

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. :

$(a - 2d), (a - d), a, (a + d), (a + 2d)$

Arithmetic Progressions

PROPERTIES

1. If any n th 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.

n^{th} Term

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

Sum of n Terms

Sum of 1st n terms of an A.P. $\rightarrow S_n$

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

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

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

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

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

$a_1 \rightarrow a_1 = 2 \rightarrow 1^{\text{st}}$ Term

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

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

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

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

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

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

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 :
 $a + c = 2b$.