QB365 QUESTION BANK SOFTWARE

10th Maths Important Case Study Questions for Arithmetic Progressions2024

SECTION A

2 x 4 = 8

1) In a board game, the number of sea shells in various cells forms an A.P. If the number of sea shells in the 3^{rd} and 11^{th} cell together is 68 and number of shells in 11^{th} cell is 24 more than that of 3^{rd} cell, then answer the following
questions based on this data.

(i) What is the difference between the number of sea shells in the 19^{th} and 20^{th} cells?

(a) 2 (b) 3 (c) 8 (d) 7

(ii) How many sea shells are there in the first cell?

(a)	**(b)**	**(c)**	**(d)**
52	**18**	**16**	**54**

(iii) How many total sea shells are there in first 13 cells?

(a)	**(b)**	**(c)**	**(d) Can't be determined**
442	**221**	**204**	

(iv) Altogether, how many sea shells are there in the first 5 cells?

(a)	**(b)**	**(c)**	**(d)**
220	**125**	**96**	**110**

(v) What is the sum of number of sea shells in the 7^{th} and 9^{th} cell?

(a)	**(b)**	**(c)**	**(d)**
42	**32**	**74**	**80**

Answer : Let the number of sea shells in the cells be of the form a, a + d, a + 2d, ...

According to question, we have

(a + 2d) + (a + 10d) = 68

$\Rightarrow$ 2a + 12d = 68 $\Rightarrow$ a + 6d = 34 ... (i)

Also, (a + 10d) - (a + 2d) = 24 $\Rightarrow$ d = 3

From (1), we get a + 6(3) = 34 $\Rightarrow$ a = 16

(i) (b): Required difference, d = 3

(ii) (c): Number of sea shells in the first cell (a) = 16

(iii) (a): Total number of sea shells in 13 cells = S_{13}

$= \frac{13}{2}[2(16) + 12(3)] = 6.5(68) = 442$

(iv) (d): $S_5 = \frac{5}{2}[2(16) + 4(3)] = 110$

(v) (c): Required sum = $t_7 + t_9$ = (a + 6d) + (a + 8d)

= 2(16) + 14(3) = 74

2) Jack is much worried about his upcoming assessment on A.P. He was vigorously practicing for the exam but unable to solve some questions. One of these questions is as shown below. If the 3^{rd} and the 9^{th} terms of an A.P. are 4 and - 8 respectively, then help Jack in solving the problem.

(i) What is the common difference?

(a) 2 (b) -1 (c) -2 (d) 4

(ii) What is the first term?

(a) 6 (b) 2 (c) -2 (d) 8

(iii) Which term of the A.P. is -160?

(a)	**(b)**	**(c)**	**(d)**
80^{th}	**85^{th}**	**81^{th}**	**84^{th}**

(iv) Which of the following is not a term of the given A.P.?

(a)	**(b)**	**(c)**	**(d)**
-123	**-100**	**0**	**-200**

(v) What is the 75^{th} term of the A.P.?

(a)	**(b)**	**(c)**	**(d)**
-140	**-102**	**-150**	**-158**

Answer : We have, 3^{rd} term = 4 and 9^{th} term = -8 i.e., a + 2d = 4 .....(i)
and a + 8d = -8 .....(ii)
Solving (1) and (2), we get
d = -2, a = 8
(i) (c)
(ii) (d)
(iii) (b): Let $t_n = -160 \Rightarrow a + (n - 1)\, d = -160$
$\Rightarrow 8 + (n - 1)(-2) = -160 \Rightarrow (n - 1)(-2) = -168$
$\Rightarrow n - 1 = 84 \Rightarrow n = 85$
So, $t_{85} = -160$
(iv) (a)
(v) (a): $t_{75} = a + 74d = 8 + 74(-2) = -140$