

Lesson 4.1 – Arithmetic Sequences & Series

I. What is an arithmetic sequence?

1. Consider the sequence 2, 9, 16, 23, 30, ...
 - a. Show that the sequence is arithmetic.
 - b. Find a formula for the general/ nth term u_n .
 - c. Find the 100th term of the sequence.
 - d. Is 828 a term of the sequence? How about 2341?

For each of the following arithmetic sequences, find the common difference, provide a general formula for the nth term of the sequence, and evaluate the stated term.

1. 7, 11, 15, ...; Evaluate a_7
3. -7, -5, -3, ...; Evaluate a_{23} .

2. 18, 11, 4, ...; Evaluate a_6
4. 3, 3.5, 4, ...; Evaluate a_{16} .

5. Graph the general formula of the sequence in #4 as a function in the graph to the right.



II. What is a series?

1. Consider the sequence 1, 4, 9, 16, 25.
 - a. Write down an expression for S_n .
 - b. Find S_n for $n = 1, 2, 3, 4,$ and 5.

III. Sum of a Finite Arithmetic Series

1. Find the sum of $4 + 7 + 10 + 13 + \dots$ to 50 terms.
2. Find the sum the arithmetic series 4, 11, ... to 16 terms.
3. Find the sum of arithmetic series 19, 13, ... to 10 terms.
4. Find the sum of the arithmetic series 3, 8.5, to 20 terms.

IV. Practice

5. Fill in the gaps for this arithmetic sequence: $-3, _, _, _, _, _, 12$.

6. An arithmetic sequence has a 10th term of 17 and 14th term of 30. Find the common difference.

7. Find the sum of the first 100 odd numbers.

8. Find the sum of the positive terms of the arithmetic sequence 85, 78, 71, ...

9. The first, second, and n th terms of an arithmetic sequence are 2, 6, and 58 respectively.
 - a. Find the value of n .

 - b. For that value of n , find the exact value of the sum of n terms.

10. The 10th term of an arithmetic sequence is 10 and the sum of the first 10 terms is -35 . Find the common difference, d , of the sequence.

11. How many terms of the arithmetic sequence 1, 3, 5, 7, ... will give a sum of 961?

12. Jerry deposited \$20,000 on an investment that will give \$1,750 for every year that his money stays in the account. How much money will he have in his account by the end of year 8?

13. There is a stack of Christmas logs in the backyard. There are 15 logs in the bottom layer, 14 in the second layer, 13 in the third, 12 in the fourth, and so on with the last layer only having 1 log. How many logs are in the stack?
14. In his piggy bank, Bingo dropped \$1.00 on May 1, \$1.75 on May 2, \$2.50 on May 3 and so on until the last day of May.
- How much did he drop in his piggy bank on May 19.
 - What was his total deposit in his piggy bank for the month of May?
15. There are 20 rows of seats on a concert hall: 25 seats are in the 1st row, 27 seats on the 2nd row, 29 seats on the 3rd row, and so on. If the price per ticket is \$2,300, how much will be the total sales for a one-night concert if all seats are taken?
16. Mr. Braza's class has 55 blocks. They decide to stack up all the blocks so that each row has one less block than the row below it. They want to end up with just 1 block on top. How many should the class put in the bottom row?
17. A theater has 32 rows of seats. If there are 26 seats in the 1st row, 30 in the 2nd, 34 in the 3rd, and so on, how many seats are there in all?
18. A tube well is bored 800 meters deep. The 1st meter costs \$250 and the cost per meter increases by \$50 for every subsequent meter. Find the cost of boring the 750th meter and the total cost incurred for the entire job.