Nishant Jindal

Khushiyan hi Khushiyan

HW1

Q1 ✓

Q2 ✓

Module

Flipkart → Aman → 379

F Module

Q3 $\log_4 2 + \log_4 4 + \log_4 8 + \cdots + \log_4 2^n$

Q4 ✓

Q5 ✓

Q6 ✓

Q7 ✓

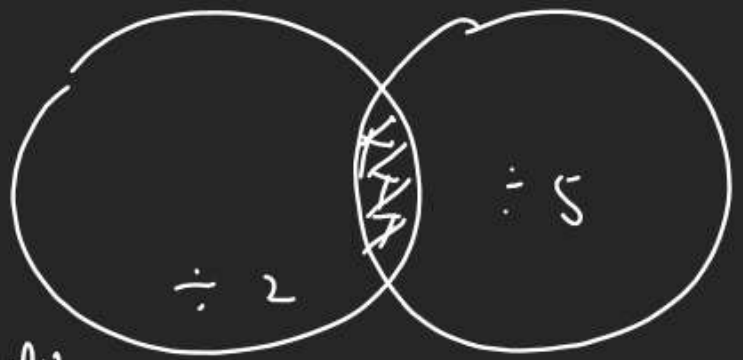
$$= \log_4 \{2 \times 4 \times 8 \times \cdots \times 2^n\}$$

$$= \log_4 \{2^1 \cdot 2^2 \cdot 2^3 \cdots 2^n\}$$

$$= \log_4 \{2^{(1+2+3+\cdots n)}\}$$

$$= \frac{(1+2+3+\cdots+n)}{2} \cancel{\log_4 2} = \frac{(n)(n+1)}{4}$$

Q5



$$\{2+4+6+\cdots+100\} + \{5+10+\cdots+100\}$$

$$-2\{10+20+\cdots 100\}$$

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Q 8 If 1, 2, 3 ... are 1st terms, 1, 3, 5 ... are com. diff & $S_1, S_2, S_3 ...$ are sum of n terms of p APs then $S_1+S_2+S_3+...+S_p = ?$

S_1 = Sum of n term of an AP whose 1st term = 1 & d = 1

S_2 = ——— = 2 & d = 3

S_3 = ——— = 3 & d = 5

⋮

S_p = ——— = p & d = (2p−1)

$S_1 = \frac{n}{2}[2\times1+(n-1)\times1]$

$S_2 = \frac{n}{2}[2\times2+(n-1)\times3]$

$S_3 = \frac{n}{2}[2\times3+(n-1)\times5]$

⋮

$S_p = \frac{n}{2}[2\times p+(n-1)\times(2p-1)]$

$S_1+S_2+...+S_p = \frac{n}{2}[2\times(1+2+3+...p)+(n-1)(1+3+5...(2p-1))]$

$= \frac{n}{2}\left[\cancel{2}\times\frac{p(p+1)}{\cancel{2}}+(n-1)p^2\right]$

$= \frac{n}{2}[\cancel{p^2}+p+np^2-\cancel{p^2}] = \frac{np}{2}[np+1]$ Ans

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Add

Q9 If $a_1, a_2, a_3 - - -$ are in AP with C.D $= d \neq 0$ then the Sum of Series.

$$\sin d \left[\operatorname{cosec} a_1 \cdot \operatorname{cosec} a_2 + \operatorname{cosec} a_2 \cdot \operatorname{cosec} a_3 + - - - + \operatorname{cosec} a_{n-1} \cdot \operatorname{cosec} a_n\right]$$

Sol $d = a_2 - a_1 = a_3 - a_2 = a_4 - a_3 = - - -$

$$\frac{\sin d}{\sin a_1 \cdot \sin a_2} + \frac{\sin d}{\sin a_2 \cdot \sin a_3} + \frac{\sin d}{\sin a_3 \cdot \sin a_4} + - - - + \frac{\sin d}{\sin a_{n-1} \sin a_n}$$

$$\frac{\sin(a_2 - a_1)}{\sin a_1 \cdot \sin a_2} + \frac{\sin(a_3 - a_2)}{\sin a_2 \cdot \sin a_3} + \frac{\sin(a_4 - a_3)}{\sin a_3 \cdot \sin a_4} + - \quad + \frac{\sin(a_n - a_{n-1})}{\sin a_{n-1} \cdot \sin a_n}$$

$$\frac{\cancel{\sin a_2} \cdot \cos a_1}{\sin a_1 \cancel{\sin a_2}} - \frac{\cos a_2 \cancel{\sin a_1}}{\cancel{\sin a_1} \cdot \sin a_2} + \frac{\cancel{\sin a_3} \cos a_2}{\sin a_2 \cancel{\sin a_3}} - \frac{\cos a_3 \cdot \cancel{\sin a_2}}{\cancel{\sin a_2} \cdot \sin a_3} + - - + \frac{\cancel{\sin a_n} \cos a_{n-1}}{\sin a_{n-1} \cancel{\sin a_n}} - \frac{\cos a_n \cdot \cancel{\sin a_{n-1}}}{\cancel{\sin a_{n-1}} \sin a_n}$$

$$\cot a_1 - \cancel{\cot a_2} + \cancel{\cot a_2} - \cancel{\cot a_3} + \cancel{\cot a_3} - \cot a_4 + - - \cancel{+} \cancel{\cot a_{n-1}} - \cot a_n = \cot a_1 - \cot a_n$$

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let

(1) $a^2(b+c),\ b^2(c+a),\ c^2(a+b)$ AP

Q16 ✓ $b^2(c+a) - a^2(b+c) = c^2(a+b) - b^2(c+a)$

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

$c(b^2-a^2) + ba(b-a) = a(c^2-b^2) + bc(c-b)$

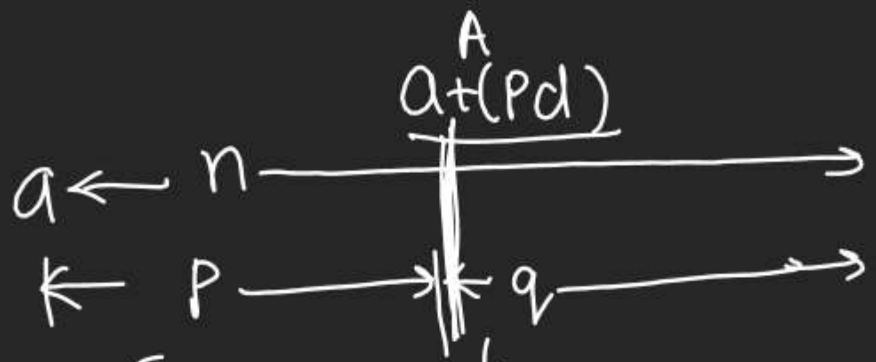
$(b-a)\{\cancel{c(b+a)+ba}\} = (c-b)\{\cancel{ac+ab+bc}\}$

$b-a = c-b$

$2b = a+c$

$a, b, c \to$ AP

Q15



$\leftarrow S_p = 0 \rightarrow 0$

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

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

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

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$$\xleftarrow{\quad 1500 \quad}\Big|\ \overleftrightarrow{\ 148+146+144 - - \cdot\ }^{\,3000}$$

$$148+146+144+142+ - - - n = \underline{3000}$$

$$\frac{n}{2}\left[296+(n-1)(-2)\right] = 3000$$

Q Eq $\rightarrow n = ?$

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L-5

Q Supp that all term of AP are Natural No. → C.D = Natural

Adv 2015 If Ratio of 1st 7 terms to sum of 1st 11 terms in 6 : 11 & 7th term lies betn 130 to 140 then C.D. = ?

$$\frac{S_7}{S_{11}} = \frac{6}{11} \Rightarrow \frac{\frac{7}{2}[2a+6d]}{\frac{11}{2}[2a+10d]} = \frac{6}{11}$$

$$\Rightarrow 14a + 42d = 12a + 60d$$

$$2a = 18d \Rightarrow a = 9d$$

$$130 < T_7 < 140$$

$$130 < a + 6d < 140$$

$$130 < 15d < 140$$

$$8.\ldots < d < 9.\ldots$$

$$\boxed{d = 9}$$

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$1\,Br = 1 \to 1^3 \quad 3 \to 27 = (3)^3$

$2 \quad = 8 = (2)^3$

Q Show that Sum of all terms of n^{th} Bracket of $(\boxed{1}), (\boxed{3,5}), (7,9,11) \ldots$ is?

1st Br, 2nd Br, 3rd Br

$(1), (3,5), (7,9,11), (13,15,17,19) \ldots (n^2-n+1, n^2-n+3 \ldots)$

3 terms, 4 terms, n term

Sum → 1st term
↳ No of term $= n$
↳ Com diff $= 2$

1st term $= 1$

2nd Br $= 3$

3rd Br $= 7$

4th Br $= 13$

5 Br $= 21$

$$\text{Sum} = \frac{n}{\cancel{2}}\left[\cancel{2}(n^2-n+1) + (n-1)\cdot\cancel{2}\right]$$

$$= n\left[n^2 - \cancel{n} + \cancel{1} + \cancel{n} - \cancel{1}\right]$$

$$\underline{\text{Sum} = n^3}$$

1

3 5

7 9 11

13 15 17 19

Video Dubara Dekhna

$$S = \overbrace{1 + 3 + 7 + 13 + 21 \ldots T_n}^{\leftarrow n\ \text{terms} \rightarrow}$$

$$S = \quad 1 + 3 + 7 + 13 \quad T_{n-1} + T_n$$

$$0 = 1 + \underbrace{\{2 + 4 + 6 + 8 + \ldots + \}}_{\leftarrow (n-1)\ \text{terms}} - T_n$$

$$T_n = 1 + 2\{1+2+3+4 \ldots (n-1)\} \Rightarrow T_n = 1 + \cancel{2}\left(\frac{(n-1)(n-\cancel{1}+\cancel{1})}{\cancel{2}}\right) = 1 + n^2 - n$$

$$= n^2 - n + 1$$

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Q If Ratio of Sum of n terms of 2 different AP is $\frac{3n-11}{5n+21}$ find d Ratio of 24^{th} terms?

$$\frac{S_n}{S_n'} = \frac{3n-11}{5n+21}$$

$$\frac{T_n}{T_n'} = \frac{3(2n-1)-11}{5(2n-1)+21}$$

$$\frac{T_n}{T_n'} = \frac{6n-14}{10n+16}$$

$$\frac{T_{24}}{T_{24}'} = \frac{6\times24-14}{10\times24+16} = \frac{130}{256} = \frac{65}{128}$$

Q. Supp $a_1, a_2, a_3 \dots a_n$ are in AP & S_K denotes Sum of 1^{st} K terms. If $\frac{S_m}{S_n} = \frac{m^4}{n^4}$ find $\frac{a_{m+1}}{a_{n+1}} = ?$

$$\frac{S_m}{S_n} = \frac{m^4}{n^4} \Rightarrow \frac{a_m}{a_n} = \frac{(2m-1)^3}{(2n-1)^3}$$

$$\frac{a_{m+1}}{a_{n+1}} = \frac{(2(m+1)-1)^3}{(2(n+1)-1)^3}$$

$$= \left(\frac{2m+1}{2n+1}\right)^3 \text{ Ans}$$

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Geometric Progression [G.P.]

It is a Seqⁿ of non Zero No. in which ratio of any term to the term preceeding is always constant & this Constant Ratio is know as Com. Ratio of this G.P.

$$\overset{2}{\frown}\ \overset{2}{\frown}\ \overset{2}{\frown}\ \overset{2}{\frown}$$

$2, 4, 8, 16, 32 - - - -$

$2, 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8} - - - -$

$\div 2 \quad \div 2 \quad \div 2 \quad \div 2 - - - -$

$\frac{4}{2} = \frac{8}{4} = \frac{16}{8} = \frac{32}{16}$

1) If $a_1, a_2, a_3, a_4 - - - a_n$ GP.

$$\boxed{\frac{a_2}{a_1} = \frac{a_3}{a_2} = \frac{a_4}{a_3} = - - - = \frac{a_n}{a_{n-1}} = C.R. = r}$$

2) G.P. when C.R. = r.

$a, ar, \underbrace{\boxed{ar^2}}_{T_3}, \underbrace{\boxed{ar^3}}_{T_4} - - - \underbrace{\boxed{a\,r^{n-1}}}_{T_n}$

3) n^{th} term $= T_n = a \cdot r^{n-1}$

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Q let $a_1, a_2, a_3 \ldots a_{10}$ are in GP. If $\frac{a_3}{a_1} = 25$

Mains

then $\frac{a_9}{a_5} = ?$

$$\frac{a_3}{a_1} = \frac{ar^2}{\cancel{a}} = 25 \Rightarrow r^2 = 25$$

$$r = 5, -5$$

Demand $\frac{a_9}{a_5} = \frac{\cancel{a}r^8}{\cancel{a}r^4} = r^4$

$$= (25)^2$$

$$= 625$$

Q The $4^{th}, 7^{th}$, Last term of GP are $10, 80, 2560$

Find 1^{st} term & No. of terms?

1) $T_4 = \boxed{ar^3 = 10}$

$T_7 = ar^6 = 80$

$\frac{T_7}{T_4} = \frac{a\cancel{r^6}^{\,r^3}}{\cancel{ar^3}} = \frac{8\cancel{0}}{1\cancel{0}} = 8 \Rightarrow \boxed{r = 2}$

$a \cdot 2^3 = 10$

$a = \frac{10}{8} = \frac{5}{4}$

No of terms $= 12$

2) Last term $= n^{th}$ term $= ar^{n-1}$

$$\frac{\cancel{5}}{4} \cdot (2)^{n-1} = \overset{512}{\cancel{2560}}$$

$$(2)^{n-1} = 2^9 \times 2^2$$

$$(2)^{n-1} = 2^{11}$$

$$n - 1 = 11 \Rightarrow \boxed{n = 12}$$

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Q If 5th term of GP is 2, then Prod of 1st 9 terms?

$T_5 = ar^4 = 2$

Prod of 1st 9 terms $= T_1 \times T_2 \times T_3 \times \ldots \times T_9$

$= a \times ar \times ar^2 \times ar^3 \times \ldots ar^8$

$= a^9 (r)^{1+2+3+\ldots 8}$

$= a^9 (r)^{\frac{\cancel{8}^{4} \times 9}{\cancel{2}}}$

$= a^9 . r^{36} = (ar^4)^9$

$= 2^9 = \underline{\underline{512}}$

Q Let $\{a_n\}$ be in GP Such that $\dfrac{a_4}{a_6} = \dfrac{1}{4}$

& $a_2 + a_5 = 216$ then $a_1 = ?$

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