Sequences and Series Formula Sheet

1. The nth term (general term) of the A.P.:

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

Where a = First term

d = Common difference

- If A.P. (in its standard form) with first term a and common difference d, i.e., a, a + d, a + 2d, ...
- If a constant is added to each term of an A.P., the resulting sequence is also an A.P.
- If a constant is subtracted from each term of an A.P., the resulting sequence is also an A.P.
- If each term of an A.P. is multiplied by a constant, then the resulting sequence is also an A.P.
- If each term of an A.P. is divided by a non-zero constant then the resulting sequence is also an A.P.
- Let a, a + d, a + 2d, ..., a + (n – 1) d be an A.P. Then

$$l = a + (n - 1)\, d$$

where a = First term

l = Last term

n = no. of terms

d = Common difference

s_n = Sum of n terms of A.P

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

$$S_n = \frac{n}{2}[a + l]$$

2. Arithmetic mean: $A = \frac{a+b}{2}$

3. General term of a G.P.: $a_n = ar^{n-1}$

4. Sum to n terms of a G.P:

$s_n = a + ar + ar^2 + \cdots + ar^{n-1}$

- If r = 1, then $s_n = na$
- If r ≠ 1, then $s_n = \frac{a(1-r^n)}{1-r}$ or $s_n = \frac{a(r^n-1)}{r-1}$

5. Geometric Mean: G = √ab

6. Relationship Between A.M. and G.M: A ≥ G

$$A - G = \frac{(\sqrt{a}-\sqrt{b})^2}{2} \geq 0$$

7. Sum of first n natural numbers: $s_n = \frac{n(n+1)}{2}$

8. Sum of squares of the first n natural numbers:

$$s_n = \frac{n(n+1)(2n+1)}{6}$$

9. Sum of cubes of the first n natural numbers:

$$s_n = \frac{[n(n+1)]^2}{4}$$