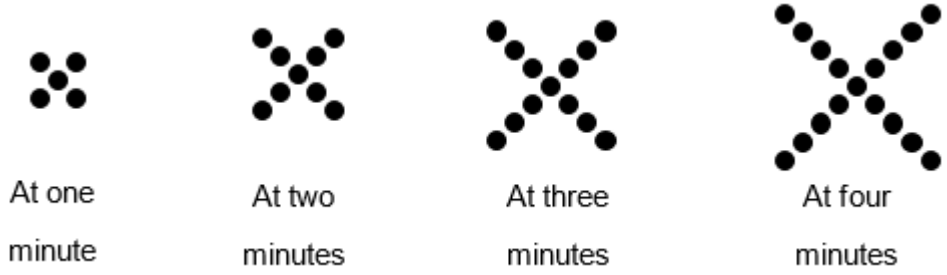
Microbial Growth

Paul and Tom observed the growth of a special kind of microbe which was growing in the following pattern every minute.



1. Complete the following table.

Minutes	1	2	3	4	5			
Number of Microbes								

2. Is the relation between the “Minutes” and the “Number of Microbes” a function? Why or Why not?

_____

3. Write the first eight terms of the sequence for the number of microbes.

_____

4. What kind of sequence is this? Justify your reasoning.

_____

5. If a_1 denotes the first term of the sequence and d represents the common difference, then find the values of a_1 and d.

_____

6. Write the "**Recursive Formula**" to find the n^{th} term a_n for this sequence.

_____

_____

Observe the conversation between Paul and Tom:

Paul: This pattern is constantly increasing by 4, so I know it is linear. It starts with 5 microbes and increases by 4 every minute, so the nth term of the sequence is $a_n = 5 + 4\ n$

Tom: I don't know about that. I agree that it is a linear function—just look at that growth pattern. However, I used the numbers in the table and got $a_n = 5 + 4(n - 1)$

7. What is different about the process that Paul and Tom used to create their equations?

_____

8. Who is right? Why? Write the correct **explicit formula** to find the n^{th} term a_n of this arithmetic sequence.

_____

_____

9. Use the above explicit formula to find the number of microbes at 10 minutes, 17 minutes, and at 40 minutes.

Number of microbes at 10 minutes, a_{10}= _____

Number of microbes at 17 minutes, a_{17} = _____

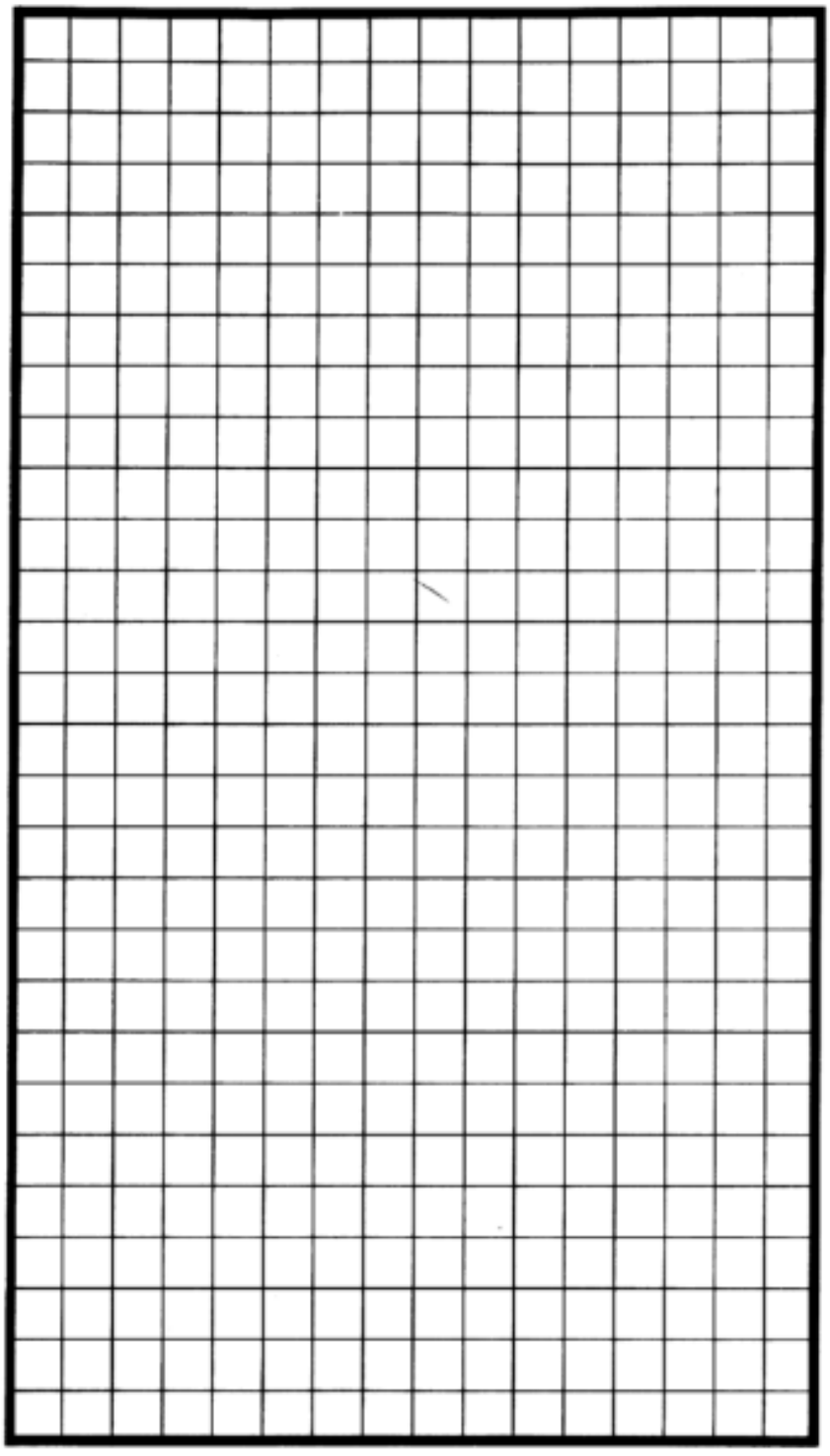
Number of microbes at 40 minutes, a_{40}= _____

10. At how many minutes there would be 173 microbes? Explain your reasoning.

_____

11. Complete the following table and graph the sequence.

Minutes	1	2	3	4	5			
No. of microbes								



12. Should we connect the points on the graph? Explain your reasoning.

_____

13. Use technology, derive the **linear function** f(x) for this sequence.

_____

14. What can you conclude about the recursive formula, explicit formula, and the function form of this arithmetic sequence?

_____

_____

15. Write a real-life example of an arithmetic sequence. Express it as a linear function.

_____

_____

_____

_____