MVP Module 1 Test Review Name: Rocio

***Multiple Choice:** Choose the best answer from the choices provided.*

1. D Given the first term, f(1) = 3 and the common difference of 5, find the first 5 terms.

A. 3, 8, 13, 20, 27
B. 3, −2, −7, −12, −17
C. 3, 15, 75, 375, 1875
D. 3, 8, 13, 18, 23

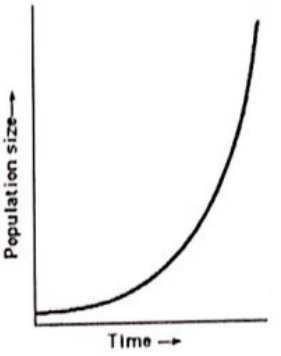
3, 8, 13 ... (+5, +5)

2. D A bacteria colony starts with 5 bacteria and triples every hour. How would you write an explicit equation to model this situation? ×3; r = 3

A. $f(x) = 3 \cdot 5^x$
B. $f(x) = 3x + 5$
C. $f(x) = 5x + 3$
D. $f(x) = 5 \cdot 3^x$

3. A Which sequence could produce a graph similar to the population model shown?

A. 1, 5, 25, 125, 625,... r = 5
B. 1, 5, 9, 13, 17,... d = 4
C. 1, −5, 25, −125, 625,... r = −5
D. 1, −4, −9, −14, −19,... d = −5



4. C A new high school is adding 50 new students each year. This is an example of:

A. Geometric Growth
B. Geometric Decay
C. Arithmetic Growth
D. Arithmetic Decay

5. D Given $f(n) = 10 \cdot \left(\frac{2}{5}\right)^{n-1}$ identify the common ratio (r) and indicate if the function is growing or declining. ← 0 ≤ r ≤ 1, this is a declining sequence ☺

A. r = 10, growing
B. $r = \frac{2}{5}$, growing
C. r = 10, declining
D. $r = \frac{2}{5}$, declining

6. ____ Given the table below, what is the correct explicit equation?

0	1	2	3	4	5
12	36	108	324	972	2916

A. $f(n) = f(n-1) * 3$ ← Geometric; RECURSIVE
B. $f(n) = 4 \cdot 3^n$
C. $f(n) = 12 \cdot 3^n$ ← start at 12 and multiply by 3 "n times"
D. $f(n) = 12 \cdot 2^n$

hours x	0	1	2	3	4	5
bacteria $f(x)$	1	4	16	64	256	1024

7. C A single bacterium lands in your mouth and starts growing by a factor of 4 every hour. After how many hours will the number of bacteria exceed 1,000?

A. One hour B. Three hours C. Five hours D. Seven hours

8. D Convert the recursive formula $f_n = f_{n-1} + 9$ with $f(0) = 3$ to an explicit equation.

A. $f(n) = 3n + 9$ B. $f(n) = 3(9)^n$
C. $f(n) = 9(3)^n$ D. $f(n) = 9n + 3$

start

$f(n) = a_1 + d(n-1)$
$f(n) = a_0 + d(n)$

9. D Write a recursive formula for the equation: $f(n) = 10(2)^n$

A. $f(n) = f(n-1) + 10$ with $f(0) = 2$
B. $f(n) = f(n-1) - 2$ with $f(0) = 10$
C. $f(n) = f(n-1) \div 2$ with $f(0) = 10$
D. $f(n) = f(n-1) \cdot 2$ with $f(0) = 10$

start $f(0)$ $r = 2$

$f(n) = f(n-1) \cdot r$, when $f(0) = a_0$

Classify: Classify each function on the left with its description on the right.

10. A $t(n) = t(n-1) - 1,\ t(1) = 2$
11. D $h(x) = \frac{3}{2}(4^x)$
12. B $g(n) = \frac{3}{2}n - 4$
13. C $f(x) = f(x-1) \cdot 2,\ f(0) = 2$

a. Arithmetic, Recursive
b. Arithmetic, Explicit
c. Geometric, Recursive
d. Geometric, Explicit

From the following two tables, choose **A** for **Arithmetic** or **B** for **Geometric** or **C** for **Neither**.

14. B

Term Number	Value
12	128
13	64
14	32
15	16

$\cdot \frac{1}{2}$

$r = \frac{1}{2}$

15. A

Term Number	Value
5	4
6	8
7	12
8	16

$+4$

$d = 4$

Matching: Match each sequence on the left with a formula on the right.

16. B 2, 12, 72, 432 $r = 6$
17. D 2, −4, −10, −16 $d = -6$
18. C $2, \frac{1}{3}, \frac{1}{18}, \frac{1}{108}, \frac{1}{648}$ $r = \frac{1}{6}$
19. A 2, 8, 14, 20 $d = 6$

a. $f(x) = 6x - 4$
b. $f(x) = 6 \cdot f(x-1), f(1) = 2$
c. $f(x) = 2\left(\frac{1}{6}\right)^{x-1}$
d. $f(x) = f(x-1) - 6, f(1) = 2$

Open Ended: Show work and explain your reasoning.

20. A plumber who charges $50 for a house call and $85 per hour can be expressed as the function $y = 85x + 50$. If the hourly rate were raised to $90 per hour, how would the function change? Write the new function.

$y = 90x + 50$

↖ the rate of change (also known as common difference or slope) increases!

*Arithmetic Sequence

21. Lauren keeps records of the distances she travels in an Uber and what it costs:

Distance (d) in miles	3	4	5	6	7
Fare (f) in dollars	$8.25				$17.25

a. Hourly Fare / Common Difference =

$$d = m = \frac{\Delta y}{\Delta x} = \frac{17.25 - 8.25}{7 - 3} = \frac{9}{4} = \$2.25$$

b. If you graph the ordered pairs (d, f) from the table, they lie on a straight line. How can this be determined without graphing them?

Since this is an arithmetic sequence, the graph is linear! $y = mx + b$ ← a constant rate of change

22. Geometric Sequence*

x	1	2	3	4
f(x)	96	−384	1536	−6144

$-6144 = 96(r)^{4-1}$

$\frac{-6144}{96} = \frac{96(r)^3}{96}$

$\sqrt[3]{-64} = \sqrt[3]{r^3}$

$-4 = r$

Determine whether the given information represents an arithmetic or geometric sequence. Then write the recursive and the explicit equation for each.

$10\% + 100\% = 110\% = 1.10 = r$

23. Cami invested $6,000 into an account that earns 10% interest each year. (Hint: Make a table of values to help yourself.)

addition

Arithmetic or geometric?

Recursive: $f(x) = f(x-1)(1.10)$, when $f(0) = 6000$

Explicit: $f(x) = 6000(1.10)^x$ or $f(x) = 6600(1.10)^{x-1}$

Year x	$f(x)$ $ in Account
0	6000
1	6600
2	7260
3	7986

$\times 1.10$, $\times 1.10$

$100\% - 12\% = 88\% = .88 = r$

24. The population of Hollyville is steadily decreasing by 12% each year. By the end of this year the population will decrease to 58,960 people. (Hint: Make a table of values to help yourself.)

Arithmetic or geometric?

Recursive: $f(x) = f(x-1)(.88)$, when $f(1) = 58960$

Explicit: $f(x) = 58960(.88)^{x-1}$ or $f(x) = 67000(.88)^x$

year x	population $f(x)$
0	67000
1	58960
2	51884.8
3	45658.624

$\times .88$, $\times .88$