ESTD. 2001

LEARN TO LEAD

STEPPING STONE SCHOOL (HIGH)

Scanned with CamScanner

"INSTRUCTION"

Please read the chapter from your textbook and the attached notes. Then workout the exercises neatly in your notebooks henceforth. Make a Contents page first with columns under the heads: date, chapter number, chapter name and teacher's signature. Ensure neat and tidy work.

CONTENTS

Date	Worksheet NO	Chapter NO AND NAME	Page No.	Teacher's signature

Scanned with CamScanner

Sub- Mathematics : CLASS-X

Worksheet No- 20. Date-23.06.20

Standard Sums on A.P

Example : (1) If the sum of mth term ie $S_m = n$ and the sum of nth term ie $S_n = m$ in an A.P, then show that $S_{m+n} = -(m+n)$

Ans → Given $S_m = n \Rightarrow$

$$n = \frac{m}{2}[2a+(m-1)d] \Rightarrow 2a+(m-1)d = \frac{2n}{m} \quad \text{------(i)}$$

Similarly, $S_n = m \Rightarrow 2a+(n-1)d = \frac{2m}{n}$ --(ii)

Subtracting, ie, (ii) − (i) ⇒

$$-(m-n)d = \frac{2m}{n} - \frac{2n}{m} = 2\left(\frac{m^2-n^2}{mn}\right).$$

$$\Rightarrow -(m-n)d = 2(m+n)(m-n) \div mn$$

$$\Rightarrow d = \frac{-2(m+n)}{mn} \quad \text{---(iii)}$$

Now; $S_{m+n} = \left(\frac{m+n}{2}\right)[2a+(m+n-1)d]$

$$= \left(\frac{m+n}{2}\right)[2a+(m-1)d+nd]$$

$$= \left(\frac{m+n}{2}\right)\left[\frac{2n}{m} - \frac{2(m+n)}{m}\right]; \text{ by (i) and (iii)}$$

P.T.O →

Scanned with CamScanner

$$S_{m+n} = \left(\frac{m+n}{2}\right)\left[\frac{2\{n-m-n\}}{m}\right]$$

$$= (m+n)\left[-\frac{m}{m}\right] = -(m+n) \text{ ; Proved}$$

Example 2: The pth term of an A.P is 20 and its qth term is 10. Show that the sum of first $(p+q)^{th}$ term is $\frac{p+q}{2}\left\{30+\frac{10}{p-q}\right\}$

Ans $\rightarrow$ Let the first term and common difference of the A.P are 'a' and 'd'. So; $a+(p-1)d=20$

and $a+(q-1)d=10$

Subtracting we get; $(p-q)d=10$.

$$d=\frac{10}{p-q} \quad \text{---(i)}$$

Similarly adding we get;

$$2a+(p+q-1)d-d=30$$

$$\Rightarrow 2a+(p+q-1)d=30+d \quad \text{---(ii)}$$

So the sum of $(p+q)^{th}$ term –

$$S_{p+q} = \left(\frac{p+q}{2}\right)\left[2a+(p+q-1)d\right] = \left(\frac{p+q}{2}\right)\left[30+d\right]; \text{ by (ii)}$$

$$= \left(\frac{p+q}{2}\right)\left[30+\frac{10}{p-q}\right]; \text{ by (i)}$$

Hence proved.

P.T.O →

Scanned with CamScanner

Example: 3. The sum of n, $2n$ and $3n$ terms of an A.P are S_1, S_2 and S_3 respectively. Prove that; $S_3 = 3(S_2 - S_1)$

Ans- Let the first term and common difference be 'a' and 'd' respectively. So -

$S_1 = \frac{n}{2}[2a + (n-1)d]$; $S_2 = \frac{2n}{2}[2a + (2n-1)d]$

So $S_2 - S_1 = \frac{n}{2}[4a + (4n-2)d - 2a - (n-1)d]$

$3(S_2 - S_1) = \frac{3n}{2}[2a + (3n-1)d]$

$= \frac{3n}{2}[2a + (3n-1)d] = S_3$, by definition of S_n. Here $n=3$.

$= S_3$, Proved.

Example 4 Find 'a' and 'b' if 12, $(a+b)$, $2a$, and 'b' are in A.P

Ans- As 12, $(a+b)$ and $2a$ are in A.P, so —

$$a+b = \frac{12+2a}{2} \Rightarrow a+b = 6+a \Rightarrow b = 6$$

Similarly; $(a+b)$, $2a$, b are in A.P, so —

$$2a = \frac{a+b+b}{2} = \frac{a+2b}{2} \Rightarrow 4a = a+2b \Rightarrow 3a = 2b$$

Hence, $3a = 2\times 6 = 12 \Rightarrow a = 4$.

P.T.O→

Scanned with CamScanner

Exercises: ① The sum of first 'n' terms of an A.P is $5n^2 - 8n$. Find the A.p and hence find its 15^{th} term.

② The common difference of two different A.P's is '8'. If the differenc of their 50^{th} terms is 50. What will be the difference between their 80^{th} terms.

③ In an A.P, the sum of first ten terms is -80 and the sum of next ten terms is -280. Find the A.P.

④ The sum of three numbers in A.P is 12 and the sum of their cubes is 216. Find the numbers.

⑤ Show that the sum of an AP, whose first term is a; second term is 'b' and last term is 'c' is equal to $\frac{(a+c)(b+c-2a)}{2(b-a)}$.

⑥ If the sum of first 'm' terms of an A.P is the same as the sum of its first 'n' terms $(m \neq n)$, Show that; $S_{m+n} = 0$ ie sum of its first $(m+n)^{th}$ terms is zero.

— END —

Scanned with CamScanner