Algebra

Name KEY

Unit 5 Test Review

Date _____ Period ____

For each sequence, state if it is arithmetic or geometric and write the explicit formula.

1) $-2, -4, -8, -16, -32, \ldots$

geometric, $r=2$, $a_1=-2$

$a_n = -2(2)^{n-1}$

2) $1, -\frac{1}{4}, \frac{1}{16}, -\frac{1}{64}, \frac{1}{256}, \ldots$

geometric, $r=-\frac{1}{4}$, $a_1=1$

$a_n = 1\left(-\frac{1}{4}\right)^{n-1}$

3) $16, 20, 24, 28, 32, \ldots$

arithmetic, $d=4$, $a_1=16$

$a_n = 16+(n-1)4 = 16+4n-4$

$a_n = 12+4n$

4) $-40, -48, -56, -64, -72, \ldots$

arithmetic, $d=-8$, $a_1=-40$

$a_n = -40+(n-1)-8 = -40-8n+8$

$a_n = 32-8n$

Find the tenth term in each sequence.

5) $5, 7, 11, 19, 35, \ldots$ (+2, +4, +8, +16) r=1.4

6) $a_n = (-2)^n - 3$

$a_{10} = (-2)^{10} - 3 = 1021$

7) $a_n = a_{n-1} + 5$, $a_9 = 68$

$a_{10} = 68+5$

$a_{10} = 73$

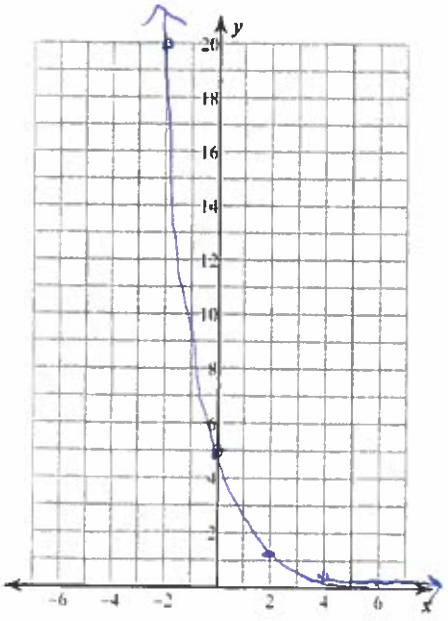
8) $a_n = -5a_{n-1}$, $a_9 = -2$

$a_{n9} = -5(a_9) = -5(-2)$

$a_{10} = 10$

Sketch the graph of each function. State if it is exponential growth or decay.

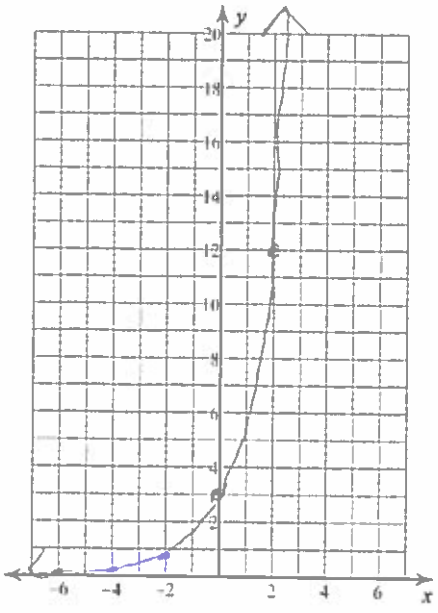
9) $y = 5 \cdot \left(\frac{1}{2}\right)^x$



X	Y
-6	320
-4	80
-2	20
0	5
2	1.25
4	.3125
6	.078

decay

10) $y = 3 \cdot 2^x$



X	Y
-6	.047
-4	.1875
-2	.75
0	3
2	12
4	48
6	192

growth

a=2, b=2

Find the average rate of change from [-2,2] for the following exponential functions.

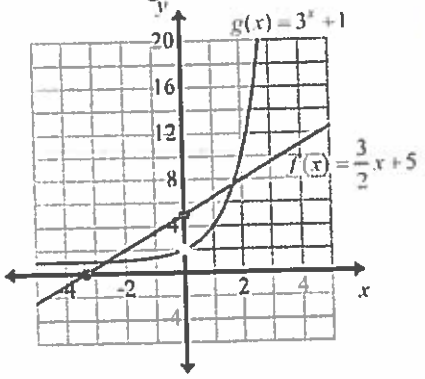
11. $y=100(.5)^x$

$\frac{f(b)-f(a)}{b-a} = \frac{25-400}{2+2} = \frac{-375}{4} = -93.75$

12. $y=100(2)^x$

$\frac{f(b)-f(a)}{b-a} = \frac{400-25}{2--2} = \frac{375}{4} = 93.75$

13. Discuss and compare the functions by analyzing the rates of change, intercepts, and where one function is greater or less than the other.



	f(x)	g(x)
Average Rate of Change from -2 to 1	$f(-2)=\frac{3}{2}(-2)+5=2$ $f(1)=\frac{3}{2}(1)+5=6.5$ $\frac{2-6.5}{-2-1}=\frac{-4.5}{-3}=1.5$	$g(-2)=3^{-2}+1=1.11$ $g(1)=3^1+1=4$ $\frac{1.11-4}{-2-1}=\frac{-2.89}{-3}=.963$
Average Rate of Change from 1 to 3	$f(1)=\frac{3}{2}(1)+5=6.5$ $f(3)=\frac{3}{2}(3)+5=9.5$ $\frac{6.5-9.5}{1-3}=\frac{-3}{-2}=1.5$	$g(1)=3^1+1=4$ $g(3)=3^3+1=28$ $\frac{4-28}{1-3}=\frac{-24}{-2}=12$

Linear and Exponential Models:

14. Write an explicit formula to model the number of dots per day.

Day 1 Day 2 Day 3

2 6 18

r=3

geometric

$a_1=2$

$a_n=2\cdot3^{n-1}$

$y=2(3)^x$

15. Sherry has a huge doll collection of 80 dolls. Her mom tells her that she needs to get rid of 5 per year to get it down to a decent number before leaving for college. Write an explicit formula to model the number of dolls per year. If she is 12, how many will she have left when she is 18?

Linear!

$y=-5(6)+80$

$y=80(1-.0625)^6=80(.9375)^6=54$

$y=-5x+80$

$y=50$

16. You bought a Boston Whaler in 2004 for $12,500. The boat's value depreciates by 7% a year. How much is the boat worth now? How much is it worth in 2020?

$y=12500(1-.07)^{16}=12500(.93)^{16}=3914.15$

17. The population of a large city increases by tripling each year. When the 2000 census was taken, the population was 1000.

a) Write a model for this population growth.

$y=1000(1+2)^t=1000(3)^t$

b) What should the population be now? What is the projected population for 2020?

now: $y=1000(3)^{16}$

4.3×10^{10}

2020: $y=1000(3)^{20}$

3.5×10^{12}