

A TRICHY PLUS CAREER BOOKLET

Quant Formulas.

THE FIFTY THAT CLEAR EVERY CUTOFF

Placement, banking, government exam. One booklet, fifty formulas.
Read ten a day. Two weeks. Job-ready.

MADE FOR

Final year students



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01

THE APPROACH

How to Use This Guide

Aptitude tests reward two things: speed and pattern recognition. Both come from knowing the right formula cold, then practising it until you can spot when to use it in five seconds.

Every card here follows the same structure: the formula, one worked example, and where useful, a shortcut that will save you 30 to 60 seconds in the exam. Read 10 formulas a day, solve 5 questions per formula, and in two weeks you will have covered the arithmetic backbone of any placement paper.

THE 20/60/20 RULE

Where your test time actually goes

In most aptitude papers, 20 percent of questions are giveaways (do them first), 60 percent are formula-driven (this booklet is for these), and 20 percent are traps you should skip. Master the middle 60 and you clear every cutoff. Fight for the top 20 percent only if you have real time to spare.

50

FORMULAS THAT
COVER 80 PERCENT OF
EVERY PAPER

14

DAYS TO INTERNALISE
THEM ALL

30s

TIME SAVED PER
QUESTION WITH A
SHORTCUT

5

PRACTICE QUESTIONS
PER FORMULA
MINIMUM

02

SECTION ONE

Percentages, Profit and Interest

Formulas 01 to 10. The workhorse block. If you master only ten formulas in this booklet, start here – every placement, banking and government exam uses these.

01 Percentage Change

FORMULA

$\% \text{ change} = ((\text{New minus Old}) / \text{Old}) \text{ times } 100$

EXAMPLE

Price went from Rs. 80 to Rs. 100. Change = $(100 \text{ minus } 80) / 80 \text{ times } 100 = 25\%$.

SHORTCUT

Increase-then-decrease by same x%: net = minus $(x \text{ squared over } 100)\%$. So +20% then minus 20% = minus 4% net.

02 Successive Percentage Change

FORMULA

$\text{Net } \% = a + b + (a \text{ times } b) / 100$

EXAMPLE

Salary increased 10% then 20%. Net = $10 + 20 + 200 / 100 = 32\%$.

SHORTCUT

Discount plus discount uses the same formula, both negative. 20% off then 10% off = minus 28% total.

03 Profit and Loss %

FORMULA

$\text{Profit}\% = (\text{SP minus CP}) / \text{CP times } 100$. $\text{Loss}\% = (\text{CP minus SP}) / \text{CP times } 100$.

EXAMPLE

CP Rs. 500, SP Rs. 600. Profit% = $100 / 500 \text{ times } 100 = 20\%$.

04 SP and CP from Profit%

FORMULA

$\text{SP} = \text{CP times } (100 + P\%) / 100$. $\text{CP} = \text{SP times } 100 / (100 + P\%)$.

EXAMPLE

CP Rs. 400, profit 25%. SP = $400 \text{ times } 125 / 100 = \text{Rs. } 500$.

SHORTCUT

Selling at CP after x% discount on marked price: $\text{MP} = \text{CP times } 100 / (100 \text{ minus } x)$.

05 Two Articles, Same SP, One Profit One Loss

FORMULA

$\text{Overall loss}\% = (x \text{ divided by } 10) \text{ squared, where } x = \text{profit}\% = \text{loss}\%$.

EXAMPLE

Sold two watches at Rs. 1000 each: one at 20% profit, one at 20% loss. Net loss = 4%.

SHORTCUT

Answer is ALWAYS a loss, never zero. Memorise this. It is a common trap.

06 Simple Interest

FORMULA

$SI = (P \text{ times } R \text{ times } T) \text{ divided by } 100.$

EXAMPLE

Rs. 5000 at 8% for 3 years. $SI = 5000 \text{ times } 8 \text{ times } 3 / 100 = \text{Rs. } 1,200.$

07 Compound Interest

FORMULA

$A = P \text{ times } (1 + R/100) \text{ to the power } T. CI = A \text{ minus } P.$

EXAMPLE

Rs. 10,000 at 10% for 2 years. $A = 10000 \text{ times } 1.21 = \text{Rs. } 12,100. CI = \text{Rs. } 2,100.$

08 CI vs SI Difference (2 years)

FORMULA

$CI \text{ minus } SI = P \text{ times } (R/100) \text{ squared}.$

EXAMPLE

$P = \text{Rs. } 8000, R = 5\%, T = 2. \text{ Difference} = 8000 \text{ times } 0.0025 = \text{Rs. } 20.$

SHORTCUT

For 3 years: $\text{Diff} = P \text{ times } (R/100) \text{ squared times } (3 + R/100).$

09 Population and Depreciation

FORMULA

$\text{Future} = \text{Present times } (1 \text{ plus or minus } R/100) \text{ to the power } T.$

EXAMPLE

Town population 50,000, growing 4% per year. After 2 years $= 50000 \text{ times } 1.0816 = 54,080.$

10 Discount Chain to Single %

FORMULA

$\text{Single equivalent of two discounts } d1, d2 = d1 + d2 \text{ minus } (d1 \text{ times } d2)/100.$

EXAMPLE

Discounts 30% then 20% $= 30 + 20 \text{ minus } 600/100 = 44\%.$

03

SECTION TWO

Ratio, Average, Ages, Mixtures

Formulas 11 to 20. These map most cleanly to real-world thinking, which means they show up in interview case questions too. Learn them and you will spot the pattern in a customer onboarding funnel or a mixture pricing question with equal ease.

11 Ratio to Actual Values

FORMULA

If $A : B = m : n$ and total = T , then $A = T \text{ times } m / (m + n)$.

EXAMPLE

Split Rs. 3,000 in ratio 2:3. $A = 3000 \text{ times } 2/5 = \text{Rs. } 1,200$. $B = \text{Rs. } 1,800$.

12 Componendo–Dividendo (ratio equations)

FORMULA

If $a/b = c/d$, then $(a + b)/(a \text{ minus } b) = (c + d)/(c \text{ minus } d)$.

EXAMPLE

Used to simplify ratio equations quickly. Save it for the last data interpretation question you attempt.

13 Average of n Numbers

FORMULA

$\text{Average} = \text{Sum} / n$. $\text{Sum} = \text{Average times } n$.

EXAMPLE

Average of 5 numbers is 40. New number added, new average = 42. New number = 42 times 6 minus 40 times 5 = 52.

14 Average Speed (equal distances)

FORMULA

$\text{Average speed} = 2xy / (x + y)$, where $x, y = \text{speeds each way}$.

EXAMPLE

60 kmph one way, 40 kmph back. Average = $4800/100 = 48 \text{ kmph}$. NOT 50.

SHORTCUT

Never take the arithmetic mean when time varies.

15 Average of Consecutive Numbers

FORMULA

$\text{Average} = (\text{first} + \text{last}) / 2$.

EXAMPLE

Average of 1 to 100 = $(1 + 100)/2 = 50.5$. Sum = 50.5 times 100 = 5,050.

16 Weighted Average

FORMULA

$\text{WA} = (n_1 \text{ times } a_1 + n_2 \text{ times } a_2) / (n_1 + n_2)$.

EXAMPLE

30 boys average 60 kg, 20 girls average 50 kg. Class average = $(30 \text{ times } 60 + 20 \text{ times } 50) / 50 = 56 \text{ kg}$.

17 Ages: Ratio Now vs Later

FORMULA

If ratio of ages now is $a:b$, and after T years becomes $c:d$, cross-multiply and solve.

EXAMPLE

Ages 5:7 now, will be 3:4 after 5 years. Solve $(5x + 5) / (7x + 5) = 3/4$ giving $x = 5$. Ages 25, 35.

SHORTCUT

Ignore the formula sheet. Trust the method: substitute, cross-multiply, solve.

18 Alligation (mixing two prices or strengths)

FORMULA

Cheaper : Dearer = (Dearer minus Mean) : (Mean minus Cheaper).

EXAMPLE

Mix rice at Rs. 30 and Rs. 40 per kg to sell at Rs. 36. Ratio = $(40 \text{ minus } 36):(36 \text{ minus } 30) = 4:6 = 2:3$.

19 Mixture Replacement

FORMULA

Final pure = P times $(1 \text{ minus } x/P)$ to the power n .

EXAMPLE

40 L of pure milk. 4 L removed and replaced with water, three times. Milk left = $40 \text{ times } (1 \text{ minus } 0.1) \text{ cubed} = 29.16 \text{ L}$.

20 Pipes and Cisterns

FORMULA

Combined rate = $1/A + 1/B$. Time to fill = $1 / \text{combined}$.

EXAMPLE

Pipe A fills in 6 hours, B in 4. Together: $1/6 + 1/4 = 5/12$. Time = $12/5 = 2.4$ hours.

SHORTCUT

If one pipe empties (a leak), subtract its rate. Same technique as time and work.

04

SECTION THREE

Time, Work, Speed and Distance

Formulas 21 to 30. Every campus recruitment paper has three questions from this block. Learn the pattern, not the numbers, and you will finish these in under a minute each.

21 Time and Work: Combined

FORMULA

$\frac{1}{T} = \frac{1}{A} + \frac{1}{B}$. Therefore $T = AB$ divided by $(A + B)$.

EXAMPLE

A does work in 10 days, B in 15. Together: $10 \times 15 / 25 = 6$ days.

22 Work Done in n Days

FORMULA

Work done = Days times Rate. Rate of A = $1/A$ per day.

EXAMPLE

A finishes in 20 days. In 5 days, A has done $5/20 = 1/4$ of the work.

23 Men – Days – Work

FORMULA

$(M1 \times D1 \times H1) / W1 = (M2 \times D2 \times H2) / W2$.

EXAMPLE

10 men build a 200 m wall in 12 days. How many days for 15 men to build 300 m? $12 \times 10 \times 200 / (15 \times 300) = 16$ days.

24 Speed, Distance, Time

FORMULA

Distance = Speed times Time.

EXAMPLE

Car at 60 kmph for 2.5 hours covers 150 km.

SHORTCUT

Convert kmph to metres per second by multiplying by $5/18$. Reverse with $18/5$.

25 Relative Speed

FORMULA

Same direction: absolute value of $(a - b)$. Opposite: $(a + b)$.

EXAMPLE

Two trains 60 and 40 kmph, opposite directions, cross in 6 seconds. Combined length = $100 \times 5/18 \times 6 = 167$ m.

26 Train Crossing a Pole

FORMULA

Time = Length of train divided by Speed.

EXAMPLE

180 m train at 54 kmph = 15 metres per second. Time = $180/15 = 12$ seconds.

27 Train Crossing a Platform

FORMULA

Time = (Length of train + Length of platform) divided by Speed.

EXAMPLE

150 m train, 100 m platform, at 25 metres per second. Time = $250/25 = 10$ seconds.

28 Boats and Streams

FORMULA

Downstream speed = $b + s$. Upstream speed = b minus s . Boat speed = $(D + U)/2$.

EXAMPLE

Downstream 20 kmph, upstream 12 kmph. Boat = 16, stream = 4 kmph.

29 Time Change with Speed Change

FORMULA

New time divided by Old time = Old speed divided by New speed.

EXAMPLE

Cover a distance in 4 hours at 60 kmph. At 80 kmph, time = $4 \text{ times } 60/80 = 3$ hours.

30 Two Trains from A and B

FORMULA

They meet after t hours. Distance covered by A divided by Distance by B = Speed A divided by Speed B.

EXAMPLE

A starts from X at 60 kmph, B from Y at 40 kmph, 200 km apart, towards each other. Meet after $200/100 = 2$ hours.

05

SECTION FOUR

Numbers, LCM–HCF, Series

Formulas 31 to 40. Small tricks in this block can turn a 90-second problem into a 15-second one. The unit-digit and divisibility rules alone will save you 5 to 6 minutes on any long paper.

31 LCM times HCF = Product of Numbers

FORMULA

$LCM(a, b) \text{ times } HCF(a, b) = a \text{ times } b.$

EXAMPLE

Given $HCF = 6$, $LCM = 72$, one number = 24. Other = 6 times $72 / 24 = 18$.

32 Divisibility Rules

FORMULA

By 3: digit sum divisible by 3. By 9: digit sum by 9. By 4: last two digits by 4. By 11: alternating sum by 11.

EXAMPLE

Is 2178 divisible by 11? $(8 + 1) \text{ minus } (7 + 2) = 0$, so yes.

33 Sum of First n Natural Numbers

FORMULA

$\text{Sum} = n(n + 1) \text{ divided by } 2.$

EXAMPLE

Sum 1 to 50 = 50 times 51 / 2 = 1,275.

34 Sum of Squares and Cubes

FORMULA

$\text{Sum of first } n \text{ squares} = n(n + 1)(2n + 1) / 6.$ $\text{Sum of first } n \text{ cubes} = [n(n + 1)/2]^2 \text{ squared}.$

EXAMPLE

Sum of squares from 1 to 5 = 5 times 6 times 11 / 6 = 55.

35 Arithmetic Progression

FORMULA

$n\text{th term} = a + (n \text{ minus } 1) d.$ $\text{Sum} = n/2 \text{ times } [2a + (n \text{ minus } 1) d].$

EXAMPLE

AP 3, 7, 11 and so on. 10th term = 3 + 9 times 4 = 39. Sum of first 10 = 5 times $(6 + 36) = 210$.

36 Geometric Progression

FORMULA

$n\text{th term} = a \text{ times } r \text{ to the power } (n \text{ minus } 1).$ $\text{Sum} = a(r \text{ to the } n \text{ minus } 1) / (r \text{ minus } 1).$

EXAMPLE

GP 2, 6, 18 and so on. 5th term = 2 times 3 to the 4 = 162.

37 Factors of a Number

FORMULA

$N = p \text{ to the } a \text{ times } q \text{ to the } b \text{ times } r \text{ to the } c.$ Number of factors = $(a + 1)(b + 1)(c + 1).$

EXAMPLE

$72 = 2 \text{ cubed times } 3 \text{ squared. Factors} = 4 \text{ times } 3 = 12.$

38 Sum of Factors

FORMULA

Sum = $[(p \text{ to the } (a+1) \text{ minus } 1) / (p \text{ minus } 1)] \text{ times same for } q \text{ and so on.}$

EXAMPLE

Sum of factors of 12 (equals 2 squared times 3): $1 + 2 + 3 + 4 + 6 + 12 = 28.$

39 Unit Digit of a to the n

FORMULA

Cycles repeat every 4 for most digits. 2: 2, 4, 8, 6. 3: 3, 9, 7, 1. 7: 7, 9, 3, 1. 8: 8, 4, 2, 6.

EXAMPLE

Unit digit of 7 to the 85: $85 \bmod 4 = 1$, so unit digit is 7.

40 Remainder Theorem (basic)

FORMULA

$(a \text{ times } b) \bmod n = [(a \bmod n) \text{ times } (b \bmod n)] \bmod n.$

EXAMPLE

$17 \text{ times } 19 \bmod 5 = (2 \text{ times } 4) \bmod 5 = 8 \bmod 5 = 3.$

06

SECTION FIVE

Geometry, Mensuration, Probability

Formulas 41 to 50. The visual block. Memorise the common Pythagorean triples and you will spot half of these questions without doing any algebra.

41 Triangle Area

FORMULA

Area = half times base times height. Heron: square root of $s(s \text{ minus } a)(s \text{ minus } b)(s \text{ minus } c)$, where $s = (a + b + c)/2$.

EXAMPLE

Base 10, height 6. Area = 30 square units.

42 Pythagoras and Common Triples

FORMULA

$a \text{ squared} + b \text{ squared} = c \text{ squared}$. Memorise: 3-4-5, 5-12-13, 8-15-17, 7-24-25.

EXAMPLE

A 5 ft ladder against a wall, base 3 ft from wall. Top height = 4 ft (3-4-5 triple).

43 Circle: Area and Circumference

FORMULA

Area = π times $r \text{ squared}$. Circumference = 2 times π times r .

EXAMPLE

Radius 7 cm. Area = 154 sq cm. Circumference = 44 cm (use $\pi = 22/7$).

44 Rectangle and Square

FORMULA

Rectangle: area = $l \text{ times } w$, perimeter = $2(l + w)$. Square: area = $s \text{ squared}$, diagonal = $s \text{ times root } 2$.

EXAMPLE

Square of side 6: diagonal = $6 \text{ root } 2 = \text{about } 8.49$.

45 Cube and Cuboid

FORMULA

Cube: $V = a \text{ cubed}$, TSA = $6 a \text{ squared}$. Cuboid: $V = l w h$, TSA = $2(lw + wh + lh)$.

EXAMPLE

Cube of side 5 cm: volume 125 cc, surface area 150 sq cm.

46 Cylinder, Cone, Sphere

FORMULA

Cylinder: $V = \pi r \text{ squared } h$, CSA = $2 \pi r h$. Cone: $V = \text{one third } \pi r \text{ squared } h$. Sphere: $V = 4/3 \pi r \text{ cubed}$, SA = $4 \pi r \text{ squared}$.

EXAMPLE

Sphere $r = 7$: $V = 4/3 \text{ times } 22/7 \text{ times } 343 = \text{about } 1,437 \text{ cc}$.

47 Probability (basic)

FORMULA

$P(\text{event}) = \text{Favourable outcomes divided by Total outcomes.}$

EXAMPLE

$P(\text{sum} = 7 \text{ on two dice}) = 6/36 = 1/6.$

48 Permutation and Combination

FORMULA

$nPr = n! / (n \text{ minus } r)!. nCr = n! / [r! (n \text{ minus } r)!].$

EXAMPLE

Choose 3 books from 5: $5C3 = 10$. Arrange them: $5P3 = 60$.

49 Circular Arrangement

FORMULA

n people around a round table: $(n \text{ minus } 1)!$. If clockwise equals anticlockwise: $(n \text{ minus } 1)! \text{ divided by } 2.$

EXAMPLE

6 friends around a table: $5! = 120$ arrangements.

50 Probability of At Least One

FORMULA

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

EXAMPLE

Two coins tossed. $P(\text{at least one head}) = 1 \text{ minus } P(TT) = 1 \text{ minus } 1/4 = 3/4.$

SHORTCUT

Works for 3 or more coins, dice, cards. Almost always the fastest route.

07

YOUR PERSONAL PLAN

The Weak-Areas Tracker

Print this section. Every time you miss a formula in practice, log it. Review the tracker every Sunday. This one habit is what turns a 60 percent scorer into a 90 percent scorer.

Part 1: The 10 formulas I keep getting wrong

Write the formula number and the type of mistake. Keep the list short: 10 items only. As you fix a formula, cross it out and add a new one. This forces prioritisation.

#	FORMULA NAME	TYPE OF MISTAKE	FIXED?
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Part 2: My 14-Day Practice Plan

Write the section number you will practise on each day. Stick to 10 formulas a day. Do not skip a day. If you miss one, do 15 the next day, not 30.

DAY	SECTION / FORMULAS	QUESTIONS SOLVED	SCORE
1			
2			
3			
4			
5			

6			
7			
8			
9			
10			
11			
12			
13			
14			

FREE LIVE WEEKLY QUIZ

Test your weak areas every Sunday, 6 PM

Every Sunday evening we run a free 30-minute live quiz on our website covering 20 questions across all five sections in this booklet. Register once, get the reminder every week. It is the cheapest way to know exactly which formulas you still need to fix, and which ones are solid.

THE LAST WORD

You do not need to be clever. You need to be prepared.

The students who top campus aptitude tests are rarely the smartest in the room. They are the ones who practised the same 50 formulas until pattern recognition became a reflex. That is not intelligence. It is discipline. The good news: discipline is buildable. Start today, 10 formulas, one hour. Then tomorrow do it again.

“It is not that I am so smart, it is just that I stay with problems longer.”

ALBERT EINSTEIN
