Arithmetic Progressions

Selection of Terms :

Taken 3 terms in A.P. :
$(a-d),\ a,\ (a+d)$

Taken 4 terms in A.P. :
$(a-3d), (a-d), (a+d), (a+3d)$

Taken 5 terms in A.P. :
$(a-2d), (a-d), a, (a+d), (a+2d)$

n^{th} Term

$T_n = a + (n-1)\ d.$

If 2,5,8,..... are in A.P.

$a_1 \to a_1 = 2 \to 1^{st}$ Term

$a_2 \to a_1 + d = 5 \to 2^{nd}$ Term

$a_3 \to a_1 + 2d = 8 \to 3^{rd}$ Term

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$a_n \to a_1 + (n-1)d = 74 \to 25^{th}$ Term

Sum of n Terms

Sum of 1^{st} n terms of an A.P. $\to S_n$

$S_n = a_1 + a_2 + a_3 + \ldots + a_{n-1} + a_n.$

$S_n = \frac{n}{2}\,[2a + (n-1)d] = \frac{n}{2}\,[a_1 + a_n].$

e.g. If 2,5,8,..... are in A.P. then
$a = 2$ and $d = 3$

$S_{25} = \frac{25}{2}\,[2(2) + (25-1)3] = 950$

PROPERTIES

1. If any nth term of a sequence is a linear expression in n e.g. $a_n = An + B$, then the given sequence is an A.P.
2. If a constant term is added to or subtracted from each term of an A.P. then the resulting sequence is also an A.P. with the same common difference.
3. If each term of a given A.P. is multiplied or divided by a non-zero constant K, then the resulting sequence is also an A.P. with common difference Kd or respectively. Where d is the common difference of the given A.P.
4. In a finite A.P. the sum of the terms equidistant from the beginning and end is always same and is equal to the sum of 1st and last term.

RESULTS

Sum of n natural nos.

$S_n = \frac{n(n+1)}{2}$

e.g. Sum of first 7 natural nos. $\Rightarrow \frac{7\times 8}{2} = 28$

m^{th} term from end

$(n - m + 1)^{th}$ term from start

Find A.P. whose n^{th} term is given ?

e.g. $T_n = 3n + 5$
put n = 1,2,3......
$T_1 = 8,\ T_2 = 11,\ T_3 = 14$......

Find T_n when S_n is given

$T_n = S_n - S_{n-1}$
e.g. $S_n = n^2 + 2n$
$\therefore\ T_n = 2n + 1$

Condition of an A.P.

If a, b, c are 3 terms of an A.P. then :
$a + c = 2b$.