

Investigation 6B: Arithmetic Sequences

Math Studies 1

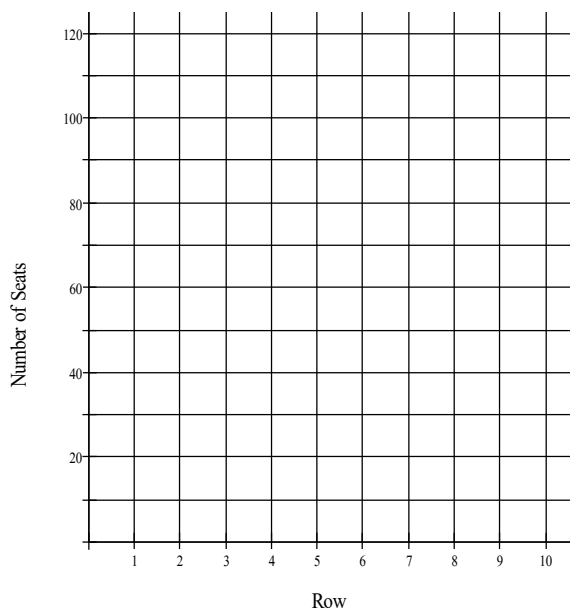
Purpose: The purpose of this investigation is to find a shortcut for calculating any term of an arithmetic sequence, without calculating all the previous terms.

The Concert Hall

The Cape Cod Symphony Orchestra has hired the Sturgis Architectural Designers to design a new concert hall. As a member of SAD, you have made the following proposal: the concert hall will have 59 seats in Row 1, 63 seats in Row 2, 67 seats in Row 3, and so on. The proposed concert hall will have 35 rows of seats.

1. Fill in this table to show the number of seats in each of the first ten rows.

Row	Number of Seats
1	59
2	63
3	67
4	
5	
6	
7	
8	
9	
10	



2. In the coordinate plane given, plot points of the form (row, number of seats).
3. Should you draw a line through these points? Why or why not?
4. Write down the first few terms of a sequence that represents the number of seats in each row.
5. What kind of sequence did you write in Step 3: arithmetic, geometric, or neither? How do you know?
6. Describe in words the starting value and recursive rule that define the sequence you wrote in Step 3.

An Explicit Equation

7. The points in your graph form a straight line. This means that the relationship between the row and the number of seats is what kind of relationship?
8. What is the gradient (slope) of this relationship? What is this gradient called in the context of a recursively-defined sequence?
9. Write an equation in the form $f(x) = mx + c$ that determines the number of seats in each row. Define the variables that you use. Use your GDC to check that your equation generates the same values as the table above.
10. Re-write your equation, replacing the variables x and $f(x)$ with the sequence variables n and u_n .
11. Use the equation you wrote in Step 9 to find
 - (a) the number of seats in Row 10 (check your answer by comparing with the table);
 - (b) the number of seats in Row 35; and
 - (c) which row has 135 seats.

Suggested Practice: page 402 #1, 2, 5a, 6a, 8.