



Unit 2 Test Review

Warm Up

<http://www.youtube.com/watch?v=dQwA-o3dUIM>

1) Simplify then Evaluate

$$\left(\frac{3^2}{3^1}\right)^4 - 2^5 \times 2^9 \div 2^6$$

$$(3^1)^4 - 2^{14} \div 2^6$$

$$3^4 - 2^8$$

$$8 - 256$$

$$= -175$$

$$\left(\frac{3^2}{3}\right)^4 - 2^5 \times 2^9 \div 2^6$$

$$\frac{3^8}{3^4} - 2^{14} \div 2^6$$

$$3^4 - 2^8$$

$$8 - 256$$

$$= -175$$

Simplify

$$\frac{(3^2)^6 \times (4^6)^4 \times (3^4)^5 \times (4^2)^4}{(4^3)^5 \times (3^4)^3 \times (4^9)^2 \times (3^2)^6}$$

$$\frac{(3^2)^6 \times (3^4)^5 \times (4^6)^4 \times (4^2)^4}{(3^4)^3 \times (3^2)^6 \times (4^3)^5 \times (4^9)^2}$$

$$\frac{3^{12} \times 3^{20}}{3^{12} \times 3^{12}}$$

$$\frac{4^{24} \times 4^{14}}{4^{15} \times 4^{18}}$$

$$\frac{3^{32}}{3^{24}} \times \frac{4^{38}}{4^{33}}$$

$$3^8 \times 4^5$$

Test Outline

Unit 2: Powers and the Exponent Laws



Page 86
Study Guide

Powers

- Base
- Exponent
- Repeated Multiplication
- Powers of ten
- Expanded form to Standard form and vice versa

Order of Operations

BEDMAS

Exponent Laws

- The Zero Exponent
- Product of Powers
- Quotient of Powers
- Power of a Power
- Power of a Product
- Power of a Quotient

Exponent Laws

1) Zero Rule

-Anything raised to the exponent of zero is 1

$$(-5)^0 = 1 \quad \text{or} \quad (x)^0 = 1$$

2) Product of Powers Rule

When you multiply like bases you add the exponents

$$(2)^3 \times (2)^5 = (2)^8 \quad \text{or} \quad (a)^m \times (a)^n = (a)^{m+n}$$

3) Quotient Rule

When you divide like bases you Subtract the exponents

$$\frac{(-4)^7}{(-4)^5} = (-4)^2 \quad \text{or} \quad (a)^m \div (a)^n = (a)^{m-n}$$

4) Power to a Power Rule

With a power to a power we multiply exponents

$$(2^5)^3 = (2)^{15} \quad \text{or} \quad (a^m)^n = (a)^{mn}$$

5) Power of Product Rule

With a power of products we multiply exponents

$$[(5^5) \times (6^4)]^3 = 5^{15} \times 6^{12}$$

$$\text{or} \quad [(a^m) \times (b^n)]^p = (a)^{mp} \times (b)^{np}$$

6) Power of Quotient Rule

With a power of quotient we multiply exponents

$$\left[\frac{(-3)^6}{(5)^3} \right]^2 = \frac{(-3)^{12}}{(5)^6}$$

$$\text{or} \quad [(a^m) \div (b^n)]^p = (a)^{mp} \div (b)^{np}$$

Simplify. Your answer should contain only one base.

1) $[2^2 \cdot (2^2)^3]^2$

2) $[6^3 \cdot 6^3 \cdot 6^2]^2$

3) $5^3 \cdot 5^2 \cdot (5^0)^3$

4) $6 \cdot (6^2)^3$

5) $(4^3)^2 \cdot 4^2$

6) $6 \cdot (6^3)^2$

7) $\frac{3^3 \cdot 3^3}{3^3}$

8) $\frac{2^0 \cdot 2^3}{2^2}$

9) $\frac{6^3 \cdot 6^2}{6^5}$

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

11) $\frac{6^2 \cdot 6^0}{6^2}$

12) $\frac{3^2}{3 \cdot 3^0}$

13) $\left(\frac{5}{5^3}\right)^3$

14) $\frac{6^3}{6^3}$

15) $\left(\frac{5^2}{5^3}\right)^0$

16) $\left(\frac{4^2}{(4^0)^2}\right)^3$

17) $\left(\frac{4^3}{4^2}\right)^3$

18) $\frac{(2^3)^2}{2}$

19) $\frac{(3^2)^3}{3^2 \cdot 3^3}$

20) $\frac{4^3 \cdot (4^2)^2}{4^2}$

21) $\frac{(2^2)^2}{2 \cdot 2^2}$

22) $\frac{[5^3 \cdot 5^2]^2}{5}$

23) $\frac{6^3 \cdot (6^3)^3}{6^0}$

24) $\frac{[2 \cdot (2^3)^0 \cdot (2^3)^2]^3}{2^0}$

Mathematic 9

Laws Of Exponents 2

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Simplify.

1) $\frac{2^2 \cdot (2^4)^0}{2}$

2) $\left(\frac{2^9}{2^4 \cdot 2^3}\right)^2$

3) $\frac{2 \cdot 2^4}{2^2}$

4) $-\frac{2 \cdot (-2)^3}{(-2)^3}$

5) $\left(\frac{(-2)^0 \cdot (-2)^0}{(-2)^4}\right)^2$

6) $\frac{(-2)^4 \cdot (-2)^2}{(-2)^2}$

7) $-\frac{2 \cdot (-2)^4}{(-2)^3}$

8) $\frac{(2^4)^4}{2 \cdot 2^2}$

9) $\frac{(-2)^2 \cdot (-2)^4}{(-2)^4}$

10) $\frac{2 \cdot 2^4 \cdot 2^4}{2^2}$

11) $\frac{(-2)^4 \cdot ((-2)^4)^3}{(-2)^4}$

12) $\frac{(-2)^3 \cdot ((-2)^3)^2}{(-2)^3 \cdot (-2)^2}$

13) $\frac{(2^3)^2 \cdot 2^2}{2^4}$

14) $\frac{2^3 \cdot (2^4)^3}{2^0}$

15) $\frac{2}{(2 \cdot 2^2)^0}$

16) $\frac{((-2)^4)^4}{(-2)^3 \cdot (-2)^4}$

17) $\frac{(2 \cdot 2^0)^4}{2^2}$

18) $\left(\frac{2^3 \cdot 2^4}{2^0}\right)^3$

Laws of Exponents (3)

1) $\frac{4^4 \cdot 4^3}{(4^3)^2}$

2) $\frac{(2^3)^3 \cdot 2^2}{(2^2)^2}$

3) $\frac{3^4 \cdot (3^4)^0 \cdot 3^2}{3^2}$

4) $\left(\frac{2^3}{2^0 \cdot 2^2}\right)^2$

5) $\left(\frac{(4^3)^3 \cdot 4^0}{(4^4)^2}\right)^0$

6) $\frac{(2^3)^2}{2^2 \cdot 2^4}$

7) $\frac{(4^4)^3 \cdot 4^0}{4}$

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

9) $\frac{(3^4)^3}{3 \cdot 3^3}$

10) $\left[\frac{(4^3)^0 \cdot (4^0)^2}{4^3}\right]^0$

11) $\frac{(3 \cdot 3^3)^2}{3^2}$

12) $\frac{2^{16}}{(2^4)^3 \cdot (2^3)^2}$

13) $\frac{2^{16} \cdot 2^3}{(2^4)^4}$

14) $\frac{(4^0)^4}{[4 \cdot 4^3]^0}$

15) $\frac{4 \cdot 4^3 \cdot 4^2}{4^2}$

16) $\frac{3^9}{3^4 \cdot 3^3}$

17) $\frac{2^4}{2 \cdot 2^3}$

18) $\left(\frac{4 \cdot 4^2 \cdot 4^3}{4}\right)^4$

Powers and Exponent laws

Simplify each of the following

1) $201^6 \times 201^3$

2) $9^{18} \div 9^{12}$

3) $6^8 \times 6^{15} \div 6^7$

4) $(-7)^{11} \div (-7)^4 \times (-7)^5$

5) $\frac{3^{13} \times 3^{11}}{3^{20}}$

6) $\frac{10^{11}}{10^6} \times 10^2$

7) $2 \times 2^5 \times 2 \times 2^3 + 3^7 \times 3^{11} \div 3^2 \times 3$

For each of the following questions SIMPLIFY then evaluate

1) $7^{12} \times 7 \div 7^9 + 7^4$

2) $\frac{10^{15} \times 10^2}{10^8}$

3) $3^{27} \div 3^{22} - 3^2 \times 3$

4) $-2^9 \times 2^{11} \div 2^6 - 2^7 + 5$

5) $4^3(4^{12} \div 4^7) + 4^2$

6) $(-5)^9 \div (-5)^6 \times (-5)^1 + (-5)^{10} \div (-5^9)$