. How much further is Saturn than Venus from the sun?