$1.1 \rightarrow$ decimal

but $1_.1 \rightarrow$ multiply.

27/6/20

Chapter 6

Sequence & series

(AP) series
↓
Arithmetic Progression.

difference same is (AP series)

$$\underbrace{1,\ 3}_{2},\ \underbrace{\ ,5}_{2},\ \underbrace{\ ,7}_{2}, \ldots$$

a_1, a_2, a_3, a_4

$d = 2$

$d = a_2 - a_1$ or

$a_3 - a_2$.

→ $1, 3, 5, 7, 9, \ldots$

find 6th term
7th term
8th term

$a_n = a_{n-1} + d$

$d = 2$

$a_6 = a_5 + d$

$= \boxed{11}$

$a_7 = 11+2 = 13$

$a_8 = 13+2 = 15$

$a_n = a+(n-1)d$,

$a_n =$ 'n' term to be find

$a =$ first term

$n =$ no. of term

$d =$ difference

17 Term

$a_n = a+(n-1)d$

$a_{17} = 1+(17-1)(2)$

$= 1+32$

$= \boxed{33}$

27 Term

$a_{27} = a+(27-1)d$

$= 1+26(2)$

$= \boxed{53}$

$a_n = 1+(n-1)2$

$= 1+2n-2$

$\boxed{2n-1}$

SHORTCUTS

Shortcut-1 If nth term of the series is to be find out then simply put any value of n (say n = 2,3) then answer should be such term (ie. 2nd term, 3rd term).

Advantages to find nth term

$a_n = 2n-1$

1, 3, 5, 9, . . .

n = 1 $a_1 = 2(1) - 1 = 1$

n = 2 $a_2 = 4 - 1 = 3$

[Whatever value of n we will put, that term of AP series will be the answer]

Q 1, 3, 5, 7, ... nth term

~~(a)~~ 2n+1 ~~(b)~~ 2n

~~(c)~~ 2n-1 (d) none

(A) $2(2)+1 = 5$ (C) $2(2)-1 = 3$ ✓

(B) $2(2) = 4$

sum of first 3 terms = 1+3+5 = 9/-

sum of 4 terms = 1+3+5+7 = 16/-

sum of 20 terms = ?

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

$$S_{20} = \frac{20}{2}[2(1)+(20-1)2]$$

$$10[2+38]$$

$$\boxed{400}$$

$$S_{27} = \frac{27}{2}[2+(26)2]$$

$$= 27[27]$$

$$= \boxed{729}$$

$S_n = ?$

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

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

Advantage to find sum of nth term

$\boxed{S_n = n^2}$

[whatever the value of 'n' we will put into S_n, we will get the sum upto that term]

$S_1 = (1)^2 = 1$

$S_2 = 2^2 = 4$

$S_{20} = (20)^2 = 400$

Q 1, 3, 5, 7... sum. n terms

~~(a)~~ n^2-1 ~~(b)~~ n^2+1 ✓(c) n^2 (d) None

Answer should be 1.

(A) $S(1) = 1-1 = 0$

(B) $S_1 = 1+1 = 2$

(C) $S_1 = 1^2 = \boxed{1}$

Shortcut-2 To find S_n of a series. Put any no. in place of 'n' (say 2, 3) & we will get the sum upto that term in correct option

Q20 a, b, c are in AP, find value:

$$\frac{a^3+4b^3+c^3}{b(a^2+c^2)}$$ or $\frac{a}{b}, \frac{b}{c}, \frac{a}{c}$ AP? GP?

a, b, c

$\boxed{2b = a+c}$

Shortcut-3 Take any AP say $(\overset{a}{1}, \overset{b}{3}, \overset{c}{5} / \overset{a}{2}, \overset{b}{4}, \overset{c}{6})$ and put in a, b, c resp.. Ans. will be correct

Page No.
Date : / /

Q26 a^2, b^2, c^2 — AP

$\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b} = ?$

Shortcut-4 Always take a^2, b^2, c^2 as $\boxed{1, 5, 7}$.

Shortcut-5 If in ques,

$a_p = q$ | $a_{10} = 8$

$a_q = p$ | $a_{8} = 10$

$a_r = p+q-r$ | $a_{25} = ??$

$p = 10 \quad q = 8 \quad r = 25$

$a_{25} = 10 + 8 - 25$

$= \boxed{-7}$

Shortcut-6 If $a_p = q$ | $a_5 = 8$

$a_q = p$ | $a_8 = 5$

$a_{p+q} = 0$ | $a_{13} = ??$ 0 Ans

$p = 5 \quad q = 8 \quad r = 13$

$\therefore a_{13} = 13 - 13 = \boxed{0}$

Shortcut-7 If $a_p = \frac{1}{q}$ $a_5 = \frac{1}{8}$

$a_q = \frac{1}{p}$ $a_8 = \frac{1}{5}$

$S_{pq} = \frac{1}{2}(pq+1)$ $S_{40} = \frac{1}{2}(40+1)$

$p = 5 \quad q = 8$ $= \boxed{41/2}$

$\therefore pq = 40.$

Finite Sequence : $a_i]_{i=1}^{n}$ * $S_n = \sum_{r=1}^{n} a_r$

Infinite Sequence : $a_i]_{i=1}^{\infty}$

Shortcut-8 If $S_p = q$, $S_q = p$

$S_{p+q} = -(p+q)$

$S_{10} = 15$

$S_{15} = 10$

$S_{25} = ??$

$p = 10 \quad q = 15$

$p + q = 25 \Rightarrow \boxed{-25}$

① Sum of first 'n' natural no. $= \frac{n(n+1)}{2}$

$1+2+3+\dots+20 = \frac{20(20+1)}{2}$

$= \boxed{210}$

② Sum of square of first 'n' natural no. $= \frac{n(n+1)(2n+1)}{6}$

$1^2+2^2+3^2+\dots+10^2 = \frac{10(10+1)(20+1)}{6}$

$= \frac{10(11)(21)}{6} = \boxed{385}$

③ Sum of cube of first 'n' natural no $= \left[\frac{n(n+1)}{2}\right]^2$

$1^3+2^3+3^3+\dots+n$

④ Sum of first 'n' odd number $= n^2$

$\boxed{a_n = S_n - S_{n-1}}$ $\quad a_7 = S_7 - S_6$ ✓

Shortcut-9 ★ If ratio of Sn of two series is given in the question, then Ratio of an term will be REPLACE 'n' from "2n-1".

Ex Sum of n terms of 1st series $= n^2$

" " 2nd series $= n(n+1)$

Ratio of $S_n = \frac{n}{n+1}$

$\Rightarrow$ Ratio of $a_n = \boxed{\frac{2n-1}{2n}}$

* If the ratio of an terms of 2 AP series is given then, ratio of Sn terms of AP series will be

REPLACE 'n' from "$\left[\frac{n+1}{2}\right]$"

Ratio $a_n = \boxed{\frac{2n-1}{2n}}$ Ratio $S_n = \frac{\cancel{2}\left(\frac{n+1}{\cancel{2}}\right)-1}{\cancel{2}\left(\frac{n+1}{2}\right)}$

$= \boxed{\frac{n}{n+1}}$

Divisible Ques

Step 1 find first & last term

Step 2. find $n = ?$

Step 3 find $S_n = ?$

* Arithmetic Mean $\boxed{AM = \frac{a+b}{2}}$

5 & 17

$\frac{5+17}{2} = \boxed{11 \text{ Ans.}}$

Q Insert 3 AM b/w 3 & 15

⇒ Calculate d.

Geometric Progression (GP)

nth term of GP = ar^{n-1}

Common ratio = $r = \frac{a_2}{a_1} = \frac{a_3}{a_2} = \frac{a_4}{a_3}$

General form : $a, ar, ar^2, ar^3 \ldots.$

→ Geometric Mean (GM)

a, b, c are in GP

$GM = \boxed{b^2 = ac}$ ⇒ $\frac{b}{a} = \frac{c}{b}$ { same common ratio }

$b = \sqrt{ac}$ ⇒ $b^2 = ac$. ✓

(GM b/w a & c)

* Sum of first n terms = $\frac{a(1-r^n)}{1-r}$, $r<1$

= $\frac{a(r^n-1)}{r-1}$, $r>1$.

= na $r=1$

→ When last term is given,
then $\frac{lr-a}{r-1}$.

* Sum of infinite series ⇒ $S_\infty = \frac{a}{1-r}$, $r<1$

Q Sum = 3+33+333. n

1. Take 3 common
2. Multiply & divide by 9
3. $(10-1)+(10^2-1)+(10^3-1)$.