**Introduction to Exponential Functions**

1. Simplify the following

a) $\left(w^{2}v\right)^{3}$ b) $(5c^{-4})(-4m^{2}c^{8})$

c) $\frac{21x^{3}y}{3xy^{4}}$ d) $\left(12x^{2}y^{-2}\right)^{2}$

e) $\left(\frac{5a^{8}}{10a^{6}}\right)^{-3}$

2. Identify each sequence as arithmetic or geometric. Write the recursive form and explicit form for each.

a) 1600, 400, 100, 25, … b) 14, 21, 28, 35, …

3. Does the table of values represent a linear function or an exponential function? Explain.



Exponential Functions are of the form $f(x)=a\left(b\right)^{x}$

a = INITIAL VALUE

b = BASE (also called the growth or decay factor)

x represents the INPUT

f(x) or y represents the OUTPUT

the y-intercept occurs at (0, a) and the base b represents the common ratio as seen with geometric sequences

if the base is greater than 1, the function is exponential growth

if the base is between 0 and 1, the function is exponential decay



What do you know?

1. $f\left(x\right)=2\left(3\right)^{x}$
2. $g\left(x\right)=1523\left(1.05\right)^{x}$
3. $h\left(x\right)=256\left(0.85\right)^{x}$
4. $k\left(x\right)=32\left(0.956\right)^{x}$

**Exponential Functions**

***Determine whether each function is exponential growth or exponential decay.***

1. ­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

$y=3(0.75)^{x}$ $y=2.4(1.07)^{x}$ $y=\frac{5}{8}(3)^{x}$

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

$y=8\left(\frac{6}{7}\right)^{x}$ $y=\frac{4}{3}\left(\frac{1}{9}\right)^{x}$ $y=3.14(2.84)^{5x}$

10. Suppose an investment of $10,000 doubles in value every 13 years. How much is the investment worth after 52 years?

11. A population of 100 insects triples in size every month. Write an equation and find how many insects there are after 5 months.

12. A tennis match begins with 64 players. Each round, half of the players are eliminated. Write an equation and find out when there will be a winner (i.e., one player left).

13. You drop a ball from a height of 12 feet. Each path has 3/5 the height of the previous path. Write an equation and find the height at the top of the fourth path.



