

NCERT-discrete : 10.5.3 - 2

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I. QUESTION

Find the sums given below:

- (i) $7 + 10\frac{1}{2} + 14 \dots + 84$
- (ii) $34 + 32 + 30 \dots + 10$
- (iii) $-5 + -8 + -11 \dots -230$

Solutions:

- (i) By observing the consecutive common differences in the given series, we observe that it is a constant value, which is $\frac{7}{2}$.

Since this is an arithmetic progression, we can use the formula which dictates the sum of n terms of such a series

Let S_n denote the sum of n terms in a series, a denotes its first term and d denotes the common difference. It is known that

$$S_n = \frac{n}{2}(2a + (n-1)d) \quad (1)$$

In the question, $a=7$ and $d=\frac{7}{2}$, and n is unknown

For calculating the number of terms, we use the formula

$$T_n = a + (n-1)d \quad (2)$$

Where T_n is the n th term of the series

Given that T_n is 84, we solve for n

$$84 = 7 + (n-1)\frac{7}{2} \quad (3)$$

Solving this yields $n=23$.

We now use this result for calculating S_{23}

$$S_{23} = \frac{23}{2}(14 + (22)\frac{7}{2}) \quad (4)$$

Again, solving this yields S_{23} as 1046.5

$a=34$, $d=-2$ For calculating the number of terms, we use the formula (2)

Substituting the values, we get

$$10 = 34 + (n-1)(-2) \quad (5)$$

Solving this yields $n=13$

For calculating the sum, we use (1)

$$S_{13} = \frac{13}{2}(64 + 11(-2)) \quad (6)$$

Solving this, we get $S_n = 286$.

- (iii) By using the previous analysis, we can conclude that $a=-5$, $d=-3$

Again, for n , we use the formula (2)

$$-230 = -5 + (n-1)(-3) \quad (7)$$

Solving this yields $n=76$

Now, for the sum we use equation (1) :

$$S_{76} = \frac{76}{2}(-10 + (76-1)(-3)) \quad (8)$$

Solving this we obtain $S_{76}=-8930$.

- (ii) Based on the analysis of the previous bit, we observe that in this bit