Sequences & Series (Q 5, Paper 1)

Lesson No. 4: Arithmetic Sequences II

2006

5 (a) The first term of an arithmetic sequence is 17 and the common difference is -8. Find, in terms of n, an expression for T_n, the nth term.

Solution

General term: $T_n = ar^{n-1}$ 4

The first term, a, is 17. The common difference is -8.

$a = 17$

$d = -8$

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

$\Rightarrow T_n = 17 + (n-1)(-8)$

$\Rightarrow T_n = 17 - 8n + 8$

$\Rightarrow T_n = 25 - 8n$

2001

5 (a) 5, 13, 21, 29,.... is an arithmetic sequence. Which term of the sequence is 813?

Solution

General term: $T_n = a + (n-1)d$ 2

$a = 5,\ d = 8$

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

$\Rightarrow T_n = 5 + (n-1)(8)$

$\Rightarrow T_n = 5 + 8n - 8$

$\Rightarrow T_n = 8n - 3$

Put the general term, T_n, equal to 813 and solve for n.

$\therefore 8n - 3 = 813$

$\Rightarrow 8n = 816$

$\Rightarrow n = 102$

1997

5 (b) The first four terms of an arithmetic sequence are given as

$a, -4, b, 6, ...$

Find

(i) the value of a and the value of b

(ii) T_5, the fifth term.

SOLUTION

5 (b) (i)

d = Common difference = Any term − Previous term

The difference between the fourth and second terms is $2d$.

$2d = 6 - (-4) = 6 + 4 = 10$

$\therefore d = 5$

You keep on adding on 5 to generate each term in the sequence.

Arithmetic sequence: $-9, -4, 1, 6, ...$

$\therefore a = -9, b = 1$

5 (b) (ii)

$T_5 = 11$ [Add 5 on to the fourth term to get the fifth term.]