STATION #1
FUNCTIONS - ANSWER KEY

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1) If $f(x) = 2\sqrt{x+3}$, find the value of $f(61)$.

$f(61) = 2\sqrt{61+3}$
$f(61) = 2\sqrt{64}$
$f(61) = 2 \bullet 8$
$f(61) = 16$

2) Find x in the function $m(x) = -\frac{1}{2}x + 8$ if $m(x) = 16$.

$16 = -\frac{1}{2}x + 8$
$8 = -\frac{1}{2}x$
$-16 = x$

3) If $f(x) = 3x^2 - 2$ and $g(x) = 5x + 1$, find the value of $f(g(-2))$.

$g(-2) = 5(-2) + 1$
$g(-2) = -9$
$f(-9) = 3(-9)^2 - 2$
$f(-9) = 241$
$f(g(-2)) = 241$

4) The water park charges \$125 for a birthday party. Guests cost \$12 each.

(a) Write a linear model that represents the total cost of a birthday party, $C(g)$ as a function of the number of guests, g.

$C(g) = 125 + 12g$

(b) Find $C(5)$. What is the meaning of $C(5)$ in the context of this situation?

$C(5) = 125 + 12(5)$
$C(5) = 185$
A birthday party for 5 guests costs \$185.

(c) How many guests are able to attend if the water park charges \$341 for a birthday party?

$341 = 125 + 12g$
$216 = 12g$
$18 = g$
18 guests would cost \$341.

STATION #2
ARITHMETIC SEQUENCES - ANSWER KEY

1) What is the *common difference* for the following sequences?

(a) 16, 11.75, 7.5, 3.25, …

$d = -4.25$

(b) $x - 5, 4x - 5, 7x - 5, \ldots$

$4x - 5 - (x - 5)$
$4x - 5 - x + 5$
$d = 3x$

2) Each term in a sequence of numbers is 5 less than the previous term. If the second term of the sequence is 21, write the equation that can be used to find the n^{th} term of the sequence.

$d = -5$
$a_1 = 26\ (21 + 5)$

$a_n = 26 - 5(n - 1)$

3) The volume (in cubic feet) of the water in a tank each hour after turning on a faucet can be estimated by the sequence in the table.

Time after turning on faucet (in hours)	1	2	3	4
Volume (cubic feet)	12	15	18	21

(a) Write a function that represents the arithmetic sequence.

$d = 3$ $a_1 = 12$

$a_n = 12 + 3(n - 1)$

(b) If the tank has a capacity of 36 cubic feet, find the amount of time needed to fill the tank.

$$36 = 12 + 3(n-1)$$
$$36 = 12 + 3n - 3$$
$$36 = 9 + 3n$$
$$27 = 3n$$
$$9 = n$$

It would take 9 hours to fill the tank.

4) After a rock concert ends, the number of people that still remain in the stadium after n minutes is displayed by the table below.

Minutes n	1	2	3	4
People $a(n)$	10,456	9,954	9,452	8,950

(a) Write an ***explicit*** rule that models the table.

$a(n) = 10456 - 502(n - 1)$

(b) If the pattern continues, how many people will be in the stadium 14 minutes after the concert ends?

$$a(14) = 10456 - 502(14-1)$$
$$a(14) = 3930 \text{people}$$

(c) How many minutes have gone by if there are 6,942 people in the stadium?

$$6942 = 10456 - 502(n-1)$$
$$6942 = 10456 - 502n + 502$$
$$6942 = 10958 - 502n$$
$$-4016 = -502n$$
$$n = 8 \text{ minutes}$$

STATION #3
GEOMETRIC SEQUENCES - ANSWER KEY

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1) What is the *common ratio* for the following sequence? $-\frac{2}{5}, \frac{1}{10}, -\frac{1}{40}, \ldots$

$$\frac{1}{10} \div -\frac{2}{5}$$
$$\frac{1}{10} \bullet -\frac{5}{2} = -\frac{1}{4}$$

r = -¼

2) Write the 8th term of the geometric sequence where $a_1 = 24$ and $r = -\frac{1}{2}$.

$$a_n = 24(-\frac{1}{2})^{n-1}$$
$$a_8 = 24(-\frac{1}{2})^{8-1}$$
$$a_8 = -0.1875$$

3) An archery competition begins with 256 competitors. After the first round, one-fourth of the competing group remains. After the second round, one-fourth of the now smaller competing group remains. The last round is when there are fewer than five members in the competing group.

(a) Define the sequence explicitly. $r = ¼$ $a_1 = 64\ (256 \bullet ¼)$

$$a_n = 64(\frac{1}{4})^{n-1}$$

(b) Which round is the last round? How many competitors are in the last round?

$$\underbrace{64(\frac{1}{4})^{n-1} < 5}_{\text{Enter into y = on calculator}}$$

n	a_n
1	64
2	16
3	4

The last round is the third round with 4 competitors.

4)

Number of Years, n	1	2	3	4
Money in Account, $a(n)$	$550	$605	$665.50	$732.05

(a) Write an ***explicit*** rule that defines the sequence displayed by the table.

$r = 1.1\ (605/550)$ $a_1 = 550$

$$a(n) = 550(1.1)^{n-1}$$

(b) If the pattern continues, how much money will be in the account after 5 years?

$$a(5) = 550(1.1)^{5-1}$$
$$a(5) = 805.255$$

The account will have $805.26 after 5 years.

STATION #4
IS IT ARITHMETIC OR GEOMETRIC? - ANSWER KEY

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1) Which sequence of numbers listed below displays a geometric sequence?

(a) -9.5, -8.25, -7, -5.75, …

$d = -1.25$

(b) -11, -5.5, -2.75, -1.375, …

$r = 0.5$

2) Determine if the sequence is *arithmetic* or *geometric* and identify the next term in the sequence.

0.75, 0.3, 0.12, 0.048, …

$r = 0.4$ **geometric**

$0.4 \cdot 0.048 = 0.0192$

3) A sequence has the following terms: $a_1 = 6$, $a_2 = 9$, $a_3 = 13.5$, $a_4 = 20.25$. Which formula represents the n^{th} term in the sequence?

$a_1 = 6 \quad r = 1.5\ (9/6)$

A) $a_n = 6 + 1.5n$

C) $a_n = 6(1.5)^n$

B) $a_n = 6 + 1.5(n - 1)$

D) $a_n = 6(1.5)^{n-1}$

4) Write an ***explicit*** formula for the n^{th} term of the sequence shown below?

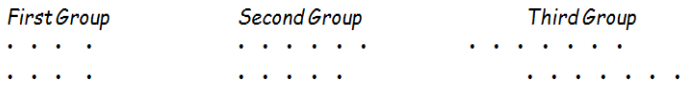
a_n = -11, -2, 7, 16, …

$d = 9$

$a_1 = -11$

$a_n = -11 + 9(n - 1)$

5) A pattern of dots is shown below.



8 11 14

If the pattern of dots continues, which formula(s) can be used to determine the number of dots in the n^{th} group?

$a(1) = 8 \quad d = 3$

I $a(n) = 8 + 3(n - 1)$

II $a(n) = 8 + 3n$

III $a(n) = 5 + 3n$

$a(n) = 8 + 3(n - 1)$

$a(n) = 8 + 3n - 3$

$a(n) = 5 + 3n$

STATION #5
RECURSIVE SEQUENCES - ANSWER KEY

1) Which of these sequences *cannot* be modeled with an ***explicit*** formula?

A) 17, 23, 29, 35, …

$d = 6$

B) 8, 11, 17, 29, …

no common difference or common ratio

C) 3, 12, 48, 192, …

$r = 4$

2) Which recursively defined sequence has a first term equal to 4 and a common ratio of 9?

A) $f(1) = 9;\ f(n) = f(n-1) + 4$

B) $f(1) = 4;\ f(n) = f(n-1) + 9$

C) $f(1) = 9;\ f(n) = 4f(n-1)$

D) $f(1) = 4;\ f(n) = 9f(n-1)$

3) The recursive rule for a sequence is $a_1 = -2,\ a_n = a_{n-1} - 4$. Write the ***explicit*** rule for the same sequence.

$a_1 = -2 \quad d = -4$

$a(n) = -2 - 4(n - 1)$

4) A sequence is defined recursively by $f(1) = 40$ and $f(n) = \frac{1}{4} f(n-1) + 2$. Write out the next 3 terms of the sequence.

$f(n) = \frac{1}{4} f(n-1) + 2$

$f(2) = \frac{1}{4} f(1) + 2 \rightarrow f(2) = \frac{1}{4}(40) + 2 \rightarrow f(2) = 12$

$f(3) = \frac{1}{4} f(2) + 2 \rightarrow f(3) = \frac{1}{4}(12) + 2 \rightarrow f(3) = 5$

$f(4) = \frac{1}{4} f(3) + 2 \rightarrow f(4) = \frac{1}{4}(5) + 2 \rightarrow f(4) = 3.25$

The next 3 terms are 12, 5 and 3.25.