## Arithmetic progressions - Points to Remember

## 1. Arithmetic Progressions (A.P.):

A sequence al, a2, a3, $\ldots$, an, $\ldots$ is called an arithmetic progression if there exists a constant d such that $\mathrm{a} 2-\mathrm{a} 1=\mathrm{d}, \mathrm{a} 3-\mathrm{a} 2=\mathrm{d}, \mathrm{a} 4-\mathrm{a} 3=\mathrm{d}, \ldots, \mathrm{an}+1-\mathrm{an}=\mathrm{d}$ and so on. The constant d is called the common difference.

## 2. General Terms of an Arithmetic Progression:

If $a$ is the first term and $d$ the common difference of an A.P., then the A.P. is $a, a+d, a+2 d, a+3 d, a+4 d, \ldots$

## 3. Properties of an Arithmetic Progression:

(i) A sequence a1, a2, a3, ... an, ... is an A.P., if ar+1-ar is independent of $r$.
(ii) A sequence a1, a2, a3, $\ldots$, an, $\ldots$ is an A.P., if and only if its $\mathrm{n}^{\text {th }}$ term an is a linear expression in n , and in such a case the coefficient of n is a common difference.
4. nth Term of an Arithmetic progression:
(i) $n^{\text {th }}$ term an of an A.P. with the first term a and common difference $d$ is given by an=a+(n-1)d.
(ii) $\mathrm{n}^{\text {th }}$ term from the end $=$ Last term $+(\mathrm{n}-1)(-\mathrm{d})=1-(\mathrm{n}-1) \mathrm{d}$, where 1 denotes the last term.

## 5. Various Terms in an AP can be Chosen in the Following Manner:

| Number of terms | Terms | Common difference |
| :---: | :---: | :---: |
| 3 | $\mathrm{a}-\mathrm{d}, \mathrm{a}, \mathrm{a}+\mathrm{d}$ | d |
| 4 | $\mathrm{a}-3 \mathrm{~d}, \mathrm{a}-\mathrm{d}, \mathrm{a}+\mathrm{d}, \mathrm{a}+3 \mathrm{~d}$ | 2 d |
| 5 | $\mathrm{a}-2 \mathrm{~d}, \mathrm{a}-\mathrm{d}, \mathrm{a}, \mathrm{a}+\mathrm{d}, \mathrm{a}+2 \mathrm{~d}$ | d |
| 6 | $\mathrm{a}-5 \mathrm{~d}, \mathrm{a}-3 \mathrm{~d}, \mathrm{a}-\mathrm{d}, \mathrm{a}+\mathrm{d}, \mathrm{a}+3 \mathrm{~d}, \mathrm{a}+5 \mathrm{~d}$ | 2 d |

## 6. Sum of First n Terms:

The sum of $n$ terms of an A.P. with the first term a and the common difference $d$ is given by $\mathrm{Sn}=\mathrm{n} 22 \mathrm{a}+\mathrm{n}-1 \mathrm{~d}$
Also, $\mathrm{Sn}=\mathrm{n} 2 \mathrm{a}+1$, where $\mathrm{l}=$ Last term $=\mathrm{a}+\mathrm{n}-1 \mathrm{~d}$

## 7. Properties of Sum of n Terms:

If the ratio of the sums of $n$ terms of two A.P.'s is given, then to find the ratio of their $n^{\text {th }}$ terms, we replace $n$ by $(2 n-1)$ in the ratio of the sums of $n$ terms.

A sequence is an A.P. if and only if the sum of its $n$ terms is of the form $A n 2+B n$, where $A, B$ are constants. In such a case the common difference is 2 A .

