Nishant Jindal

Khushiyan hi Khushiyan (L-3)

$$(5)^{2+4+6+\cdots 2x} = \left(\frac{100}{4}\right)^{28}$$

$$(5)^{2(1+2+3\cdots x)} = (5)^{56}$$

$$\cancel{2}(1+2+3+\cdots x) = \cancel{56}\,28$$

$$\frac{(x)(x+1)}{2} = 28$$

$$x^2+x-56=0$$

$$(x+8)(x-7)=0$$

$$\underline{x=7}$$

16 (1) Sum of 4 No. of AP = 1

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

$$4a=1 \Rightarrow a=\frac{1}{4}$$

(2) Sum of sq^n of those No = .3

$$\left(\frac{1}{4}-3d\right)^2+\left(\frac{1}{4}-d\right)^2+\left(\frac{1}{4}+d\right)^2+\left(\frac{1}{4}+3d\right)^2 = .3$$

$$4\times\frac{1}{16}+2\times 9d^2+2d^2 = \frac{3}{10}$$

$$20d^2 = \frac{3}{10}-\frac{1}{4} = \frac{12-10}{40} = \frac{2}{40} = \frac{1}{20}$$

$$d = \pm\frac{1}{20}$$

No = $a-3d, a-d, a+d, a+3d$

$= \frac{1}{4}-\frac{3}{20}, \frac{1}{4}-\frac{1}{20}, \frac{1}{4}+\frac{1}{20}, \frac{1}{4}+\frac{3}{20}$

Q 17 1) $a+(a+d)+(a+2d)+\dots+(a+11d)=354$

$12a+d(1+2+3+\dots+11)=354$

$12a+\frac{11\times\cancel{12}^{6}}{\cancel{2}}d=354$

$12a+66d=354 \rightarrow (A) \Rightarrow 12a+165a=354 \Rightarrow \cancel{177}a=\cancel{354}^{2}$

$\boxed{a=2}$

$\boxed{21-25}$

(2) $\frac{\overset{T_2}{(a+d)}+\overset{T_4}{(a+3d)}+\overset{T_6}{(a+5d)}+(a+7d)+(a+9d)+(a+11d)}{a+(a+2d)+(a+4d)+(a+6d)+(a+8d)+(a+10d)}=\frac{32}{27}$

$d=\frac{10}{2}=5$

$\frac{6a+d(1+3+5+7+9+11)}{6a+d(2+4+6+8+10)}=\frac{32}{27}$

$19, 20$, $\boxed{29}$

Milta Julta

$\frac{\cancel{6}a+\cancel{36}^{6}d}{\cancel{6}a+\cancel{30}_{5}d}=\frac{32}{27} \Rightarrow 27a+162d=32a+160d$

$2d=5a$

Nishant Jindal

Q If $\frac{b+c-a}{a}, \frac{a+c-b}{b}, \frac{a+b-c}{c}$ are in AP.

then P.T $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are also in AP

$\frac{b+c-a}{a}, \frac{a+c-b}{b}, \frac{a+b-c}{c} \rightarrow AP.$

$\frac{b+c-a}{a}+2, \frac{a+c-b}{b}+2, \frac{a+b-c}{c}+2$ AP

$\frac{a+b+c}{a}, \frac{a+b+c}{b}, \frac{a+b+c}{c} \rightarrow AP \div (a+b+c)$

$\frac{1}{a}, \frac{1}{b}, \frac{1}{c} \rightarrow AP$

[J.I.P.]

Q Sum of 1st 24 terms of an AP, $a_1, a_2, a_3 - - a_{24}$

if it is known that

$a_1+a_5+a_{10}+a_{15}+a_{20}+a_{24}=225$

then Sum?

$a_1+a_2+a_3+a_4+a_5 \;/\;/\; a_{20}+a_{21}+a_{22}+a_{23}+a_{24}$

$a_1+a_5^{5}+a_{10}^{10}+a_{15}^{10}+a_{20}^{5}+a_{24}=225$

$K+K+K=225 \Rightarrow 3K=225$

$K=75$

$a_1+a_{24}=75$

$Sum=\frac{24}{2}[a_1+a_{24}]=12\times 75=900$

Nishant Jindal

Q Sum of n term of seq^n is given by
$S_n = 2n^2+3n$ then 50th term = ?

$T_{50} = S_{50} - S_{49}$

$= \left(2(50)^2+3\times 50\right) - \left(2\times(49)^2+3\times 49\right)$

$= 2(50^2-49^2)+3(50-49)$

$= 2\underline{(50-49)}\times(50+49)+3\times 1$

$= 198+3 = 201$

Q $a_1 a_2 a_3 \ldots a_n$ are in AP

& $a_1+a_4+a_7+\ldots+a_{16}=114$

find $\underline{a_1+a_6+a_{11}+a_{16}} = ?$

$a_1+a_4+a_7+a_{10}+a_{13}+a_{16}=114$

$K+K+K = 114$

$3K = 114 \Rightarrow K = 38$

Demand $= a_1+a_6+a_{11}+a_{16}$

$= K+K$

$= 2K = \underline{\underline{76}}$ A

Nishant Jindal

Q If Roots of $x^3-12x^2+39x-28=0$ are in AP then find C.D. = d = ?

SOR $= -\frac{b}{a}$

α SORT2AT $= \frac{c}{a}$

POR $= -\frac{d}{a}$

$x^3-12x^2+39x-28=0 \to \alpha, \beta, \gamma$

$\alpha, \beta, \gamma \to$ AP

$a-d,\ a,\ a+d$ as Sum is known

SOR $=(a-d)+(a)+(a+d) = -\frac{(-12)}{1} = 12$

$3a = 12 \Rightarrow \boxed{a=4}$

POR $= (4-d)(4)(4+d) = -\frac{d}{a} = -\frac{(-28)}{1} = 28 \; 7$

$16-d^2 = 7$

$\Rightarrow d^2 = 9 \Rightarrow \boxed{d=3}, -3$

$d=3$

$\alpha, \beta, \gamma = 4-3, 4, 4+3 \Rightarrow 1, 4, 7$

$d=-3$

$= 4+3, 4, 4-3 = 7, 4, 1$

Q If in an AP Sum of 1st p terms is equal to sum of 1st q terms then Sum of (p+q) terms.

① $S_p = S_q$

$\frac{p}{2}[2a+(p-1)d] = \frac{q}{2}[2a+(q-1)d]$

$ap+(p^2-p)\frac{d}{2} = aq+(q^2-q)\frac{d}{2}$

$a(p-q)+\frac{d}{2}(p^2-p-q^2+q)=0$

$a(p-q)+\frac{d}{2}((p-q)(p+q)-1(p-q))=0$

$\cancel{(p-q)}\left[a+\frac{d}{2}(p+q-1)\right]=0 \Rightarrow 2a+(p+q-1)d=0$

② Demand: $S_{p+q} = \frac{p+q}{2}[\cancel{2a+(p+q-1)d}]$

$= 0$

Nishant Jindal (19-3P)

Q If 7^{th} term of an AP is 9 then find Com diff of an AP such that value of $t_1 \cdot t_2 \cdot t_7$ is Min?

Imp

$t_7 = 9$ $\quad$ C.D $= x$

$t_7 = 9$
$t_6 = 9 - x$
$t_5 = 9 - 2x$
$t_4 = 9 - 3x$
$t_3 = 9 - 4x$
$t_2 = 9 - 5x$
$t_1 = 9 - 6x$

$Z = t_1 \cdot t_2 \cdot t_7$

$Z = (9-6x)\cdot(9-5x)\cdot 9$

$Z = 9(81 - 54x - 45x + 30x^2)$

$Z = 9(30x^2 - 99x + 81)$

$\frac{dz}{dx} = 9[60x - 99] = 0$

$\boxed{x = \frac{99}{60} = \frac{33}{20}}$

$Z = 9\left(9 - 6\times\frac{33}{20}\right)\left(9 - \frac{5\times 33}{20}\right)$ ✗

Q If Ratio of Sum of m terms to n terms of an AP is $\frac{m^2}{n^2}$ then Ratio of m terms to n terms = ?

given $\frac{S_m}{S_n} = \frac{m^2}{n^2}$

Demand $= \frac{T_m}{T_n}$

① $\frac{S_m}{m^2} = \frac{S_n}{n^2} = K$

$\Rightarrow S_m = Km^2 \;\&\; S_n = Kn^2$

② Demand $= \frac{T_m}{T_n} = \frac{S_m - S_{m-1}}{S_n - S_{n-1}} = \frac{Km^2 - K(m-1)^2}{Kn^2 - K(n-1)^2}$

$= \frac{m^2 - (m-1)^2}{n^2 - (n-1)^2} = \frac{\cancel{m^2} - (\cancel{m^2} - 2m + 1)}{\cancel{n^2} - (\cancel{n^2} - 2n + 1)}$

$= \frac{2m-1}{2n-1}$ Ans

Nishant Jindal

Result $\dfrac{S_m}{S_n} = \dfrac{f(m)}{f(n)}$

$$\boxed{\frac{S_m}{S_n} = \frac{m^2}{n^2} \Rightarrow \frac{T_m}{T_n} = \frac{2m-1}{2n-1}}$$

Q If Ratio of Sum of $\underline{n}$ terms of 2 different AP is $\dfrac{7n+1}{4n+27}$. Find the Ratio of 11^{th} term.

given $\dfrac{S_n}{S_n'} = \dfrac{7n+1}{4n+27}$

Demand $\dfrac{T_{11}}{T_{11}'} =$

① $\dfrac{S_n}{S_n'} = \dfrac{7n^2+n}{4n^2+27n}$

② $\dfrac{T_{11}}{T_{11}'} = \dfrac{S_{11}-S_{10}}{S_{11}'-S_{10}'} = \dfrac{(7\times11^2+11)-(7\times10^2+10)}{(4\times11^2+27\times11)-(4\times10^2+27\times10)} = \dfrac{7(11^2-10^2)+(11-10)}{4(11^2-10^2)+27(11-10)} = \dfrac{148}{111} = \dfrac{4}{3}$

Shortway.

$\dfrac{T_{11}}{T_{11}'} = \dfrac{7(2n-1)+1}{4(2n-1)+27} = \dfrac{14n-6}{8n+23} = \dfrac{14\times11+6}{8\times11+23}$

$= \dfrac{148}{111} = \dfrac{4}{3}.$

Nishant Jindal

Q If $a_1 a_2 \dots a_n$ are in AP & if

$$\frac{(a_1+a_2+\dots+a_p)}{a_1+a_2+\dots+a_q} = \frac{p^2}{q^2} \text{ then } \frac{a_6}{a_{21}}?$$

1) given $\frac{S_p}{S_q} = \frac{p^2}{q^2}$

2) Demand $= \frac{T_6}{T_{21}} = \frac{2p-1}{2q-1} = \frac{2\times6-1}{2\times21-1}$

$= \frac{11}{41}$

Q Let $a_1 a_2 a_3 \dots a_{100}$ is in AP, $a_1 = 3$, $S_p = \sum_{i=1}^{p} a_i$

Adv.

& $1 \le p \le 100$ for any Int. n such that

$1 \le n \le 20$. Let $m = 5n$. If $\frac{S_m}{S_n}$ is independent

of n then $a_2 = ?$

$$\frac{S_m}{S_n} = \frac{\frac{m}{\cancel{2}}[2\times3+(m-1)d]}{\frac{n}{\cancel{2}}[2\times3+(n-1)d]} = \frac{5\cancel{n}[6+5nd-d]}{\cancel{n}[6+nd-d]}$$

$$= \frac{5[(6-d)+5nd]}{[6-d+nd]}$$

$$= 5\frac{(5\cancel{nd})}{(\cancel{nd})}$$

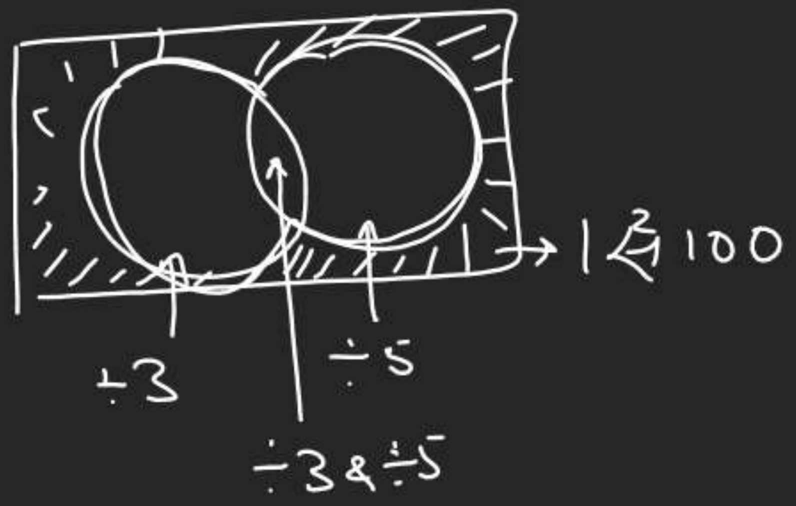
If $6-d=0 \Rightarrow \boxed{d=6}$

$a_2 = a_1 + d$

$= 3+6$

$= 9$

Q Find Sum of all Integers from 1 to 100 which are niether div. by 3 nor by 5.



HW|

Q 1-18

153
153
1683
1050
2733

2433

2

$$(1+2+3+\dots+100)-\{S_{\div 3}+S_{\div 5}-S_{\div 3 \& \div 5}\}$$

$$-\{(3+6+9+\dots-99)+(5+10+15--100)-(15+30+45+\ \ 90)\}$$

$$-\left\{\frac{33}{2}(3+99)+\frac{\cancel{20}^{10}}{\cancel{2}}(5+100)-\frac{\cancel{6}^{3}}{\cancel{2}}(15+90)\right\}$$

5050 $\quad -\{33\times 51+1050-315\}=5050-2418=\underline{2632}$