

First & Last Name: \_\_\_\_\_ Period: \_\_\_\_ ID: A

Directions: Show all thinking for maximum credit and circle your final answers.. You may use a calculator and each question is worth five points unless noted otherwise.

"If you tell the truth, you don't have to remember anything." - Mark Twain

### GGG Unit Test (Mazzeo 2012/13)

Short Answer Simply the following expressions by first expanding all the way out or by using the exponent properties.

$$1. (3w^3)^5 = (3w^3)(3w^3)(3w^3)(3w^3)(3w^3) = 243w^{15}$$

$$2. \frac{2x^2y}{x^3y^2} \cdot \frac{4x^7y^2}{2x^3} = \frac{8x^9y^3}{2x^6y^2} = 4x^3y$$

$$3. \frac{16c^3d}{-c} \cdot \frac{-2cd}{-4cd^3} = \frac{-32cccccdd}{4cc-ddd} = \frac{-8c^2}{d}$$

$$4. (10 \text{ points}) \frac{-6t^{-5}u}{-4t} \cdot \frac{-8t^6u^{-3}}{3t^{-2}u^{-5}} = \frac{48t^1u^{-2}}{-12t^{-1}u^{-5}} = -4t^2u^3$$
$$= \frac{48t^2u^5}{-12u^2}$$

5. (10 points)  $\frac{(2qr^2)^2}{q^{-3}} \cdot \frac{(4q^2r^3)^{-1}}{3r}$

$$= \frac{4q^2r^4}{q^{-3}} \cdot \frac{1}{3r(4q^2r^3)}$$

$$= \frac{4q^5r^4}{12q^2r^4} = \frac{12^3}{3}$$

6. (15 points)  $\left(\frac{4jk}{2j^{-1}k^3}\right)^2 \cdot \left(\frac{2jk^{-2}k^4}{2j^{-1}k}\right)^{-2}$

$$= \left[\frac{4j^2}{2k^3}\right]^2 \cdot \left[\frac{2j^2k^4}{2k^2k}\right]^{-2}$$

$$= \left[\frac{2j^2}{k^3}\right]^2 \cdot \left[\frac{j^2k}{1}\right]^{-2}$$

$$= \left[\frac{2j^2}{k^3}\right]^2 \cdot \left[\frac{1}{j^2k}\right]^2$$

$$= \frac{4j^4}{k^6} \cdot \frac{1}{j^4k^2} = \frac{4j^4}{j^4k^6}$$

$$= \frac{4}{k^6}$$

7. Write the results in *both standard and scientific notation form*.

a.)  $345,000 \cdot 623,000 \approx$

$2.14935 \times 10^{11}$

$214,935,000,000$

c.)  $(8 \times 10^5)(7 \times 10^{-3}) \approx$

$56 \times 10^2 = 5.6 \times 10^3$

$5,600$

b.)  $\frac{1.99 \times 10^{28}}{7.26 \times 10^{20}} \approx$

$2.741046832 \times 10^8$

$= 2.741046832 \times 10^7$

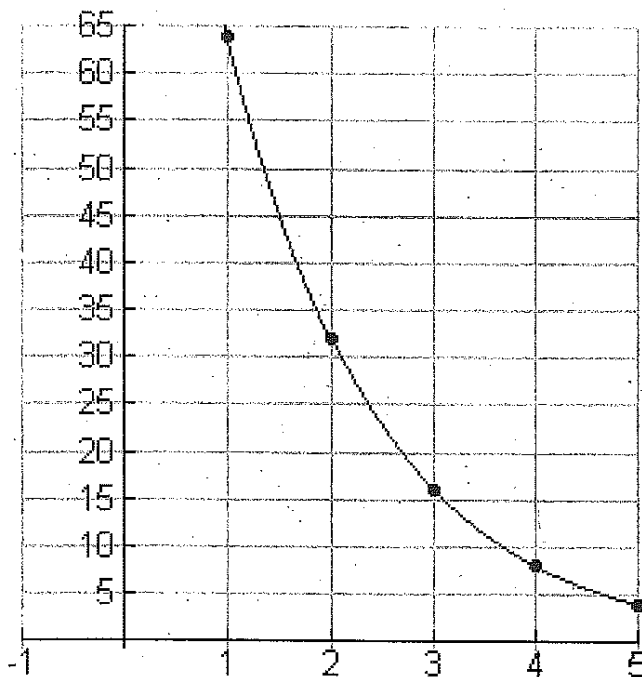
$274,104,683.2$

d.)  $(3.5 \times 10^{-15})(4.6 \times 10^{23}) \approx$

$16.1 \times 10^8 = 1.61 \times 10^9$

$1,610,000,000$

8. What is the approximate equation for the graph below? Show your thinking.



x	y
0	
1	64
2	32
3	16
4	8

$\cdot \frac{1}{2}$

$\cdot \frac{1}{2}$

$\cdot \frac{1}{2}$

so  $y = a(b)^x$   $b = \frac{1}{2}$

$a = 64 \div 12 = 128$

$y = 128\left(\frac{1}{2}\right)^x$

9. Carlos raises fuzzy insects called tribetts. The following table shows the decrease in the population of tribetts every year. The relationship between the number of years and the tribett population is approximately exponential. (note some of the numbers may have been rounded)

number of years	0	1	2	3	4	5
number of tribetts		2840	2016	1432	1016	722

a.) What is the decay rate and the decay factor for this relationship? How do you know?

$\frac{2016}{2840} \approx 0.71$      $\frac{1432}{2016} \approx 0.71$      $\frac{y_4}{y_3} \approx \frac{y_5}{y_4} \approx 0.71$     decay factor 0.71  
 decay rate  $1 - 0.71 = 0.29$      $\approx 29\%$

b.) Write an equation for the relationship between the number of years and the number of tribetts.

$2840 \div 0.71 = 4000$  starting # of tribetts     $y = 4000(0.71)^x$

c.) Explain what information the numbers and variables in your equation represent in the context of this situation.

$y = 4000(0.71)^x$   
 $y$  → # of tribetts  
 $4000$  → starting # of tribetts  
 $0.71$  → decay factor  
 $x$  → # of years

10. The population of a certain type of bacteria in a culture grows by 40% every hour. If there are 8232 bacteria at the end of 3 hours...

a.) How many bacteria were there initially? Show your thinking. so  $8232 \div 1.4^3 = 3000$

$x$	0	1	2	3	4
$y$				8232	11524.8

$\div 1.4$      $\div 1.4$     3000 bacteria

b.) Write an equation to model this situation for  $B$ , bacteria and  $h$ , hours.

$B = 3000(1.4)^h$

11. Bonus: Solve using any method you know, but be clear as to your thinking.

$$\left( \frac{2x^4 y^{-2} y^4}{3x^{-1} y^{-5}} \right)^{-3} \left( \frac{4x^{-6} y^{-3}}{2x^{-2} y^3} \right)^{-2}$$

$$\left[ \frac{2x^4 x^1 y^4 y^5}{3 y^2} \right]^{-3} \left[ \frac{2x^2}{x^6 y^3 y^3} \right]^{-2}$$

$$\left[ \frac{2x^5 y^9}{3 y^2} \right]^{-3} \left[ \frac{2}{x^4 y^6} \right]^{-2}$$

$$\left[ \frac{2x^5 y^7}{3} \right]^{-3} \left[ \frac{x^4 y^6}{2} \right]^2$$

$$\left[ \frac{3}{2x^5 y^7} \right]^3 \left[ \frac{x^8 y^{12}}{4} \right]$$

$$\frac{27}{8x^{15} y^{21}} \cdot \frac{x^8 y^{12}}{4}$$

$$\frac{27x^8 y^{12}}{32x^{15} y^{21}} = \frac{27}{32x^7 y^9}$$

started by working inside to remove negative exponents

combined like-terms

remove negative exponent outside of ( )

again remove neg. exp. & apply power

multiply across like you do with fractions

combine like-terms

