

Quant Formula Sheet

Use this as your last-day formula sheet.

Percentages

$$x\% = x/100$$

- $x\% \text{ of } y = xy/100$
- Increase from A to B: $((B - A) / A) \times 100$
- Decrease from A to B: $((A - B) / A) \times 100$
- If price increases by $x\%$, new value = $\text{old} \times (100 + x)/100$
- If price decreases by $x\%$, new value = $\text{old} \times (100 - x)/100$

Successive percentage change

Net change for $+a\%$ and $+b\%$:

$$a + b + ab/100$$

For $+a\%$ then $-b\%$:

$$a - b - ab/100$$

Example: $+20\%$ then $-10\% = 20 - 10 - 2 = +8\%$.

Profit, Loss, Discount

- Profit = $SP - CP$
- Loss = $CP - SP$
- Profit % = $(\text{Profit} / CP) \times 100$
- Loss % = $(\text{Loss} / CP) \times 100$
- Discount = $MP - SP$
- Discount % = $(\text{Discount} / MP) \times 100$

If marked price is MP and discount is $d\%$:

$$SP = MP \times (100 - d)/100$$

Simple Interest

$$SI = \frac{PRT}{100}$$
$$\text{Amount} = P + SI$$

Where:

- P = principal
- R = annual rate
- T = time in years

Compound Interest

$$A = P(1 + \frac{R}{100})^T$$
$$CI = A - P$$

For 2 years:

$$CI = P \times [2\frac{R}{100} + (\frac{R}{100})^2]$$

Ratio and Proportion

If $A:B = m:n$, take:

$$A = mx, B = nx$$

If values are divided in ratio $a:b:c$, total parts = $a+b+c$.

Share of first part:

$$\text{total} \times \frac{a}{a+b+c}$$

Averages

$$\text{Average} = \frac{\text{Sum}}{\text{Number of items}}$$
$$\text{Sum} = \text{Average} \times \text{Number of items}$$

If one number is replaced:

$$\text{New average} = \text{Old average} + \frac{(\text{new value} - \text{old value})}{n}$$

Time and Work

If A completes work in x days:

$$\text{A's one-day work} = 1/x$$

If A and B work together:

$$\begin{aligned} 1/x + 1/y &= (x+y)/(xy) \\ \text{Days together} &= xy/(x+y) \end{aligned}$$

Efficiency is inverse of time:

$$\text{Efficiency ratio A:B} = y:x$$

if A takes x days and B takes y days.

Pipes and Cisterns

- Inlet pipe = positive work
- Outlet pipe = negative work

If inlet fills in x hours and outlet empties in y hours:

$$\begin{aligned} \text{Net work/hour} &= 1/x - 1/y \\ \text{Time} &= 1 / \text{net work} \end{aligned}$$

Time, Speed, Distance

$$\begin{aligned} \text{Speed} &= \text{Distance} / \text{Time} \\ \text{Distance} &= \text{Speed} \times \text{Time} \\ \text{Time} &= \text{Distance} / \text{Speed} \end{aligned}$$

Unit conversion:

$$\begin{aligned} \text{km/h to m/s} &= \times 5/18 \\ \text{m/s to km/h} &= \times 18/5 \end{aligned}$$

Relative speed:

- Same direction: **difference**
- Opposite direction: **sum**

Train crossing pole:

$$\text{Time} = \text{train length} / \text{speed}$$

Train crossing platform:

$$\text{Time} = (\text{train length} + \text{platform length}) / \text{speed}$$

Boats and Streams

$$\text{Downstream speed} = \text{boat speed} + \text{stream speed}$$

$$\text{Upstream speed} = \text{boat speed} - \text{stream speed}$$

$$\text{Boat speed} = (\text{downstream} + \text{upstream})/2$$

$$\text{Stream speed} = (\text{downstream} - \text{upstream})/2$$

Number System

- Even number: divisible by 2
- Odd number: not divisible by 2
- Prime number: exactly two factors, 1 and itself
- Composite number: more than two factors
- Co-prime: GCD is 1

Divisibility:

- 2: last digit even
- 3: sum of digits divisible by 3
- 4: last two digits divisible by 4
- 5: last digit 0 or 5
- 6: divisible by 2 and 3
- 8: last three digits divisible by 8
- 9: sum of digits divisible by 9
- 10: last digit 0
- 11: difference between alternating digit sums divisible by 11

LCM and HCF

For two numbers:

$$\text{Product} = \text{LCM} \times \text{HCF}$$

Use HCF for:

- largest possible equal size,
- maximum length,
- greatest common divisor.

Use LCM for:

- events repeating together,
- least common time,
- minimum number exactly divisible.

Probability

Probability = favorable outcomes / total outcomes

At least one:

$P(\text{at least one}) = 1 - P(\text{none})$

Permutation and Combination

Permutation: arrangement/order matters.

$nPr = n! / (n-r)!$

Combination: selection/order does not matter.

$nCr = n! / [r!(n-r)!]$

Data Interpretation

Core operations:

- percentage share,
- increase/decrease,
- average,
- ratio,
- total difference.

Shortcut:

Read the question first, then table/chart. Do not fully analyze the chart before knowing what is asked.