TEXT BOOK QUESTIONS - ARITHMETIC SEQUENCES

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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, ...

Answer .

(i) 24 , 42 , ----- , ------ , . . .

Common difference = 42 – 24 = 18

24 , 42 , 60 , 78 , . . .

Third term = Second term + common difference = 42 + 18 = 60

Fourth term = Third term + common difference = 60 + 18 = 78

(ii) ----- , 24 , 42 , ------ , . . .

Common difference = 42 – 24 = 18

6 , 24 , 42 , 60 , . . .

First term = Second term - common difference = 24 - 18 = 6

Fourth term = Third term + common difference = 42 + 18 = 60

(iii) ----- , ----- , 24 , 42 , . . .

Common difference = 42 – 24 = 18

-12 , 6 , 24 , 42 , . . .

Second term = Third term - common difference = 24 - 18 = 6

First term = second term - common difference = 6 - 18 = -12

(iv) 24 , ----- , 42 , ----- , . . .

$$common\ \ difference = \frac{Term\ \ difference}{position\ \ difference} = \frac{x_3 - x_1}{3-1} = \frac{42-24}{3-1} = \frac{18}{2} = 9$$

24 , 33 , 42 , 51 , . . .

Second = First term + common difference = 24 + 9 = 33

Fourth term = Third term + common differences = 42 + 9 = 51

(v) ---- , 24 , ----- , 42 , . . .

$$common\ \ difference = \frac{Term\ \ difference}{position\ \ difference} = \frac{x_4 - x_2}{4-2} = \frac{42-24}{4-2} = \frac{18}{2} = 9$$

15 , 24 , 33 , 42 , . . .

First term = Second term - common difference = 24 - 9 = 15

Third term = Second term + common difference = 24 + 9 = 33

(vi) 24 , ---- , ---- , 42 , . . .

$$common\ \ difference = \frac{Term\ \ difference}{position\ \ difference} = \frac{x_4 - x_1}{4-1} = \frac{42-24}{4-1} = \frac{18}{3} = 6$$

24 , 30 , 36 , 42 , . . .

Second term = First term + common difference = 24 + 6 = 30

Third term = Second term + common difference = 30 + 6 = 36

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

Answer .

(i) $x_3 = 34$, $x_6 = 67$

$$common\ difference = \frac{Term\ difference}{position\ difference} = \frac{x_6 - x_3}{6-3} = \frac{67-34}{6-3} = \frac{33}{3} = 11$$

First term = Third term - 2 x common difference

= 34 – 2 x 11 = 34 – 22 = 12

First five terms = 12 , 23 , 34 , 45 , 56

(ii) $x_3 = 43$, $x_6 = 76$

$$common\ difference = \frac{Term\ difference}{position\ difference} = \frac{x_6 - x_3}{6-3} = \frac{76-43}{6-3} = \frac{33}{3} = 11$$

First term = Third term - 2 x common difference

= 43 – 2 x 11 = 43 – 22 = 21

First five terms = 21 , 32 , 43 , 54 , 65

(ii) $x_3 = 2$, $x_5 = 3$

$$common\ difference = \frac{Term\ difference}{position\ difference} = \frac{x_5 - x_3}{5-3} = \frac{3-2}{5-3} = \frac{1}{2}$$

First term = Third term - 2 x common difference

$$= 2 - 2\times\frac{1}{2} = 2 - 1 = 1$$

First five terms = $1 , 1\frac{1}{2} , 2 , 2\frac{1}{2} , 3 , \ldots$

(iv) $x_4 = 2$, $x_7 = 3$

$$common\ \ difference = \frac{Term\ \ difference}{position\ \ difference} = \frac{x_7 - x_4}{7-4} = \frac{3-2}{7-4} = \frac{1}{3}$$

First term = Fourth term - 3 x common difference

$$= 2 - 3 \times \frac{1}{3} = 2 - 1 = 1$$

First five terms = $1 , 1\frac{1}{3} , 1\frac{2}{3} , 2 , 2\frac{1}{3} , \ldots$

(v) $x_2 = 5$, $x_5 = 2$

$$common\ \ difference = \frac{Term\ \ difference}{position\ \ difference} = \frac{x_5 - x_2}{5-2} = \frac{2-5}{5-2} = \frac{-3}{3} = -1$$

Fourth term = Second term - common difference

= 5 - (- 1) = 5 + 1 = 6

First five terms = 6 , 5 , 4 , 3 , 2

3

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

Answer .

$x_5 = 38$, $x_9 = 66$

$$common\ \ difference = \frac{Term\ \ difference}{position\ \ difference} = \frac{x_9 - x_5}{9-5} = \frac{66-38}{9-5} = \frac{28}{4} = 7$$

25th term = 5th term + 20 x common difference

= 38 + 20 x 7 = 38+ 140 = 178

4

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

Answer .

Common difference = 24 – 13 = 11

Term difference = 101 – 13 = 88 = 8 x 11 = 8 x common difference

101 is a term of this sequence . (The difference between any two terms of an arithmetic sequence is a multiple of its common difference)

Term difference = 1001 – 13 = 988 ($988 = 89\frac{9}{11}$)

Here 988 is not a multiple of the common difference . So 1001 is not a term of this sequence .

5

How many three-digit numbers are there, which leave a remainder 3 on division by 7?

Answer .

First term = 101 , Last term = 997 , common difference = 7

Term difference = 997 - 101 = 896

Position difference = $\frac{Term\ \ difference}{common\ \ difference} = \frac{896}{7} = 128$

Number of terms = 128 + 1 = 129

6

Fill up the empty cells of the given square such that the numbers in each row and column form arithmetic sequences:

What if we use some other numbers instead of 1, 4, 28 and 7?

1			4
7			28

Answer .

1	**2**	**3**	**4**
3	**6**	**9**	**12**
5	**10**	**15**	**20**
7	**14**	**21**	**28**

2	7	12	17
6	10	14	18
10	13	16	19
14	16	18	20

7 In the table below, some arithmetic sequences are given with two numbers against each. Check whether each belongs to the sequence or not.

Sequence	Numbers	Yes/No
11, 22, 33, ...	123	
	132	
12, 23, 34, ...	100	
	1000	
21, 32, 43, ...	100	
	1000	
$\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, \ldots$	3	
	4	
$\frac{3}{4}, 1\frac{1}{2}, 2\frac{1}{4}, \ldots$	3	
	4	

Answer .

Sequence	Numbers	Yes / No
11 , 22 , 33 , . . .	123	No
	132	Yes
12 , 23 , 34 , . . .	100	Yes
	1000	No
21 , 32 , 43 , . . .	100	No
	1000	Yes

$\frac{1}{4}$, $\frac{1}{2}$ $\frac{3}{4}$, . . .	**3**	**Yes**
	4	**Yes**
$\frac{3}{4}$, $1\frac{1}{2}$ $2\frac{1}{4}$, . . .	**3**	**Yes**
	4	**No**