

# Sequences and Series – Arithmetic Series and Sigma Notation (By Hand)

## Introduction to (General) Series

- **series** → the indicated \_\_\_\_\_

- distinguish the difference – sequence → 6 , 12 , 18 , ... , 300 where it contains \_\_\_\_\_  
series → 6 + 12 + 18 + ... + 300 where it contains \_\_\_\_\_

• series notation –  $S_n = a_1 + a_2 + a_3 + \dots + a_n$

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**Example 1:** Find the sum of the first four terms for  $a_n = 3n + 5$ .

## Specific Series # 1 – Arithmetic Series

- **arithmetic series** → the indicated \_\_\_\_\_

where it's represented by the following formula:  $S_n = \frac{n}{2} (a_1 + a_n)$

\_\_\_\_\_

**Example 2:** Find  $S_n$  for each arithmetic series described.

a.) $a_1 = 8$ , $a_n = 85$ , $n = 12$	b.) $a_1 = 21$ , $d = -5$ , $n = 13$	c.) $a_1 = -32$ , $d = 4$ , $a_n = 156$
d.) $d = -12$ , $n = 19$ , $a_n = -231$	e.) $9 + 14 + 19 + \dots + 304$	f.) The first 20 positive even integers

**Example 3:** Find the first three terms of an arithmetic series in which ...

$$a_1 = 9, a_n = 105, \text{ and } S_n = 741.$$

### Sigma Notation (By Hand Method)

- **sigma notation** → a \_\_\_\_\_ and more concise way to \_\_\_\_\_

- The following is a simple representation of Sigma Notation:

$$\sum_{n=1}^4 3n = 3(1) + 3(2) + 3(3) + 3(4)$$

$$3 + 6 + 9 + 12 \Rightarrow S_4 = 30$$

→ the Greek symbol  $\Sigma$  means “\_\_\_\_\_”

→ “n” is the main variable (in this problem) and is called the \_\_\_\_\_

→ “1” is the \_\_\_\_\_ and is known as the \_\_\_\_\_

→ “4” is the \_\_\_\_\_ and is known as the \_\_\_\_\_

→ “3n” is the \_\_\_\_\_

**Example 4:** Find the sum of the given arithmetic series using the two methods as described.

Both methods should be the SAME EXACT ANSWER.

Make sure to write your answer as  $S_n = \text{sum}$  where you fill in “n” and the series’ sum.

Given arithmetic series →  $\sum_{j=5}^{10} 4j - 7$

Method # 1 – Sigma Notation (by hand)	Method # 2 – Arithmetic Series Formula