Algebra 1
Review of Unit 5 Lesson 1: Exponential Growth

NAME Doyle - Key
DATE

1. The drug penicillin was discovered by observation of mold growing on biology lab dishes. Suppose a mold begins growing on a lab dish. When first observed, the mold covers 7 cm^2 of the dish surface, but it appears to double in area every day.

   a. What rules can be use to predict the area of the mold patch 4 days after the first measurement:
      i. using *NOW-NEXT* form?

      NEXT = NOW · 2 SA 7

      ii. using "y=..." form?

      $y = 7(2)^x$

   b. What mold area would be predicted after 5 days?

      $y = 7(2)^5$

      $y = 224\ cm^2$

x	y
4	112
5	224
6	448

   c. Write and solve an equation or inequality that help to answer this question.

      If the area of the mold patch is first measured to be 5 cm^2 and the area doubles each day, how long will it take that mold sample to grow to an area of 40 cm^2?

      $40 = 5(2)^x$

x	y
2	20
3	40
4	80

      It will take 3 days for mold to grow to an area of 40 cm^2.

2. Write each of the following in a simpler equivalent form.

   a. $(5x^3y^4)(4x^2y)$

      $5 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y \cdot 4x \cdot x \cdot y$

      $20x^5y^5$

   b. $(3xy^4z^2)^4$

      $3 \cdot x \cdot y \cdot y\,y\,y\,z\,z \cdot 3xyyyyzz \cdot 3xyyyyzz \cdot 3xyyyyzz$

      $81x^4y^{16}z^8$

3. Studies in 2001 gave a low estimate of 7,700 for the population of Arctic bowhead whales. The natural annual growth rate was estimated to be about 3%. The harvest by Inuit people is very small in relation to the total population. Disregard the harvest for this task.

a. Write a NOW/NEXT rule for this situation.

NEXT = NOW · 1.03 SA 7700

b. Write a rule in function notation for this situation.

$f(x) = 7700(1.03)^x$

c. How many whales will there be in 2015? Show your work.

$f(x) = 7700(1.03)^{15}$

$= 11996$

x	y
14	11647
15	11996
16	12356

4. For $y = 50(2^x)$

a. What is the domain?

all real #s

b. What is the range?

all real #s greater than 0 or positive real #s

c. What is the average rate of change over the interval from 3 to 6? Show your work.

x	y	
3	400	
4	800	2800
5	1600	
6	3200	

3

$\frac{2800}{3} = 933.33$

5. Suppose the first two terms in an arithmetic sequence are 10 and 15. Write the first five terms of the sequence.

add a # each time

10, 15, 20, 25, 30

Stat, Edit

6. The following table shows the number of votes cast in a sample of U.S. Presidential elections between 1840 and 2008.

1) Put t in L1
2) Turn on Stat Plot (2nd Y=)
3) Set windows
4) Graph

t	Year of Election	Major Party Candidates	Total Votes Cast
0	1840	Harrison vs. Van Buren	2,412,694
20	1860	Lincoln vs. Douglas	4,681,267
40	1880	Garfield vs. Hancock	9,217,410
60	1900	McKinley vs. Bryan	13,997,429
80	1920	Harding vs. Cox	26,765,180
100	1940	Roosevelt vs. Willkie	49,902,113
120	1960	Kennedy vs. Nixon	68,832,482
140	1980	Reagan vs. Carter	86,509,678
160	2000	Bush vs. Gore	105,417,475
164	2004	Bush vs. Kerry	122,293,548
168	2008	Obama vs. McCain	131,463,122

Source: uselectionatlas.org/RESULTS

a. Which type of model- linear or exponential- would best fit this data? Why?

Exp : ↑ at ↑ rate

Linear : pattern of data clustered around a line

b. Using regression in your calculator, find a model that would best fit the trends of votes cast to time (use $t = 0$ for the year 1840).

Depends what they said in a.

Stat, Calc

LinReg

$y = 785817x - 18653463$

cannot start with neg # of votes

ExpReg

$y = 3366225(1.02)^x$

This makes more sense