

Quantitative Aptitude Formula Guide

1. Number System & Simplification

- **LCM × HCF = Product of Two Numbers** ($A \times B$)
- **Sum of first n natural numbers** = $n(n + 1) / 2$
- **Sum of squares of first n natural numbers** = $n(n + 1)(2n + 1) / 6$
- **Sum of cubes of first n natural numbers** = $[n(n + 1) / 2]^2$
- **Product of all factors of a number N** = $N^{(\text{Total Factors} / 2)}$
- **BODMAS Rule:** Order of operations: Brackets, Of, Division, Multiplication, Addition, Subtraction.

2. Percentage

- **Percentage Formula** = $(\text{Value} / \text{Total}) \times 100$
- **Percentage Increase / Decrease** = $(\text{Change} / \text{Original Value}) \times 100$
- **Successive Percentage Change** = $A + B + (AB / 100)\%$ (Use negative signs for decreases or discounts)

3. Profit, Loss, and Discount

- **Profit** = $SP - CP$ | **Loss** = $CP - SP$ (where SP = Selling Price, CP = Cost Price)
- **Profit %** = $(\text{Profit} / CP) \times 100$ | **Loss %** = $(\text{Loss} / CP) \times 100$
- **Selling Price (Profit)** = $CP \times (1 + \text{Profit}\% / 100)$
- **Selling Price (Loss)** = $CP \times (1 - \text{Loss}\% / 100)$
- **Discount** = $\text{Marked Price (MP)} - SP$
- **Discount %** = $(\text{Discount} / MP) \times 100$

4. Simple & Compound Interest

- **Simple Interest (SI)** = $(P \times R \times T) / 100$ (where P = Principal, R = Rate, T = Time)

- **Compound Interest Amount (A)** = $P \times (1 + R/100)^T$
- **Compound Interest (CI)** = Amount (A) - Principal (P)
- **Difference between CI and SI for 2 Years** = $P \times (R / 100)^2$
- **Difference between CI and SI for 3 Years** = $P \times (R / 100)^2 \times (3 + R / 100)$

5. Ratio, Proportion & Average

- **Proportion Property:** If $a : b = c : d$, then $a \times d = b \times c$
- **Average** = Sum of all observations / Total number of observations
- **Average Speed (Equal Distances)** = $2xy / (x + y)$ (where x and y are the two speeds)

6. Time, Speed, and Distance

- **Speed** = Distance / Time
- **Unit Conversion (km/h to m/s):** Multiply by $5/18$
- **Unit Conversion (m/s to km/h):** Multiply by $18/5$
- **Relative Speed (Same Direction)** = $|S_1 - S_2|$
- **Relative Speed (Opposite Direction)** = $S_1 + S_2$
- **Downstream Speed** = Speed of boat (B) + Speed of stream (S)
- **Upstream Speed** = Speed of boat (B) - Speed of stream (S)

7. Time and Work

- **Work Formula** = Rate (Efficiency) $\times$ Time
- **Individual Capability:** If a person completes work in x days, their 1-day efficiency = $1/x$
- **Combined Work Formula:** If A takes x days and B takes y days, together they take $(x \times y) / (x + y)$ days.
- **Chain Rule:** $(M_1 \times D_1 \times H_1) / W_1 = (M_2 \times D_2 \times H_2) / W_2$ (where M = men, D = days, H = hours, W = work)

8. Basic Algebra Identities

- $(a + b)^2 = a^2 + 2ab + b^2$
- $(a - b)^2 = a^2 - 2ab + b^2$
- $a^2 - b^2 = (a - b)(a + b)$
- $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
- $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
- $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

9. Mensuration Formulas (2D & 3D)

Shape	Area / Curved Surface Area (CSA)	Total Surface Area / Perimeter	Volume
Square	Area = a^2	Perimeter = $4a$	—
Rectangle	Area = $l \times b$	Perimeter = $2(l + b)$	—
Circle	Area = πr^2	Circumference = $2\pi r$	—
Triangle	Area = $\frac{1}{2} \times b \times h$	Perimeter = $a + b + c$	—
Cube	Lateral Area = $4a^2$	TSA = $6a^2$	Volume = a^3
Cuboid	Lateral Area = $2h(l + b)$	TSA = $2(lb + bh + hl)$	Volume = $l \times b \times h$
Cylinder	CSA = $2\pi rh$	TSA = $2\pi r(r + h)$	Volume = $\pi r^2 h$
Sphere	Surface Area = $4\pi r^2$	TSA = $4\pi r^2$	Volume = $\frac{4}{3}(\pi r^3)$
Hemisphere	CSA = $2\pi r^2$	TSA = $3\pi r^2$	Volume = $\frac{2}{3}(\pi r^3)$