

Section 11.2 Arithmetic Sequences

Arithmetic Sequence

Definition: An **arithmetic sequence** is a sequence $\{a_n\}$, which satisfies the following recursive definition:

- $a_1 = a$
- $a_n = a_{n-1} + d$

So the sequence is essentially determined by two parameters: the first term, a , and the **common difference**, d .

n-th Term Formula

Given the first term a_1 and the common difference d , the formula for the n -th term is:

$$a_n = a + (n-1)d$$

i.e.

$$a_1 = a + (1-1)d = a$$

$$a_2 = a + (2-1)d = a + d$$

$$a_3 = a + 2d$$

Exercise 1

[11.2.1aPT] The 4th term of an arithmetic sequence with first term $a_1 = \sqrt{2}$ and common difference $d = -\sqrt{2}$ is

None of these

$-5\sqrt{2}$

$-3\sqrt{2}$

$-4\sqrt{2}$

$-2\sqrt{2}$

Exercise 2

[11.2.1bPT]The n^{th} term of an arithmetic sequence with first term $a_1 = 3$ and common difference $d = -\frac{1}{3}$ is

- $\frac{13}{3} - \frac{1}{3}n$
- $\frac{10}{3} - \frac{1}{3}n$
- $\frac{7}{3} - \frac{1}{3}n$
- $\frac{4}{3} - \frac{1}{3}n$
- None of these

Exercise 3

[11.2.1cPT]The 47^{th} term of the arithmetic sequence $\{1, \frac{1}{2}, 0, -\frac{1}{2}, \dots\}$ is

- -20
- -19
- -22
- -21

Exercise 4

[11.2.2aPT]Given an arithmetic sequence with $a_{26} = 80$, and $a_{41} = 125$, find the first term a_1 .

- 5
- 2
- 3
- 4

Exercise 5

[11.2.2bPT]Given an arithmetic sequence with $a_{26} = 77$, and $a_{46} = 157$, find the common difference.

- 3
- 2
- 5
- 4

Summing the first n terms of an arithmetic sequence

There are two commonly used formulas of the sum of the first n terms of a arithmetic sequence:

- $S_n = na + \frac{n(n-1)}{2}d$, if it is easier to find a and d.

- $S_n = n \frac{a_1 + a_n}{2}$, if the first term and the last term are given.

Exercise 6

[11.2.2cPT] Given the arithmetic sequence $\{1, \frac{1}{2}, 0, -\frac{1}{2}, \dots\}$, find the sum S_{45}

- 450
- 369
- 296
- 539