

Arithmetic Sequences

Work through handout on "Search for a Pattern"

Sequence: Is an arrangement of numbers in some special order.

Arithmetic Sequence: Is a sequence in which successive terms are obtained by adding some fixed quantity called the common difference. (d)

Ex:

5, 8, 11, ... Has a common difference of 3

24, 20, 16 has a common difference of -4

The common difference is calculated by $d = t^2 - t^1$

The general term of an arithmetic sequence is given by

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

a - the first term of the sequence

n - the term number

d - common difference

Given the sequence 5, 9, 13,

a) Determine t_{50}

$$t_{50} = a + (n-1)d$$

$$t_{50} = 5 + (50-1)(4)$$

$$t_{50} = 201$$

b) Determine the ^{formula} ~~formula~~ for t_n

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

Keep "n" as "n"

$$t_n = 5 + (n-1)4$$

$$t_n = 5 + 4n - 4$$

$$t_n = 4n + 1$$

$$t_{25} = 4(25) + 1$$

$$t_{25} = 101$$

In the sequence 6, 10, 14, 18, ... one of the terms is 110. Which term is it?

last term \rightarrow

$$t_n = a + (n-1)d$$
$$110 = 6 + (n-1)(4)$$
$$104 = 4(n-1)$$
$$26 = n-1$$
$$n = 27$$

In an arithmetic sequence, the 5th term is 53 and the 12th term is 102.

a) List the first four terms of the sequence.

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

$$53 = a + (5-1)d \quad | \quad 102 = a + (12-1)d$$

$$53 = a + 4d \quad | \quad 102 = a + 11d$$

$$102 = a + 11d$$

$$102 = a + 11(7)$$

$$102 = a + 77$$

$$-49 = -7d \quad | \quad d = 7 \quad | \quad a = 25$$

25, 32, 39, 46

b) Write the general term (t_n) of the sequence.

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

$$t_n = 25 + (n-1)7$$

$$t_n = 7n + 18$$

c) How many terms are less than 150?

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

$$150 = 25 + (n-1)7$$

$$125 = 7(n-1)$$

$$17.9 = n-1$$

$$18.9 = n$$

18 terms are less than 150.