

Math 9

Name \_\_\_\_\_ ID: 1

## Laws of Exponents (Review)

Date \_\_\_\_\_ Period \_\_\_\_\_

Simplify. Your answer should contain only one base.

1)  $[5^2 \times (5^4)]^6 = (5^6)^6 = 5^{36}$

2)  $[6^3 \times 6^3 \times 6^2]^2 = [6^8]^2 = 6^{16}$

3)  $5^3 \times 5^2 \times (5^0)^3 = 5^5 \times 5^0 = 5^5$

4)  $6^4 (6^2)^3 = 6^4 \times 6^6 = 6^{10}$

5)  $(4^3)^2 \times 4^2 = 4^6 \times 4^2 = 4^8$

6)  $6 \times (6^3)^2 = 6^1 \times 6^6 = 6^7$

7)  $\frac{3^3 \times 3^3}{3^3} = \frac{3^6}{3^3} = 3^3$

8)  $\frac{2^0 \times 2^3}{2^2} = \frac{2^3}{2^2} = 2^1$

9)  $\frac{6^3 \times 6^9}{6^5} = \frac{6^{12}}{6^5} = 6^7$

10)  $\frac{4 \times 4^3}{4^2 \times 4^2} = \frac{4^4}{4^4} = 4^0 = 1$

11)  $\frac{6^2 \times 6^0}{6^2} = \frac{6^2}{6^2} = 6^0 = 1$

12)  $\frac{3^{12}}{3 \times 3^0} = \frac{3^{12}}{3^1} = 3^{11}$

13)  $\left(\frac{5^4}{5^3}\right)^3 = (5^1)^3 = 5^3$

14)  $\frac{6^{22}}{6^{15}} = 6^7$

15)  $\left(\frac{5^2}{5^3}\right)^0 = 1$

16)  $\left(\frac{4^2}{(4^0)^2}\right)^3 = \left(\frac{4^2}{4^0}\right)^3 = (4^2)^3 = 4^6$

17)  $\left(\frac{4^3}{4^2}\right)^3 = (4^1)^3 = 4^3$

18)  $\frac{(2^3)^2}{2^3} = \frac{2^6}{2^3} = 2^3$

9)  $\frac{(3^2)^8}{3^2 \times 3^5} = \frac{3^{16}}{3^7} = 3^9$

20)  $\frac{4^3 \times (4^2)^2}{4^2} = \frac{4^3 \times 4^4}{4^2} = \frac{4^7}{4^2} = 4^5$

1)  $\frac{(2^2)^5}{2^4 \times 2^2} = \frac{2^{10}}{2^6} = 2^4$

22)  $\frac{[5^3 \times 5^2]^2}{5} = \frac{(5^5)^2}{5^1} = \frac{5^{10}}{5^1} = 5^9$

)  $\frac{6^3 \times (6^3)^3}{6^0} = \frac{6^3 \times 6^9}{6^0} = \frac{6^{12}}{6^0} = 6^{12}$

24)  $\frac{[2 \times (2^3)^0 \times (2^3)^2]^3}{2^6} = \frac{[2^1 \times 2^0 \times 2^6]^3}{2^6} = \frac{(2^7)^3}{2^6} = \frac{2^{21}}{2^6} = 2^{15}$

Powers and Exponent laws

Simplify each of the following

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

$$= (201)^9$$

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

$$= (9)^6$$

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

$$= 6^{23} \div 6^7$$

$$= 6^{16}$$

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

$$= (-7)^7 \times (-7)^5$$

$$= (-7)^{12}$$

$$5) \frac{3^{13} \times 3^{11}}{3^{20}} = \frac{3^{24}}{3^{20}}$$

$$= 3^4$$

$$6) \frac{10^{14}}{10^6} \times 10^2$$

$$10^5 \times 10^2$$

$$= 10^7$$

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

$$= 2^{10} + 3^{17}$$

For each of the following questions SIMPLIFY then evaluate

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

$$7^{13} \div 7^9 + 7^4$$

$$\boxed{7^4 + 7^4}$$

$$= 2401 + 2401$$

$$\boxed{= 4802}$$

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

$$\frac{10^{17}}{10^8}$$

$$\boxed{= 10^9}$$

$$\boxed{= 1\,000\,000\,000}$$

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

$$\boxed{3^5 - 3^3}$$

$$243 - 27$$

$$\boxed{= 216}$$

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

$$\boxed{-2^{14} - 2^7 + 5}$$

$$-16\,384 - 128 + 5$$

$$\boxed{= -16\,507}$$

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

$$4^3(4^5) + 4^2$$

$$\boxed{4^8 + 4^2}$$

$$65\,536 + 16$$

$$\boxed{= 65\,552}$$

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

$$\boxed{(-5)^4 + (-5)^1}$$

$$625 + (-5)$$

$$\boxed{620}$$