Nishant Jindal

Prilabko.

1.12 Progression.

$\boxed{2-29}$

Q4 Find Sum of 20 terms of AP if 2st term is 2 & 7th is 20.

$a=2,\quad T_7=a+6d=20$

$6d=20-2$

$6d=18$

$d=3$

$S_{20}=\frac{\cancel{20}^{10}}{\cancel{2}}\left[2\times2+(20-1)\times3\right]$

610

Q5 Find 1st term & difference of AP if Sum of 1st 5 terms is equal to 15 & Sum of 1st 3 terms = -3.

$a=?\quad d=?$

$S_5=a+(a+d)+(a+2d)+(a+3d)+(a+4d)=15$

$5a+10d=15$

$a+2d=3\rightarrow(1)$

$S_3=a+(a+d)+(a+2d)=-3$

$3a+3d=-3.$

$a+d=-1\rightarrow(2)$

$a+2d=3\rightarrow(1)$

$-d=-4\Rightarrow\boxed{d=4}$

$a+4=-1$

$\boxed{a=-5}$

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Q10 How many terms of an AP must be taken for their Sum to be equal to 91, if its 3rd term is 9 & difference betn 7th & 2nd term is 20?

let 1) Sum of n terms = 91

$S_n = 91$

$\frac{n}{\cancel{2}}[\cancel{2}\times 1+(n-1)\overset{2}{\cancel{4}}] = 91$

$n + 2n^2 - 2n = 91$

$2n^2 - n - 91 = 0$

$2n^2 - 14n + 13n - 91 = 0$

$2n(n-7) + 13(n-7) = 0$

$n = 7, \; \frac{-13}{2} \times$

2) $a + 2d = 9$

(3) $(a+6d) - (a+d) = 20$

$5d = 20$

$\boxed{d = 4}$

$\boxed{a = 1}$

Q8 Sum of sqr of 5th & 11th term of an AP is 3 & Prod of 2nd by 14th = K Find the Prod of 1st by 15th of this Progession.

1) $(a+4d)^2 + (a+10d)^2 = 3$

$2a^2 + 116d^2 + 28ad = 3$

2) $(a+d)\times(a+13d) = K$

$a^2 + 14ad + 13d^2 = K \times 2$

$a^2 + 14ad = 2K - 26d^2$

$2a^2 + 28ad + 26d^2 = 2K$

less $\quad 90d^2 = 3 - 2K$

(3) $a\times(a+14d) = a^2 + 14ad$

$= 2K - 26\left(\frac{3-2K}{90}\right)$

Khushiyan Hi Kushiyan!!

Q Sum of 1st 2n terms of an AP 2, 5, 8 - - - is equal to sum of 1st n terms of AP 57, 59, 61 - - - then n = ?

Sum of 1st 2n terms of AP_1 = Sum of 1st n terms of AP_2

$$\frac{2n}{\cancel{2}}\left[2\cdot 2+(2n-1)\times 3\right] = \frac{n}{2}\left[2\times 57+(n-1)\times 2\right]$$

$$8+12n-6 = 114+2n-2$$

$$10n = 110$$

$$n = 11$$

Q How many terms of series $54+51+48+45 - - -$ have sum $= 513$.

let Sum of n terms $= 513$.

$$\frac{n}{2}\left[2\times 54+(n-1)\times(-3)\right] = 513$$

$$108n-3n^2+3n = 1026$$

$$3n^2-111n+1026 = 0$$

$$n^2-37n+342 = 0$$

$$(n-18)(n-19) = 0$$

$$n = 18, 19$$

Both answer correct

$4+3+2+1 = 10$
← 4 term →

$4+3+2+1+0 = 10$
← 5 term →

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Q In an AP sum of 1st 4 terms = 56.

& Sum of last 4 terms = 112, if $a = 11$

find No of terms in AP.

1) $a+(a+d)+(a+2d)+(a+3d)=56.$

$4a+6d=56$

$2a+3d=28 \rightarrow (1)$

$3d=28-22=6 \Rightarrow d=2$

2) $l+(l-d)+(l-2d)+(l-3d)=112$

$4l-6d=112$

$2l-3d=56. \rightarrow (2)$

$2l=56+3\times 2=62$

$l=31$

$n=\frac{l-a}{d}+1=\frac{31-11}{2}+1=11$

Q Find Sum of series.

$1^2-2^2+3^2-4^2+5^2-6^2+7^2 - \cdots - 2002^2+2003^2=?$

$1+(3^2-2^2)+(5^2-4^2)+(7^2-6^2) \cdots (2003^2-2002^2)$

$1+(3-2)(3+2)+(5-4)(5+4)+(7-6)(7+6) \cdots (2003-2002)(2003+2002)$

$1+5+9+13+17 \cdots 4005$

$n=\frac{4005-1}{4}+1=1001+1=1002$

$\therefore S_n=\frac{1002}{2}[1+4005]$

$=1002\times 2003$

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Q let $S_n=\sum_{K=1}^{4n}(-1)^{\frac{(K)(K+1)}{2}}\cdot K^2$ then S_n can be 1056 1088 1120 1332.

$S_n=(-1)^{\frac{1\times2}{2}}(1)^2+(-1)^{\frac{2\times3}{2}}\cdot2^2+(-1)^{\frac{3\times4}{2}}3^2+(-1)^{\frac{4\times5}{2}}4^2+(-1)^{\frac{5\times6}{2}}5^2+(-1)^{\frac{6\times7}{2}}(6)^2+\cdots+(-1)^{\frac{(4n)(4n+1)}{2}}\cdot(4n)^2$

← 4n तक →

-1×1^2

$S_n=(-1)^1\cdot(1)^2+(-1)^3 2^2+(-1)^6\cdot3^2+(-1)^{10}\cdot4^2+(-1)^{15}5^2+(-1)^{21}\cdot6^2+\cdots$

$S_n=-1^2-2^2+3^2+4^2-5^2-6^2+7^2+8^2-9^2-10^2+11^2+12^2-13^2-14^2+15^2+16^2-\cdots$

$=(3^2-1^2)+(4^2-2^2)+(7^2-5^2)+(8^2-6^2)+(11^2-9^2)+(12^2-10^2)+(15^2-13^2)+(16^2-14^2)+\cdots$

← 2n तक →

$=(3-1)(3+1)+(4-2)(4+2)+(7-5)(7+5)+(8-6)(8+6)+(11-9)(11+9)+(12-10)(12+10)+(15-13)(15+13)+(16-14)(16+14)\cdots$

$=2\{4+6+12+14+20+22+28+30\cdots\}=2\{(4+12+20+28\cdots)+(6+14+22+30\cdots)\}$

← n तक → ← n तक →

$=2\{\frac{n}{2}(2\times4+(n-1)8)\}+\{\frac{n}{2}(2\times6+(n-1)8)\}=2n((4n)+(4n+2))=4n(4n+1)$

$n=7$: $28\times(29)$

$n=8$: $32\times33=1056$ ✓

$n=9$: $36\times37=1332$

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Q If $\boxed{\text{No of terms in AP are even}}$ & Sum of odd terms is 24 & sum of even terms = 30 & last term exceeds the first term by $\frac{21}{2}$ find n.

1) $T_1 + T_3 + \dots = 24 \to x$

$T_2 + T_4 + \dots = 30 \to y$

$nd = y - x$

$nd = 6$

(2) $(\cancel{a} + (2n-1)d) - (\cancel{a}) = \frac{21}{2}$

$2nd - d = \frac{21}{2}$

$12 - d = \frac{21}{2} \Rightarrow \boxed{d = \frac{3}{2}}$

$n \times \frac{3}{2} = 6 \Rightarrow n = \frac{12}{3} = 4$ ✓

Imp Note

(1) Whenever qs has Sum of even & sum of odd terms = take No of terms = $\boxed{2n}$

(2) $T_1 + T_3 + T_5 \dots = x \Rightarrow \frac{n}{2}[2a + (n-1)d] = x$

n terms

$T_2 + T_4 + T_6 \dots = y \Rightarrow \frac{n}{2}[2(a+d) + (n-1)d] = y$

$\frac{n}{2}\{(\cancel{2a} + \cancel{nd} - \cancel{d}) - (\cancel{2a} + 2d + \cancel{nd} - \cancel{d})\} = x - y$

$\frac{n}{\cancel{2}} \times (-\cancel{2}d) = x - y$

$\boxed{nd = y - x}$

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Properties of AP.

1) Sum of Equidistant term Remain Same in AP

$a_1, a_2, a_3, a_4, a_5, a_6 \rightarrow AP.$

$a_1 + a_6 = a_2 + a_4 = a_3 + a_4 = K$

(2) $a_1, a_2, a_3 - - - a_n \rightarrow AP_1$

$b_1, b_2, b_3 \; - - b_n \rightarrow AP_2$

$a_1 + b_1, a_2 + b_2, a_3 + b_3 - - a_n + b_n = AP$

(3) $a_1 a_2 a_3 - - - a_n \Rightarrow AP$

$a_1 + K, a_2 + K, a_3 + K \sim - a_n + K = AP$

$\frac{a_1}{K}, \frac{a_2}{K}, \frac{a_3}{K} - - - \frac{a_n}{K} \rightarrow AP$

$K.a_1, Ka_2 \sim - \; K.a_n \rightarrow AP$

(4) Supposition of term.

$a-2d, a-d, a+d, a+2d.$ ×AP

3 term → $a-d, a, a+d.$

4 term → $a-3d, a-d, a+d, a+3d.$

5 term → $a-2d, a-d, a, a+d, a+2d.$

When Sum is given

(5) $3, 5, 7, 9 - - - d = 2 \oplus \uparrow AP$

$9, 7, 5, 3 - - - d = -2 \ominus \downarrow AP$

$3, 3, 3, 3 - \sim d = 0 \quad AP$

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