

## Section 11.2: Arithmetic Sequences; Partial Sums

**Key Topics:** arithmetic sequence definitions,  $n$ th term, sum of a finite arithmetic sequence, sum of the first  $n$  terms of an arithmetic sequence

### Arithmetic Sequence

The sequence

$$a_1, a_2, a_3, a_4, \dots, a_n, \dots$$

is an \_\_\_\_\_, or an **arithmetic progression**, if there is a number \_\_\_\_\_ such that each term in the sequence \_\_\_\_\_ is obtained from the preceding term by \_\_\_\_\_. The number  $d$  is called the \_\_\_\_\_ of the arithmetic sequence. We have

$$d = \text{_____}, \text{_____}$$

### Recursive Definition of an Arithmetic Sequence

An arithmetic sequence  $a_1, a_2, a_3, a_4, \dots, a_n, \dots$  can be defined recursively. The recursive formula

$$a_{n+1} = \text{_____} \text{ for } \text{_____}$$

defines an arithmetic sequence with \_\_\_\_\_ and \_\_\_\_\_.

### **$n$ TH TERM OF AN ARITHMETIC SEQUENCE**

If a sequence  $a_1, a_2, a_3, \dots$  is an arithmetic sequence, then its  $n$ th term,  $a_n$ , is given by

$$a_n = \text{_____}$$

where \_\_\_\_\_ is the first term and \_\_\_\_\_ is the common difference.

Find an expression for the  $n$ th term of the arithmetic sequence 12, 17, 22, 27, ...

(a)  $5 + 12n$

(b)  $12 + 5n$

(c)  $5 + 7n$

(d)  $7 + 5n$

### Further Properties of an Arithmetic Sequence

1. The general term of an arithmetic sequence can be obtained from the \_\_\_\_\_ function  $f(x) = Ax + B$ . That is,

$$a_n = f(n) = \underline{\hspace{2cm}}, \quad \text{where } A = \underline{\hspace{1cm}} \text{ and } B = \underline{\hspace{1cm}}.$$

2. Points on the graph of the arithmetic sequence lie on the line  $y = \underline{\hspace{2cm}}$
3. The arithmetic sequence exhibits the following growth patterns:
- If  $A = d \underline{\hspace{1cm}} 0$  the arithmetic sequence represents  $\underline{\hspace{2cm}}$ .
  - If  $A = d \underline{\hspace{1cm}} 0$  the arithmetic sequence represents  $\underline{\hspace{2cm}}$ .

### Sum of the First $n$ Terms of an Arithmetic Sequence

Let  $a_1, a_2, a_3, \dots, a_n$  be the first  $n$  terms of an arithmetic sequence with common difference  $d$ . The \_\_\_\_\_ of these  $n$  terms is given by

$$S_n = \underline{\hspace{3cm}}$$

or

$$S_n = \underline{\hspace{3cm}} \quad \underline{\hspace{3cm}}$$

Find the sum of the arithmetic sequence of numbers  $8 + 11 + 14 + \dots + 59 + 62 + 65$ .