Name:_____ Date: _____ Period:_____

Arithmetic Sequence Explicit Formula Discovery Activity

A. Michael works at an iced tea stand by the beach. . He earns a daily pay of $20 and then earns $1 for each iced tea he sells.

1. Complete the table below to represent how much Michael earns in one day of sales.

Iced Teas Sold	0	1	2	3	4	5	6	7
Daily Pay (in dollars)								

2.

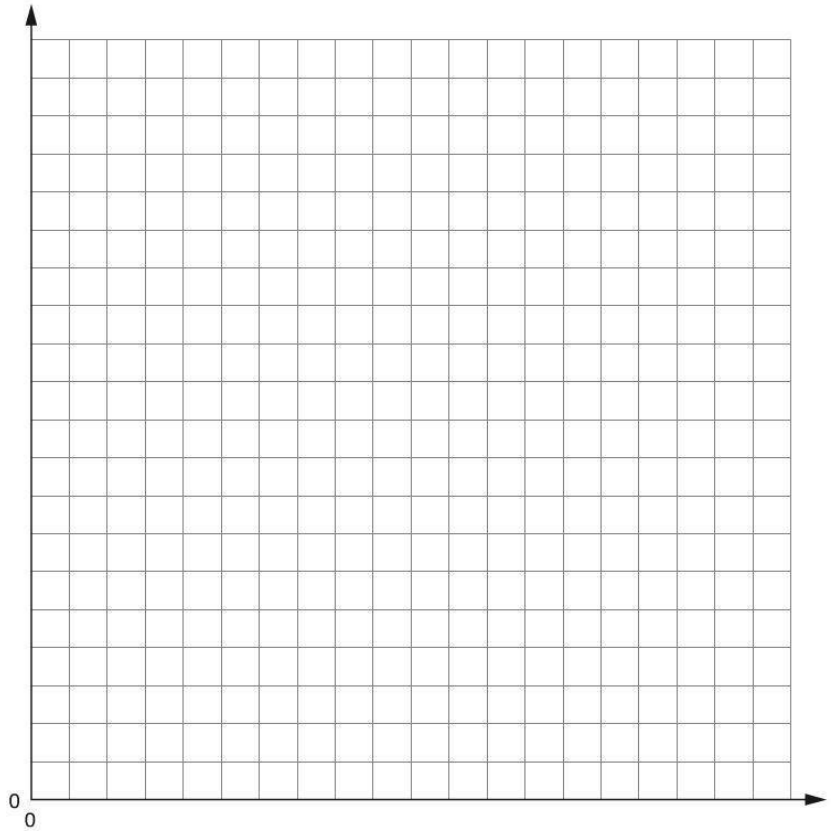
a. Write an equation to represent the amount of money Michael earns, M, in one day after he sells t iced teas.

b. Label how each variable and number in your equation represents this situation.

3. Does Michael's daily pay relationship represent an arithmetic sequence or is it just a linear relationship? Explain.

4.

a. Graph Michael's daily income relationship on the grid below.



b. Explain how your graph in represents your equation from part **2a.**

c. Did you connect your data points on your graph? In this context, would it make sense to do so?

B. Any arithmetic sequence can be written as an equation in the form

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

This is often how reference sheets display the generic equation. The variables are defined as follows:

- a_n is the n^{th} term of the sequence. For example, a_6 is the 6^{th} term.
- n represents the number of the current term. For a_6, $n = 6$.
- a_1 is the term when $n = 1$ which is usually the first term of the sequence.
- d is the common difference. It represents how much the sequence changes from one term to the next.

1. Suppose we apply this new equation format to Michael's daily pay relationship from part **A.** What would a_6 represent in this case?

2. Michael says that a_1 represents the y-intercept. Whereas Michelle says that a_0 represents the y-intercept. Who do you agree with? Explain.

3. What is the value of d for Michael's pay situation? What is another name we typically use for this value?

4. Write an equation using the new format to represent Michael's daily pay.

5. Simplify your equation from part **4**. How does this equation relate to the one you wrote in part **2a**?

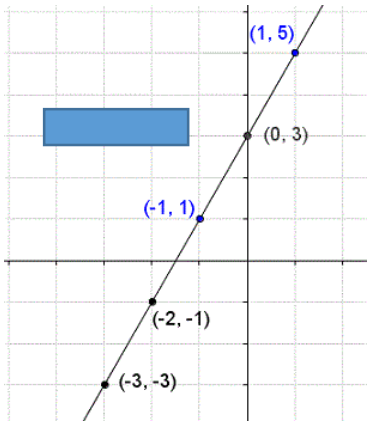
C. Arithmetic sequences can be written as equations using the traditional linear format of $y = mx + b$ or the new format $a_n = a_1 + (n - 1)$.

1. Which variable in the linear equation corresponds to the a_n variable from the new format?

2. Which variable in the new format corresponds to the m variable from the linear format?

3. Is there a variable in the new format that corresponds to the variable b from the linear format? If not, how could we write it using the new notation?

D. For each sequence shown below, write an equation using the traditional $y = mx + b$ format and an equation using the new $a_n = a_1 + (n - 1)$d. Simplify all equations completely and draw arrows to show the relationship between the two equations.

1. 

2. An arithmetic sequence begins with the number 3 and has a common difference of 2.

3.

x	1	2	3	4	5
y	14	9	4	-1	-6

Extensions/Homework

1. Use the equation of an arithmetic sequence show below to answer the following questions.

$$a_n = 6 + (n - 1)(4)$$

a. What is the first term, a_1? What is the common difference, d?

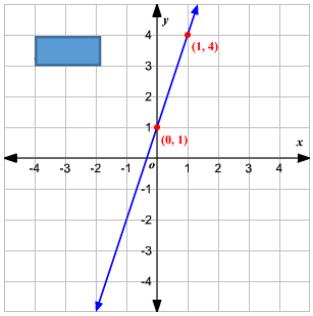
b. Simplify the equation completely.

c. What is the value of the y-intercept of this relationship?

d. What is the value of a_4?

For # below, write an equation using the traditional $y = mx + b$ format and an equation using the new $a_n = a_1 + (n - 1)$d. Simplify all equations completely and draw arrows to show the relationship between the two equations.

2.



3. An arithmetic sequence that begins with the number 1 and has a common difference of -2

4.

x	1	2	3	4	5
y	7	11	15	19	23