

Q no 1. The series of integral multiple of 3 between 4 and 96 is

$$6 + 9 + 12 + 15 + \dots + 96$$

Here $a_1 = 6$

$$d = 9 - 6 = 12 - 9 = 3$$

$$a_n = 96$$

Since $a_n = a_1 + (n-1)d$

$$\Rightarrow 96 = 6 + (n-1)(3)$$

$$\Rightarrow 96 = 6 + 3n - 3$$

$$\Rightarrow 96 - 6 + 3 = 3n$$

$$\Rightarrow 93 = 3n \Rightarrow \boxed{n=31}$$

Now

$$S_n = \frac{n}{2} (a_1 + a_n)$$

$$\Rightarrow S_{31} = \frac{31}{2} (6 + 96)$$

$$= \frac{31}{2} (102)$$

$$= (31)(51) = 1581$$

Answer

Q no 2 i)

$$-3 + (-1) + 1 + 3 + 5 + \dots + a_{16}$$

Here $a_1 = -3$

$$d = -1 - (-3) = -1 + 3 = 2$$

$$n = 16$$

Since $S_n = \frac{n}{2} (2a_1 + (n-1)d)$

$$\Rightarrow S_{16} = \frac{16}{2} (2(-3) + (16-1)(2))$$

$$= 8 (-6 + 30)$$

$$= 8 (24) = 192$$

Answer

ii) $\frac{3}{\sqrt{2}} + 2\sqrt{2} + \frac{5}{\sqrt{2}} + \dots + a_{13}$

Here $a_1 = \frac{3}{\sqrt{2}}$

$$d = 2\sqrt{2} - \frac{3}{\sqrt{2}} = \frac{4-3}{\sqrt{2}} = \frac{1}{\sqrt{2}}$$

$$n = 13$$

Since $S_n = \frac{n}{2} (2a_1 + (n-1)d)$

$$\Rightarrow S_{13} = \frac{13}{2} (2(\frac{3}{\sqrt{2}}) + (13-1)\frac{1}{\sqrt{2}})$$

$$= \frac{13}{2} (\frac{6}{\sqrt{2}} + \frac{12}{\sqrt{2}})$$

$$= \frac{13}{2} (\frac{18}{\sqrt{2}}) = \frac{117}{\sqrt{2}} \text{ Answer}$$

iii) $1.11 + 1.41 + 1.71 + \dots + a_{10}$

Here $a_1 = 1.11$

$$d = 1.41 - 1.11 = 0.31$$

$$n = 10$$

Do yourself

iv) $-8 - 3\frac{1}{2} + 1 + \dots + a_{11}$

$$-8 - \frac{7}{2} + 1 + \dots + a_{11}$$

Here $a_1 = -8$

$$d = -\frac{7}{2} - (-8) = -\frac{7}{2} + 8$$

$$= \frac{9}{2}, n = 11$$

Now Do yourself as (i)

v) $(x-a) + (x+a) + (x+3a) + \dots$
..... to n terms

Here $a_1 = x - a$

$$d = (x+a) - (x-a)$$

$$= x+a - x+a = 2a$$

$$n = n$$

Since $S_n = \frac{n}{2} [2a_1 + (n-1)d]$

$$\Rightarrow S_n = \frac{n}{2} [2(x-a) + (n-1)(2a)]$$

$$= \frac{n}{2} [2x - 2a + 2an - 2a]$$

$$= \frac{n}{2} [2x + 2an - 4a]$$

$$= \frac{n}{2} \cdot 2 [x + an - 2a]$$

$$= n [x + (n-2)a]$$

Answer

vi) $\frac{1}{1-\sqrt{x}} + \frac{1}{1-x} + \frac{1}{1+\sqrt{x}} + \dots$ to n term

Here $a_1 = \frac{1}{1-\sqrt{x}}$

$$d = \frac{1}{1-x} - \frac{1}{1-\sqrt{x}}$$

$$= \frac{1}{(1-\sqrt{x})(1+\sqrt{x})} - \frac{1}{1-\sqrt{x}}$$

$$= \frac{1 - (1+\sqrt{x})}{(1-\sqrt{x})(1+\sqrt{x})}$$

$$= \frac{1 - 1 - \sqrt{x}}{1-x} = \frac{-\sqrt{x}}{1-x}$$

& $n = n$

Since $S_n = \frac{n}{2} [2a_1 + (n-1)d]$

$$\Rightarrow S_n = \frac{n}{2} \left[2 \cdot \frac{1}{1-\sqrt{x}} + (n-1) \cdot \left(\frac{-\sqrt{x}}{1-x} \right) \right]$$

$$= \frac{n}{2} \left[\frac{2}{1-\sqrt{x}} - \frac{\sqrt{x}(n-1)}{1-x} \right]$$

$$= \frac{n}{2} \left[\frac{2}{1-\sqrt{x}} - \frac{\sqrt{x}(n-1)}{(1-\sqrt{x})(1+\sqrt{x})} \right]$$

$$= \frac{n}{2} \left[\frac{2(1+\sqrt{x}) - \sqrt{x}(n-1)}{(1-\sqrt{x})(1+\sqrt{x})} \right]$$

$$= \frac{n}{2} \left[\frac{2 + 2\sqrt{x} - \sqrt{x}(n-1)}{1-x} \right]$$

$$= \frac{n}{2} \left[\frac{2 + (2-n+1)\sqrt{x}}{1-x} \right]$$

$$= \frac{n}{2} \left[\frac{2 + (3-n)\sqrt{x}}{1-x} \right]$$

Answer

vii) Do yourself as above

Q.No.3

$-7 + (-5) + (-3) + \dots$ amount to 65

Here $a_1 = -7$

$d = (-5) - (-7) = -5 + 7 = 2$

$S_n = 65, n = ?$

Since $S_n = \frac{n}{2} [2a_1 + (n-1)d]$

$$\Rightarrow 65 = \frac{n}{2} [2(-7) + (n-1)(2)]$$

$$\Rightarrow 130 = n(-14 + 2n - 2)$$

$$\Rightarrow 130 = n(2n - 16)$$

$$\Rightarrow 130 = 2n^2 - 16n$$

$$\Rightarrow 2n^2 - 16n - 130 = 0$$

$$\Rightarrow n^2 - 8n - 65 = 0 \text{ dividing by 2.}$$

$$\Rightarrow n^2 - 13n + 5n - 65 = 0$$

$$\Rightarrow n(n-13) + 5(n-13) = 0$$

$$\Rightarrow (n-13)(n+5) = 0$$

$$\Rightarrow n-13=0 \text{ or } n+5=0$$

$$n=13 \text{ or } n=-5$$

As n can not be -ive

so $n=13$ Answer

ii) Do yourself

Hint: you will get equation

$$3n^2 - 17n - 288 = 0$$

you may use quadratic

formula to find value of n .

Q.No.4 i)

$3+5-7+9+11-13+15+17-19+\dots$
 \dots to 3n terms

$(3+5-7) + (9+11-13) + (15+17-19) + \dots$

\dots to n terms

$1 + 7 + 13 + \dots$ to n terms

Here $a_1 = 1, d = 7-1 = 6, n = n$

Since $S_n = \frac{n}{2} [2a_1 + (n-1)d]$

$$\Rightarrow S_n = \frac{n}{2} [2(1) + (n-1)(6)]$$

$$= \frac{n}{2} [2 + 6n - 6] = \frac{n}{2} (6n - 4)$$

$$= \frac{n}{2} \cdot 2(3n - 2)$$

$$= n(3n - 2) \text{ Answer}$$

ii) Do yourself as above

Q.No.5 Since $a_r = 3r + 1$
 put $r=1$, $a_1 = 3(1) + 1 = 4$
 put $r=2$, $a_2 = 3(2) + 1 = 7$
 So $d = a_2 - a_1 = 7 - 4 = 3$
 also $n = 20$, $S_n = ?$
 Since $S_n = \frac{n}{2}(2a_1 + (n-1)d)$
 $\Rightarrow S_{20} = \frac{20}{2}(2(4) + (20-1)(3))$
 $= 10(8 + 57) = 10(65)$
 $= 650$ Answer

Q.No.6 $S_n = n(2n-1)$
 put $n=1, 2, 3, 4$
 $S_1 = 1(2(1)-1) = 1(2-1) = 1$
 $S_2 = 2(2(2)-1) = 2(4-1) = 6$
 $S_3 = 3(2(3)-1) = 3(6-1) = 15$
 $S_4 = 4(2(4)-1) = 4(8-1) = 28$

Now
 $a_1 = S_1 = 1$
 $a_2 = S_2 - S_1 = 6 - 1 = 5$
 $a_3 = S_3 - S_2 = 15 - 6 = 9$
 $a_4 = S_4 - S_3 = 28 - 15 = 13$
 hence required series is
 $1 + 5 + 9 + 13 + \dots$

Q.No.7
 Consider a_1, a_1' are the first terms and d, d' are the common differences of two series in A.P.
 Now we gave given
 $S_n : S_n' = 3n + 2 : n + 1$
 $\Rightarrow \frac{S_n}{S_n'} = \frac{3n + 2}{n + 1}$
 $\Rightarrow \frac{\frac{n}{2}(2a_1 + (n-1)d)}{\frac{n}{2}(2a_1' + (n-1)d')} = \frac{3n + 2}{n + 1}$

$$\Rightarrow \frac{2a_1 + (n-1)d}{2a_1' + (n-1)d'} = \frac{3n + 2}{n + 1}$$

$$\Rightarrow \frac{2[a_1 + (\frac{n-1}{2})d]}{2[a_1' + (\frac{n-1}{2})d']} = \frac{3n + 2}{n + 1}$$

$$\Rightarrow \frac{a_1 + (\frac{n-1}{2})d}{a_1' + (\frac{n-1}{2})d'} = \frac{3n + 2}{n + 1} \quad \text{--- (i)}$$

For 8th term
 Consider $\frac{n-1}{2} = 7$
 $\Rightarrow n-1 = 14$
 $\Rightarrow n = 14 + 1 = 15$

putting in (i)
 $\frac{a_1 + 7d}{a_1' + 7d} = \frac{3(15) + 2}{15 + 1}$

$$\Rightarrow \frac{a_8}{a_8'} = \frac{47}{16} \quad \because a_8 = a_1 + 7d$$

$$\Rightarrow a_8 : a_8' = 47 : 16 \quad \text{or } \frac{47}{16}$$

Answer

Q.No.8
 Since
 $S_2 = S_{2n} = \frac{2n}{2}(2a_1 + (2n-1)d)$ --- (i)
 $S_3 = S_{3n} = \frac{3n}{2}(2a_1 + (3n-1)d)$ --- (ii)
 $S_5 = S_{5n} = \frac{5n}{2}(2a_1 + (5n-1)d)$ --- (iii)

Now
 R.H.S = $5(S_3 - S_2)$
 ~~$= \frac{5n}{2}(2a_1 + (5n-1)d) - \frac{5n}{2}(2a_1 + (2n-1)d)$~~
 $= 5\left(\frac{3n}{2}(2a_1 + (3n-1)d) - \frac{2n}{2}(2a_1 + (2n-1)d)\right)$
 $= \frac{5n}{2}(3(2a_1 + (3n-1)d) - 2(2a_1 + (2n-1)d))$
 $= \frac{5n}{2}(6a_1 + 3(3n-1)d - 4a_1 - 2(2n-1)d)$
 $= \frac{5n}{2}(2a_1 + [3(3n-1) - 2(2n-1)]d)$
 $= \frac{5n}{2}(2a_1 + (9n - 3 - 4n + 2)d)$

$$\Rightarrow R.H.S = \frac{5n}{2}(2a_1 + (n-1)d)$$

$$= S_5 = L.H.S \text{ from (iii) } \therefore$$

hence $S_5 = 5(S_3 - S_2)$ proved

Q.No 9 The series of integers which are neither divisible by 5 nor by 2 are

1 + 3 + 7 + 9 + 11 + 13 + 17 + 19 + 21 +
 23 + 27 + 29 + + 991 + 993 + 997 + 999
 (400 terms)

(1+3+7+9) + (11+13+17+19) + (21+23+27+29) + + (991+993+997+999)
 (100 terms)

20 + 60 + 100 + + 3980 (100 terms)

here $a_1 = 20$, $d = 60 - 20 = 40$
 $n = 100$

Since $S_n = \frac{n}{2}(2a_1 + (n-1)d)$

$$\Rightarrow S_{100} = \frac{100}{2}(2(20) + (100-1)(40))$$

$$= 50(40 + 3960)$$

$$= 50(4000) = 200000$$

Answer

Q.No 10 $50S_9 = 63S_8$, $a_1 = 2$

$$\Rightarrow 50\left(\frac{9}{2}(2a_1 + (9-1)d)\right) = 63\left(\frac{8}{2}(2a_1 + (8-1)d)\right)$$

$$\Rightarrow 50\left(\frac{9}{2}(2a_1 + 8d)\right) = 63(4(2a_1 + 7d))$$

$$\Rightarrow 225(2a_1 + 8d) = 252(2a_1 + 7d)$$

$\therefore a_1 = 2$

$$\Rightarrow 225(2(2) + 8d) = 252(2(2) + 7d)$$

$$\Rightarrow 225(4 + 8d) = 252(4 + 7d)$$

$$\Rightarrow 900 + 1800d = 1008 + 1764d$$

$$\Rightarrow 1800d - 1764d = 1008 - 900$$

$$\Rightarrow 36d = 108 \Rightarrow d = \frac{108}{36} = 3$$

Now $S_9 = \frac{9}{2}(2a_1 + (9-1)d)$

$$\Rightarrow S_9 = \frac{9}{2}(2(2) + 8(3))$$

$$= \frac{9}{2}(4 + 24) = \frac{9}{2}(28)$$

$$= 126 \text{ Answer}$$

Q.No 11

Since $S_9 = 171$

$$\Rightarrow \frac{9}{2}(2a_1 + (9-1)d) = 171$$

$$\Rightarrow \frac{9}{2}(2a_1 + 8d) = 171$$

$$\Rightarrow \frac{9}{2} \cdot 2(a_1 + 4d) = 171$$

$$\Rightarrow 9a_1 + 36d = 171 \text{ --- (i)}$$

Now $a_8 = 31$

$$\Rightarrow a_1 + 7d = 31 \text{ --- (ii)}$$

Multiplying eq (ii) by 9 and subtracting from (i)

$$9a_1 + 36d = 171$$

$$- 9a_1 + 63d = 279$$

$$- 27d = -108$$

$$\Rightarrow d = \frac{-108}{-27} \Rightarrow \boxed{d = 4}$$

put $d = 4$ in eq (ii)

$$a_1 + 7(4) = 31$$

$$\Rightarrow a_1 + 28 = 31$$

$$\Rightarrow a_1 = 31 - 28 \Rightarrow \boxed{a_1 = 3}$$

Now

$$a_2 = a_1 + d = 3 + 4 = 7$$

$$a_3 = a_1 + 2d = 3 + 2(4) = 11$$

$$a_4 = a_1 + 3d = 3 + 3(4) = 15$$

hence the required series is

3 + 7 + 11 + 15 +

Q No 12 Since

$$S_9 + S_7 = 203 \text{ --- (i)}$$

also $S_9 - S_7 = 49 \text{ --- (ii)}$

adding (i) and (ii)

$$S_9 + S_7 = 203$$

$$S_9 - S_7 = 49$$

$$\hline 2S_9 = 252$$

$$\Rightarrow S_9 = 126$$

If a_1 be the first term and 'd' be the common difference then

$$\frac{9}{2} [2a_1 + (9-1)d] = 126$$

$$\Rightarrow 9(2a_1 + 8d) = 252$$

$$\Rightarrow 18a_1 + 72d = 252$$

$$\Rightarrow 18(a_1 + 4d) = 252$$

$$\Rightarrow a_1 + 4d = 14 \text{ --- (iii)}$$

Now -ing (i) and (ii)

$$S_9 + S_7 = 203$$

$$-S_9 + S_7 = -49$$

$$\hline 2S_7 = 154$$

$$\Rightarrow S_7 = 77$$

$$\Rightarrow \frac{7}{2} [2a_1 + (7-1)d] = 77$$

$$\Rightarrow 7(2a_1 + 6d) = 154$$

$$\Rightarrow 14a_1 + 42d = 154$$

$$\Rightarrow 14(a_1 + 3d) = 154$$

$$\Rightarrow a_1 + 3d = 11 \text{ --- (iv)}$$

subtracting (iii) & (iv)

$$a_1 + 4d = 14$$

$$-a_1 + 3d = 11$$

$$\hline d = 3$$

putting in (iii)

$$a_1 + 4(3) = 14$$

$$\Rightarrow a_1 + 12 = 14 \Rightarrow a_1 = 14 - 12$$

$$\Rightarrow a_1 = 2$$

Now

$$a_2 = a_1 + d = 2 + 3 = 5$$

$$a_3 = a_1 + 2d = 2 + 2(3) = 8$$

$$a_4 = a_1 + 3d = 2 + 3(3) = 11$$

Thus the required series is

$$2 + 5 + 8 + 11 + \dots$$

Q No 13

Since $\frac{S_9}{S_7} = \frac{18}{11}$

$$\Rightarrow 11S_9 = 18S_7$$

$$\Rightarrow 11 \cdot \frac{9}{2} [2a_1 + (9-1)d] = 18 \cdot \frac{7}{2} [2a_1 + (7-1)d]$$

$$\Rightarrow \frac{99}{2} [2a_1 + 8d] = 63 [2a_1 + 6d]$$

$$\Rightarrow 99a_1 + 396d = 126a_1 + 378d$$

$$\Rightarrow 99a_1 - 126a_1 = 378d - 396d$$

$$\Rightarrow -27a_1 = -18d$$

$$\Rightarrow a_1 = \frac{-18}{-27} d$$

$$\Rightarrow a_1 = \frac{2}{3} d \text{ --- (1)}$$

also

$$a_7 = 20$$

$$\Rightarrow a_1 + 6d = 20$$

putting value of a_1 in above

$$\frac{2}{3} d + 6d = 20$$

$$\Rightarrow \frac{20}{3} d = 20$$

$$\Rightarrow d = \frac{3}{20} \cdot 20 \Rightarrow \boxed{d=3}$$

putting in (1)

$$a_1 = \frac{2}{3} (3) \Rightarrow \boxed{a_1=2}$$

Now

$$a_2 = a_1 + d = 2 + 3 = 5$$

$$a_3 = a_1 + 2d = 2 + 2(3) = 8$$

$$a_4 = a_1 + 3d = 2 + 3(3) = 11$$

Thus the required series is

$$2 + 5 + 8 + 11 + \dots$$

QNo14 Let the number in A.P are $a-d, a, a+d$.

By given condition

$$a-d + a + a+d = 24$$

$$\Rightarrow 3a = 24 \Rightarrow a = 8$$

also by given condition

$$(a-d) \cdot a \cdot (a+d) = 440$$

$$\Rightarrow a(a^2 - d^2) = 440$$

putting $a=8$ in above

$$8(8^2 - d^2) = 440$$

$$\Rightarrow 8(64 - d^2) = 440$$

$$\Rightarrow 512 - 8d^2 = 440$$

$$\Rightarrow 512 - 440 = 8d^2$$

$$\Rightarrow 8d^2 = 72 \Rightarrow d^2 = \frac{72}{8}$$

$$\Rightarrow d^2 = 9 \Rightarrow d = \pm 3$$

When $a=8, d=3$

$$a-d = 8-3 = 5$$

$$a = 8$$

$$a+d = 8+3 = 11$$

When $a=8, d=-3$

$$a-d = 8-(-3) = 8+3 = 11$$

$$a = 8$$

$$a+d = 8+(-3) = 8-3 = 5$$

hence 5, 8, 11 OR 11, 8, 5 are the required number.

QNo15 Consider four numbers $a-3d, a-d, a+d, a+3d$ are in A.P then

$$a-3d + a-d + a+d + a+3d = 32$$

$$\Rightarrow 4a = 32 \Rightarrow \boxed{a = 8}$$

also

$$(a-3d)^2 + (a-d)^2 + (a+d)^2 + (a+3d)^2 = 276$$

$$\Rightarrow a^2 - 6ad + 9d^2 + a^2 - 2ad + d^2$$

$$+ a^2 + 2ad + d^2 + a^2 + 6ad + 9d^2 = 276$$

$$\Rightarrow 4a^2 + 20d^2 = 276$$

put $a=8$ in above

$$4(8)^2 + 20d^2 = 276$$

$$\Rightarrow 256 + 20d^2 = 276$$

$$\Rightarrow 20d^2 = 276 - 256$$

$$\Rightarrow 20d^2 = 20$$

$$\Rightarrow d^2 = 1 \Rightarrow d = \pm 1$$

When $a=8, d=1$

$$a-3d = 8-3(1) = 8-3 = 5$$

$$a-d = 8-(1) = 8-1 = 7$$

$$a+d = 8+(1) = 8+1 = 9$$

$$a+3d = 8+3(1) = 8+3 = 11$$

When $a=8, d=-1$

$$a-3d = 8-3(-1) = 8+3 = 11$$

$$a-d = 8-(-1) = 8+1 = 9$$

$$a+d = 8+(-1) = 8-1 = 7$$

$$a+3d = 8+3(-1) = 8-3 = 5$$

hence 5, 7, 9, 11 OR 11, 9, 7, 5 are required number.

QNo.16

Do yourself

Consider $a-2d, a-d, a, a+d$ and $a+2d$ as five number in A.P

QNo17

$$\text{Since } a_6 + a_8 = 40$$

$$\Rightarrow a_1 + 5d + a_1 + 7d = 40$$

$$\Rightarrow 2a_1 + 12d = 40$$

$$\Rightarrow 2(a_1 + 6d) = 40$$

$$\Rightarrow a_1 + 6d = 20 \text{ --- (i)}$$

Also

$$a_4 \cdot a_7 = 220$$

$$\Rightarrow (a_1 + 3d)(a_1 + 6d) = 220$$

$$\Rightarrow (a_1 + 3d)(20) = 220 \text{ From (i)}$$

$$\Rightarrow a_1 + 3d = \frac{220}{20}$$

$$\Rightarrow a_1 + 3d = 11 \text{ --- (ii)}$$

Subtracting (i) & (ii)

$$a_1 + 6d = 20$$

$$a_1 + 3d = 11$$

$$3d = 9 \Rightarrow d = 3$$

putting in (ii)

$$a_1 + 3(3) = 11$$

$$a_1 + 9 = 11 \Rightarrow a_1 = 11 - 9$$

$$\Rightarrow a_1 = 2$$

Now

$$a_2 = a_1 + d = 2 + 3 = 5$$

$$a_3 = a_1 + 2d = 2 + 2(3) = 8$$

$$a_4 = a_1 + 3d = 2 + 3(3) = 11$$

Thus the required A.P. is

$$2, 5, 8, 11, \dots$$

Q.No. 18

Since a^2, b^2, c^2 are in A.P.

therefore

$$b^2 - a^2 = c^2 - b^2$$

$$\Rightarrow (b-a)(b+a) = (c-b)(c+b) \quad \text{--- (i)}$$

Now to show $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are in A.P. Consider

$$d = \frac{1}{c+a} - \frac{1}{b+c}$$

$$= \frac{b+c - c-a}{(c+a)(b+c)}$$

$$\Rightarrow d = \frac{b-a}{(c+a)(b+c)} \quad \text{--- (ii)}$$

Also

$$d = \frac{1}{a+b} - \frac{1}{c+a}$$

$$= \frac{c+a - a-b}{(a+b)(c+a)}$$

$$= \frac{c-b}{(a+b)(c+a)}$$

From eq (i) $\frac{(b-a)(b+a)}{(c+b)} = c-b$

putting in above

$$d = \frac{(b-a)(b+a)}{(c+b)}$$

$$= \frac{(b-a)(b+a)}{(a+b)(c+a)}$$

$$= \frac{(b-a)(b+a)}{(c+b)(a+b)(c+a)}$$

$$= \frac{b-a}{(c+b)(c+a)}$$

$$\Rightarrow d = \frac{b-a}{(c+a)(b+c)} \quad \text{--- (iii)}$$

From (ii) and (iii)

$$d = d$$

hence $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$

are in A.P.

Q.No. 8 (Ex 6.3)

Let $A_1, A_2, A_3, \dots, A_n$ be the n A.Ms between a & b .

Then $a, A_1, A_2, A_3, \dots, A_n, b$ are in A.P.

Here $a_1 = a$

$$a_{n+2} = b$$

$$\Rightarrow a_1 + (n+2-1)d = b$$

$$\Rightarrow a_1 + (n+1)d = b$$

$$\Rightarrow (n+1)d = b - a$$

$$\Rightarrow d = \frac{b-a}{n+1}$$

Now

$$A_1 = a_2 = a_1 + d = a + \frac{b-a}{n+1}$$

$$A_2 = a_3 = a_1 + 2d = a + 2 \left(\frac{b-a}{n+1} \right)$$

$$A_3 = a_4 = a_1 + 3d = a + 3 \left(\frac{b-a}{n+1} \right)$$

$$A_n = a_{n+1} = a_1 + nd = a + n \left(\frac{b-a}{n+1} \right)$$

P.T.O



Now Sum of n A.Ms

$$= A_1 + A_2 + A_3 + \dots + A_n$$

$$= a + \frac{b-a}{n+1} + a + 2\left(\frac{b-a}{n+1}\right) + a + 3\left(\frac{b-a}{n+1}\right)$$

$$+ \dots + a + n\left(\frac{b-a}{n+1}\right)$$

$$= (a+a+a+\dots+a) + \frac{b-a}{n+1} + 2\left(\frac{b-a}{n+1}\right)$$

$$+ 3\left(\frac{b-a}{n+1}\right) + \dots + n\left(\frac{b-a}{n+1}\right)$$

$$= na + \frac{b-a}{n+1} (1+2+3+\dots+n)$$

$$a_1=1, d=2-1=1, n=n$$

$$= na + \frac{b-a}{n+1} \left[\frac{n}{2} (2 + (n-1)(1)) \right]$$

$$= na + \frac{b-a}{n+1} \left[\frac{n}{2} (2+n-1) \right]$$

$$= na + \frac{b-a}{n+1} \left[\frac{n}{2} (n+1) \right]$$

$$= na + (b-a) \left(\frac{n}{2} \right)$$

$$= n \left(a + \frac{b-a}{2} \right)$$

$$= n \left(\frac{2a+b-a}{2} \right)$$

$$= n \left(\frac{a+b}{2} \right)$$

$$= n (\text{A.Ms between } a \text{ \& } b)$$

Hence sum of n A.Ms between a & b is n times their A.Ms.
 proved

End

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