Name ______________________________ HW#______ Date ______________________

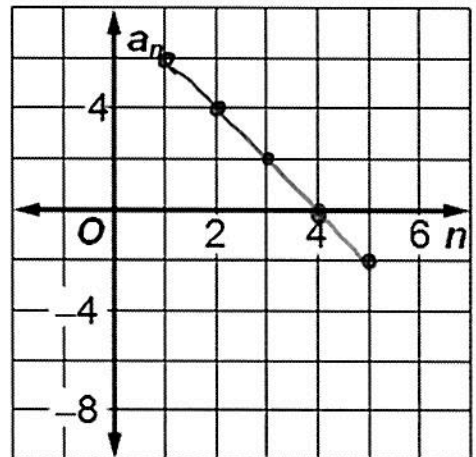
Review for Unit 5 Test: Sequences

1) Determine whether each sequence is an arithmetic or geometric sequence. State the common difference or common ratio. State if the graph would be linear or exponential.

Sequence	Identify if the sequence is Arithmetic or Geometric (A or G)	Identify the Common difference or the Common ratio (D or R)	Identify if the sequence will graph a Linear Graph or an Exponential Graph (L or E)
a) 4, 7, 10, 13, …	arithmetic	$d=3$	linear
b) 15, 13, 11, 9, …	arithmetic	$d=-2$	linear
c) 1, 4, 16, 64, …	geometric	$r=4$	exponential
d) 2, -4, 8, -16, …	geometric	$r=-2$	exponential

2) Find the next **three** terms of the sequence. 6, 4, 2, 0, -2, -4,…

a. Graph the first **five** terms of the sequence.



linear

b. Write the explicit formula for the nth term of the sequence.

$a_1=6$
$d=-2$

$a_n=a_1+(n-1)d$

$a_n=6+(n-1)(-2)$

$a_n=6-2n+2$

$\boxed{a_n=8-2n}$

n	a_n
1	6
2	4
3	2
4	0
5	-2

c. Use the explicit formula to find the 13[th] term

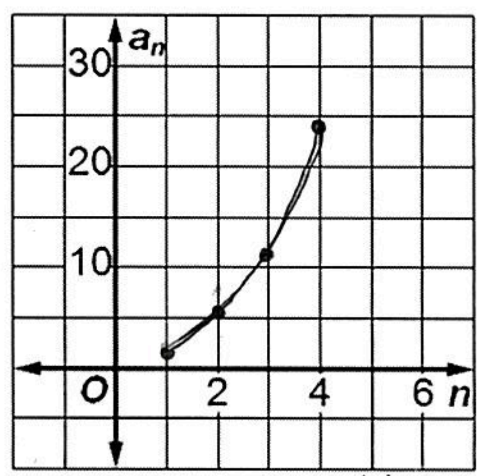
$a_{13}=8-2(13)$

$a_{13}=8-26$

$\boxed{a_{13}=-18}$

3) Find the next **three** terms of the sequence. 3, 6, 12, 24, 48, 96,…

a. Graph the first **four** terms of the sequence.



exponential

b. Write the explicit formula for the nth term of the sequence.

$a_1=3$
$r=2$

$a_n=a_1r^{n-1}$

$\boxed{a_n=3(2)^{n-1}}$

n	a_n
1	3
2	6
3	12
4	24
5	48

c. Use the explicit formula to find the 7[th] term

$a_7=3(2)^{7-1}$

$a_7=3(2)^6$

$\boxed{a_n=192}$

4) Determine the 10th term of the arithmetic sequence in which $a_1 = 3$ and $d = 5$. → arithmetic

$a_1 = 3$
$d = 5$
$n = 10$

$a_n = a_1 + (n-1)d$
$a_{10} = 3 + (10-1)5$
$\boxed{a_{10} = 48}$

5) Determine the 15th term of the geometric sequence for which $a_1 = 3$ and $r = 2$.

$a_1 = 3$
$r = 2$
$n = 15$

$a_n = a_1 r^{n-1}$
$a_{15} = 3(2)^{15-1}$
$\boxed{a_{15} = 49{,}152}$

6) Given the following sequence following: -12, -7, -2, 3.....

a. Write a *recursive formula* for the sequence.

$a_1 = -12$
$d = 5$

$a_n = a_{n-1} + d$
$\boxed{a_n = a_{n-1} + 5 \; ; \; a_1 = -12}$

b. Write an *explicit formula* for the sequence.

$a_1 = -12$
$d = 5$

$a_n = a_1 + (n-1)d$
$a_n = -12 + (n-1)(5)$
$a_n = -12 + 5n - 5$
$\boxed{a_n = -17 + 5n}$

c. Use the explicit formula to find the 17th term.

$a_n = -17 + 5n$
$a_{17} = -17 + 5(17)$
$\boxed{a_{17} = 68}$

7) Given the following sequence 16, 32, 64, 128...... geometric

a. Write a *recursive formula* for the sequence.

$a_1 = 16$
$r = 2$

$a_n = r \cdot a_{n-1}$
$\boxed{a_n = 2a_{n-1} \; ; \; a_1 = 16}$

b. Write the *explicit formula for the sequence.*

$a_1 = 16$
$r = 2$

$a_n = a_1 r^{n-1}$
$\boxed{a_n = 16(2)^{n-1}}$

c. Use the explicit formula to find the 17th term.

$a_1 = 16$
$r = 2$

$a_n = 16(2)^{n-1}$
$a_{17} = 16(2)^{17-1}$
$\boxed{a_{17} = 1{,}048{,}576}$

8) Determine the first four terms of the recursive sequence defined below.

$a_1 = -3$

$a_1 = a_{n-1} + 4$

$a_1 = -3$

$d = 4$

$a_2 = -3 + 4 = 1$

$a_3 = 1 + 4 = 5$

$a_4 = 5 + 4 = 9$

$\boxed{-3, 1, 5, 9}$

9) Determine the first four terms of the recursive sequence defined below.

$a_1 = 4$

$a_1 = 3 * a_{n-1}$

$a_1 = 4$

$r = 3$

$a_2 = 3 \cdot 4 = 12$

$a_3 = 3 \cdot 12 = 36$

$a_4 = 3 \cdot 36 = 108$

$\boxed{4, 12, 36, 108}$

10) Each time Juanita bowls, her score increases by 5% of her previous score. If her initial score is represented by a, which equations shows this relationship?

a) $y = a(1.5)^x$ b) $y = a(1.05)^x$ c) $y = 0.05^x$ d) $y = a(0.5)^x$

.05%

growth

$y = a(1 + .05)^x$

$y = a(1.05)^x$

11) Which of the following is an exponential function?

a) $y = x^2$ b) $y = 3x + 2$ c) $y = 2^x$ d) $y = 3x$

exponent is a variable!

12) Any graph of the form $y = b^x$ is an example of exponential growth if which of the following is true?

a) $b < 0$ b) $b = 1$ c) $b > 1$ d) $0 < b < 1$

13) What is the equation of the reflection of $y = 4^x$ in the y-axis?

a) $y = -4^x$ b) $x = 4y$ c) $y = -(1/4)^x$ d) $y = (1/4)^x$

$y = b^x$ + $y = \left(\frac{1}{b}\right)^x$ are always reflected over y-axis!

$.031\%$

14) The country of Benin in West Africa has a population of 9.05 million people. The population is growing at a rate of 3.1% each year. Which function can be used to find the population 7 years from now?

~~1)~~ $f(t) = (9.05 \times 10^6)(1 - 0.31)^7$

2) $f(t) = (9.05 \times 10^6)(1 + 0.31)^7$

3) $f(t) = (9.05 \times 10^6)(1 + 0.031)^7$

~~4)~~ $f(t) = (9.05 \times 10^6)(1 - 0.031)^7$

$A = 9.05 \times 10^6$
$r = .031$
$t = 7$

$y = A(1+r)^t$
$y = 9.05 \times 10^6(1 + .031)^7$

15) Which recursively defined function has a first term equal to 10 and a common difference of 4?

1) $f(1) = 10$
$f(x) = f(x-1) + 4$

d

same thing

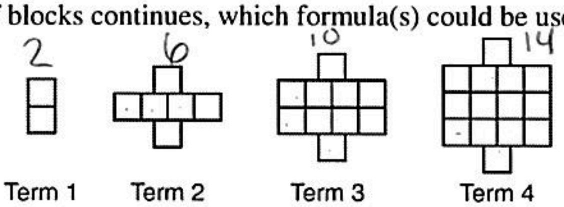
$a_n = 10$
$a_n = a_{n-1} + 4$

~~2)~~ $f(1) = 4x$
$f(x) = f(x-1) + 10$

3) $f(1) = 10$
$f(x) = 4f(x-1)$

~~4)~~ $f(1) = 4x$
$f(x) = 10f(x-1)$

16) A pattern of blocks is shown. If the pattern of blocks continues, which formula(s) could be used to determine the number of blocks in the nth term?



1) I and II

2) I and III

3) II and III

4) III, only

I	II	III
$a_n = n + 4$ $a_1 = 1 + 4 = 5$	$a_1 = 2$ $a_n = a_{n-1} + 4$	$a_n = 4n - 2$

plug in!

not 1st term!

recursive

explicit $\boxed{a_n = 4n - 2}$

$a_1 = 2$
$d = 4$

$a_n = a_1 + (n-1)d$
$a_n = 2 + (n-1)(4)$
$a_n = 2 + 4n - 4$
$a_n = -2 + 4n$

17) Which of the following equations would model an exponential quantity that begins at a level of 16 and decreases at a constant rate of 8% per hour?

(1) $Q = 16(0.92)^t$

(2) $Q = 16 + 0.92^t$

(3) $Q = 16(1.08)^t$

(4) $Q = 16(-7)^t$

decay

$y = A(1-r)^t$
$y = 16(1 - .08)^t$
$y = 16(.92)^t$

$A = 16$
$r = .08$

e 3.5% growth

18) A bank account earns interest at a rate of 3.5% per year (in other words it increases in value by that percent) and starts with a balance of \$350. Which of the following equations would give the account's worth, W, as a function of the number of years, y, it has been gaining interest?

(1) $W = 350(1.035)^y$ (3) $W = 1.035y + 350$

(2) $W = 350(0.35)^y$ (4) $W = 1.35y + 350$

$y = A(1+r)^t$

$y = 350(1+.035)^t$

$y = 350(1.035)^t$

$A = 350$

$r = .035$

$t = y$

19) Lisa's grandfather decides to start a fund for her college education. He makes an initial contribution of \$3000 and each month deposits an additional \$500. After one month he will have contributed \$3500.

$a_1 = 3000$

$d = 500$

a. Write an equation for the nth term of the sequence.

$a_n = a_1 + (n-1)d$

$a_n = 3000 + (n-1)500$

$a_n = 3000 + 500n - 500$

$\boxed{a_n = 500n + 2500}$

b. Using the formula to determine how much money will Lisa's grandfather have contributed after 24 months?

$a_{24} = 500(24) + 2500$

$\boxed{a_{24} = \$14,500}$

20) A bank is advertising a rate of 5% interest compounded annually. If \$2,000 is invested in an account at that rate, find the amount of money in the account after 10 years.

$A = 2000$

$r = .05$

$t = 10$

$y = A(1+r)^t$

$y = 2000(1+.05)^{10}$

$\boxed{y = \$3,257.79}$

21) Dylan's Candy Store purchased a bunch of candy for \$20,000. Each year it depreciates at a rate of 2%. What will its value be at the end of the sixth year, rounded to the nearest dollar?

$y = A(1-r)^t$

$y = 20,000(1-.02)^6$

$y = 17,716.84762$

$\boxed{y = \$17,717}$

$A = 20,000$

$r = .02$

$t = 6$

22) Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

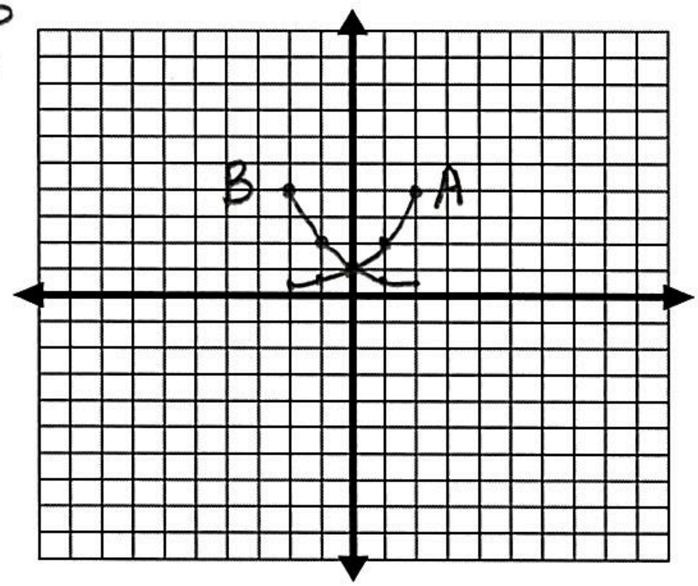
Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, B(x)	220	280	350	440	550	690	860	1070	1340	1680

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

Exponential function b/c it has a common ratio of appoximately 1.27 and the # of bacteria grows exponentially.

23) Graph $y = 2^x$ in the interval $-2 \le x \le 2$.

x	y
-2	.25
-1	.5
0	1
1	2
2	4



a) Label the graph A.

b) Reflect the graph in the y-axis. Label the graph B.

c) Write an equation for the function whose graph is B.

$\boxed{y = \left(\frac{1}{2}\right)^x}$ OR $\boxed{y = 2^{-x}}$

d) At what point do the graphs intersect?

$\boxed{(0, 1)}$

24) The following is data based off a survey on 7th grade students at Johnson Middle School.

Middle School Music and Sports Survey

	Plays Team Sport	Does Not Play Team Sport	Total
Plays Instrument	8	3	11
Does Not Play Instrument	2	7	9
Total	10	10	20

a. What percentage~~s~~ of students play an instrument and are involved in a sport?

$\frac{8}{20} = .4 = \boxed{40\%}$

b. What is the joint relative frequency of students that do not play an instrument and are not involved in a sport?

$\frac{7}{20} = .35 = \boxed{35\%}$

c. What is the marginal relative frequency for students who play a sport?

$\frac{10}{20} = .50 = \boxed{50\%}$

d. What is the marginal frequency for students that do not play an instrument?

$\frac{9}{20} = .45 = \boxed{45\%}$

e. Given that a student plays a sport, what is the conditional relative frequency that he/she does not play an instrument?

$\frac{2}{10} = .2 = \boxed{20\%}$

f. Given that a student does not play an instrument, what is the conditional relative frequency that he/she plays a sport? Round to the nearest percent.

$\frac{2}{9} = .\overline{22}$ $\boxed{22\%}$