Mathematics Online Class X On 29-06-2021

ARITHMETIC SEQUENCE

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Question

Write the arithmetic sequence with first term 30 and second term 50

Answer

First term $= x_1 = 30$

Second term $= x_2 = 50$

Common difference $= d = x_2 - x_1 = 50 - 30 = 20$

$\therefore$ arithmetic sequence is 30 , 50 , 70 , 90 , . . .

Question

Write an arithmetic sequence with first term 30 and third term 50

Answer

First term $= x_1 = 30$

Third term $= x_3 = 50$

Now $x_3 - x_1 = 50 - 30 = 20$

$$2d = 20 \quad \therefore \text{Common difference} = d = \frac{20}{2} = 10$$

$\therefore$ arithmetic sequence is 30 , 40 , 50 , 60 , . . .

Question

Write an arithmetic sequence with third term 30 and seventh term 50

Answer

Third term $= x_3 = 30$

Seventh term $= x_7 = 50$

Now $x_7 - x_3 = 50 - 30 = 20$

$$4d = 20 \quad \therefore \text{Common difference} = d = \frac{20}{4} = 5$$

First term $= x_1 = x_3 - 2d = 30 - 2 \times 5 = 30 - 10 = 20$

$\therefore$ arithmetic sequence is 20 , 25 , 30 , 35 , . . .

Question

Write an arithmetic sequence with tenth term 30 and twentieth term 70

Answer

Tenth term = x_{10} = 30

Twentieth term = x_{20} = 70

Now $x_{20} - x_{10} = 70 - 30 = 40$

$10\,d = 40$ ∴ Common difference = $d = \frac{40}{10} = 4$

First term = $x_1 = x_{10} - 9d = 30 - 9 \times 4 = 30 - 36 = -6$

∴ arithmetic sequence is -6 , -2 , 2 , 6 , . . .

NOTE

In an arithmetic sequence, the difference between any two terms is the product of the position difference and common difference.

That is,

Term difference = position difference × common difference

In an arithmetic sequence, term difference is proportional to the position difference.

The constant of proportionality is the common difference.

Question

Is 100 a term of the arithmetic sequence 4, 7, 10, . . .

Answer

Method-1

In an arithmetic sequence, term difference is always a multiple of common difference.

100 – 4 = 96, which is a multiple of common difference 3.

∴ 100 is a term of this sequence.

Method-2

When we divide the terms of an arithmetic sequence by common difference, we get the same remainder.

That is, when we divide 4 by 3, remainder is 1.

when we divide 7 by 3, remainder is 1.
when we divide 10 by 3, remainder is 1.
when we divide 100 by 3, remainder is also 1.
∴ 100 is a term of this sequence.

ASSIGNMENT

Questions 1 to 4 of page number 21 of the text book.

(1) In each of the arithmetic sequences below, some terms are missing and their positions are marked with ◯. Find them.

i) 24, 42, ◯, ◯, ... ii) ◯, 24, 42 , ◯, ...

iii) ◯, ◯, 24, 42, ... iv) 24, ◯, 42, ◯, ...

v) ◯, 24, ◯, 42, ... vi) 24, ◯, ◯, 42, ...

(2) The terms in two positions of some arithmetic sequences are given below. Write the first five terms of each:

i) 3rd term 34, 6th term 67 ii) 3rd term 43, 6th term 76 iii) 3rd term 2, 5th term 3

iv) 4th term 2, 7th term 3 v) 2nd term 5, 5th term 2

(3) The 5th term of an arithmetic sequence is 38 and the 9th term is 66. What is its 25th term?

(4) Is 101 a term of the arithmetic sequence 13, 24, 35, ...? What about 1001?