Sec. 8.2: Apply Exponent Properties Involving Quotients

Consider the quotient $7^5 \div 7^2$, which could also be written as $(7 \cdot 7 \cdot 7 \cdot 7 \cdot 7) \div (7 \cdot 7)$. Notice that two of the 7s in the numerator could cancel the two 7s in the denominator, leaving us with three 7s in the numerator. In other words, $7^5 \div 7^2 = 7^3$. As was the case with products of powers that share a common base, we have a shortcut for quotients of powers with the same base.

Quotient of Powers Property:

$a^m \div a^n = a^{m-n}$, given a is a _____ real number, and m and n are _____ integers with $m > n$.

Power of a Quotient Property:

$\left(\dfrac{a}{b}\right)^m = a^m \div b^m$, given a and b are real numbers with _____ and m is a positive integer.

Examples

Simplify the expression. Write your answer using exponents.

1. $3^8 \div 3^3$

2. $(-4)^3 \div (-4)^2$

3. $\left(\dfrac{3}{4}\right)^3$

4. $8x^6 \div 2x^4$

5. $-6h^9k^8 \div 3hk^2$

6. $(-3 \div p^4)^3$

7. $(2x^4 \div y^2)^3$

8. The distance from the earth to the sun is roughly on the order of 10^8 miles. The distance from the earth to the moon is roughly on the order of 10^5 miles. Approximately how many times as far from the earth is the sun than the moon?

Algebra 1

Name_____

Sec. 8.2 Practice Problems

Simplify. Your answer should contain only positive exponents.

1) $\dfrac{2^3}{2^2}$

2) $\dfrac{(-4)^4}{(-4)^2}$

3) $\dfrac{(-3)^2}{-3}$

4) $\dfrac{2n^4}{2n^3}$

5) $\dfrac{4k^4}{-2k^2}$

6) $\dfrac{-3r^2}{-2r}$

7) $-\dfrac{3n^4}{n^2}$

8) $-\dfrac{3n^3}{2n^2}$

9) $-\dfrac{2r^3}{2r}$

10) $\dfrac{3v^4}{v}$

11) $\dfrac{-a^3b^3}{-4a}$

12) $\dfrac{a^3b^3}{-ab^2}$

13) $-\dfrac{2u^4}{4v^4}$

14) $-\dfrac{x^3y^4}{xy^2}$

15) $-\dfrac{4x^4 y^4}{2x^2 y^2}$

16) $-\dfrac{m^3 n^2}{m}$

17) $\dfrac{2mn^2 p^2}{3mpn^2}$

18) $\dfrac{3x^2 y^4 z^2}{-y^3}$

19) $\dfrac{b^4 c^4}{bc^3}$

20) $\dfrac{-mpq^4}{-3mpq^2}$

21) Evaluate the expression $\dfrac{7^3 \cdot 7^6}{7^4}$

22) Evaluate the expression $\left(\dfrac{x^3}{y^2}\right)^3$

23) Evaluate the expression $\left(\dfrac{2x^4}{y^5}\right)^3$

24) Evaluate the expression $\left(-\dfrac{2}{x^4}\right)^3$

25) Evaluate the expression $\left(-\dfrac{3}{x^2}\right)^4$

26) The area of New Zealand is approximately 10^5 square miles, and the area of Saint Kitts and Nevis, islands in the Caribbean Sea, is approximately 10^2 square miles. How many times as great is the area of New Zealand compared to the area of Saint Kitts and Nevis? Express your answer using exponents.

Answers to Sec. 8.2 Practice Problems

1) 2

2) $(-4)^2$

3) -3

4) n

5) $-2k^2$

6) $\dfrac{3r}{2}$

7) $-3n^2$

8) $-\dfrac{3n}{2}$

9) $-r^2$

10) $3v^3$

11) $\dfrac{a^2 b^3}{4}$

12) $-a^2 b$

13) $-\dfrac{u^4}{2v^4}$

14) $-x^2 y^2$

15) $-2x^2 y^2$

16) $-m^2 n^2$

17) $\dfrac{2p}{3}$

18) $-3x^2 y z^2$

19) $b^3 c$

20) $\dfrac{q^2}{3}$

21) 7^5

22) $\dfrac{x^9}{y^6}$

23) $\dfrac{8x^{12}}{y^{15}}$

24) $-\dfrac{8}{x^{12}}$

25) $\dfrac{81}{x^8}$

26) The area of New Zealand is 10^3 times as great as the area of Saint Kitts and Nevis.