

name: \_\_\_\_\_

Solutions

MCF3M - Quiz #2: Exponents and Exponential Functions /31

1. Identify the following as linear, quadratic, exponential. [3]  
 (Hint: use first and second differences and ratio of first difference)

x	y
-2	8
-1	2
0	0
1	2
2	8

quad ✓

x	y
-2	25
-1	20
0	15
1	10
2	5

linear ✓

x	y
-2	0.04
-1	0.2
0	1
1	5
2	25

exp ✓

2. Determine an equation for each exponential function described below. [4]

a)

initial →

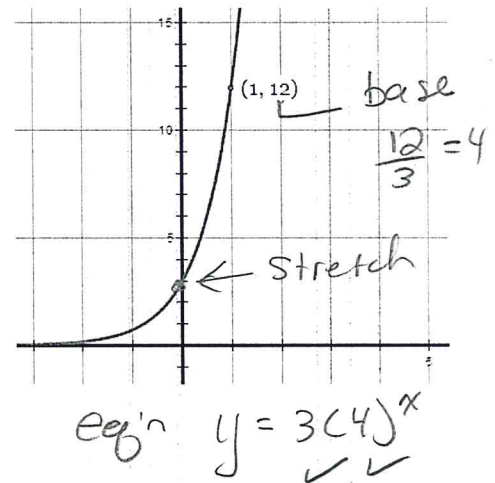
x	y
0	500.0
1	600.0
2	720.0
3	864.0
4	1036.8

100  
120  
144

Ratio  
 $120/100 = 1.2$

eq'n  $y = 500(1.2)^x$

b)



3. a) Give an example of an exponential function representing growth using an equation. [1]

Answers will vary \* base > 1 \* ie)  $f(x) = 3^x$  ✓

- b) Give an example of an exponential function representing decay using an equation. [1]

Answers will vary \*  $0 < \text{base} < 1$  \* ie)  $f(x) = 0.3^x$  ✓

4. Evaluate. (leave answers in fractional form) [4]

a)  $-2^6$

b)  $(-3)^0$

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

d)  $78125^{\frac{2}{7}}$

$= -64$  ✓

$= 1$  ✓

$= \frac{16}{81}$  ✓

$= 25$  ✓

$= -64$

5. Simplify (express answers as fractions with pos exponents only) [8]

a)  $(7^3)^{-5}$   
 $= 7^{-15}$  ✓  
 $= \frac{1}{7^{15}}$  ✓

b)  $\frac{5(5^{-4})}{5^7}$   
 $= 5^{-3-7}$  ✓  
 $= \frac{1}{5^{10}}$

c)  $\left(\frac{2x}{3}\right)^{-2}$   
 $= \left(\frac{3}{2x}\right)^2$  ✓  
 $= \frac{9}{4x^2}$  ✓

d)  $\left(\frac{4a^{-3}}{(a^3)^2}\right)^2$   
 $= (4a^{-3-6})^2$  ✓  
 $= 16a^{-18}$  ✓  
 $= \frac{16}{a^{18}}$  ✓

6. Evaluate without a calculator (show all steps for full marks) [3]

$$\sqrt[7]{(64^{\frac{1}{2}})(64^{\frac{2}{3}})}$$

$$= (64^{\frac{1}{2} + \frac{2}{3}})^{\frac{1}{7}}$$

$$= 64^{\frac{7}{6}}$$

$$= \sqrt[6]{64}$$

$$= 2$$

7. The value of my new Volkswagen, V, was \$30 000 but it has depreciated in value by 15% at the end of each year since it was purchased.

a) Write a function that models the situation [1] *Let n rep # of yrs* ✓  
 $P(n) = 30000(0.85)^n$  ✓

b) What is the car's value at the end of 4 years? What is the car's value at the end of 5 years? [2]

$$P(4) = 30000(0.85)^4 = 15660.19$$

$$P(5) = 30000(0.85)^5 = 13311.16$$

c) What value did the car lose during the 5th year? [1]

$$= 15660.19 - 13311.16$$

$$= 2349.03$$

*it lost \$2349.03* ✓

d) When will the car be worth \$6948.50? [3]

$$6948.50 = 30000(0.85)^n$$

$$0.2316 = 0.85^n$$

then  $n = \frac{\log 0.2316}{\log 0.85}$  ✓

$$n = 9$$

*at the end of 9 yrs* ✓