QUANTITATIVE APTITUDE

Important Formulas Revision E-book

FINAL PREP EDITION

By LearnFrenzy

BANK • SSC • RAILWAY • INSURANCE • CAT • GRE • UPSC

INTRODUCTION

Quantitative Aptitude is a pivotal component of nearly every competitive examination in India, ranging from Banking (IBPS, SBI), Staff Selection Commission (SSC), Railways, and Insurance to high-level management entrances like CAT and GMAT.

This E-book is designed as a quick-revision tool to help you recall essential formulas, shortcuts, and mathematical rules right before your exam. Each section is curated for maximum retention and clarity.

Preparation Guide

- Memorize Table of Squares up to 30.
- Memorize Table of Cubes up to 20.
- Learn Fraction-to-Percentage conversions (1-20).
- Always practice with a timer.

Stay connected with us for daily practice quizzes.

Learn Frenzy Community

1. SIMPLIFICATION

The foundation of Aptitude is the speed and accuracy of calculation.

BODMAS Rule

Depicts the correct sequence of operations:

B - Brackets (Order: (), {}, [])
O - Of
D - Division
M - Multiplication
A - Addition
S - Subtraction

Modulus & Vinculum

Modulus of a Real Number:

```
|a| = a (if a > 0) else -a
```

Example: |-5| = 5

Vinculum (Bar):

Expression marked with a bar (—) is solved before the standard BODMAS sequence.

Pro-Tip: Solve 10 simplification questions daily to reduce calculation errors.

2. PROFIT AND LOSS

Loss or gain is always reckoned on the Cost Price (C.P.).

Basic Formulas

Gain	(S.P.) - (C.P.)
Loss	(C.P.) - (S.P.)
Gain %	(Gain x 100) / C.P.
Loss %	(Loss x 100) / C.P.

To find S.P. & C.P.

S.P. = [(100 + Gain%) / 100] x C.P.

S.P. = [(100 - Loss%) / 100] x C.P.

C.P. = [100 / (100 + Gain%)] x S.P.

Special Scenarios

- **Common Gain & Loss:** Sells two items, one at x% gain and other at x% loss. Gain/loss is always a loss:

```
Loss % = (x / 10)^2
```

- **False Weights:** Gain % = [Error / (True Value - Error)] x 100%

3. MIXTURES & ALLIGATIONS

The Rule of Alligation enables us to find the ratio in which two ingredients must be mixed to reach a desired price.

Rule of Alligation:

```
(Qty of Cheaper) / (Qty of Dearer) = (C.P. Dearer - Mean Price) / (Mean Price - C.P. Cheaper)
```

Alligation Diagram

Cheaper Price (c) ↘ ↙ Dearer Price (d)

Mean Price (m)

↙ ↘

(d - m) (m - c)

Ratio = (d - m) : (m - c)

Liquid Replacement Formula

If a container has x units of liquid and y units are replaced by water repeatedly n times:

```
Final Quantity = x [1 - (y/x)]^n
```

4. INTEREST CALCULATION

Simple Interest (S.I.)

```
S.I. = (P x R x T) / 100
```

Where P = Principal, R = Rate%, T = Time in years.

Compound Interest (C.I.)

Amount (A) = P [1 + (R/100)]^n

Compounded	Formula for Amount (A)
Annually	P [1 + R/100]^n
Half-Yearly	P [1 + (R/2)/100]^2n
Quarterly	P [1 + (R/4)/100]^4n
Varying R1,R2,R3	P [1 + R1/100][1 + R2/100][1 + R3/100]

Present Worth (P.W.): Rs. x due n years hence:

```
P.W. = x / [ 1 + (R/100) ]^n
```

5. SURDS & INDICES

Laws of Indices

- a^m x a^n = a^(m+n)
- a^m / a^n = a^(m-n)
- (a^m)^n = a^(mn)
- (ab)^n = a^n b^n
- (a/b)^n = a^n / b^n
- a^0 = 1

Laws of Surds

Let **a** be rational and **n** be positive integer:

√(ab) = √a x √b
√(a/b) = √a / √b
(n√a)^n = a
m√(n√a) = (mn)√a

Example: (√a)^2 = a

6. TIME, WORK & DISTANCE

Work & Time

- If A can do a piece of work in **n** days, then A's 1 day's work = **1/n**.
- **Efficiency:** If A is thrice as good as workman B, Ratio of work A:B = 3:1. Ratio of time A:B = 1:3.

Time & Distance

Speed = Dist/Time	Time = Dist/Speed	Dist = Speed x Time

Conversions & Average

x km/hr to m/s	x * (5/18)
x m/s to km/hr	x * (18/5)
Average Speed	(2xy) / (x+y) — [Equal distances at speeds x and y]

7. RATIO & PROPORTION

Ratio (a:b)

a = antecedent, b = consequent.

Multiplying or dividing both terms by same non-zero number does not change ratio.

Proportion (a:b :: c:d)

Product of Means = Product of Extremes

```
(b x c) = (a x d)
```

Key Terms

- **Fourth Proportional:** x = (b*c)/a
- **Third Proportional:** x = b^2/a
- **Mean Proportional:** √(ab)
- **Componendo & Dividendo:** If a/b = c/d, then (a+b)/(a-b) = (c+d)/(c-d)

8. PERMUTATION & COMBINATION

Factorial Notation

```
n! = n(n-1)(n-2)...3.2.1
```

Example: 0! = 1; 4! = 24

Permutation (nPr)

Arrangements where order matters.

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

Combination (nCr)

Selections where order doesn't matter.

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

Properties:
- nCn = 1
- nC0 = 1
- nCr = nC(n-r)

9. PROBABILITY

The measure of uncertainty of an event.

$$P(E) = n(E) / n(S)$$

n(E) = favorable outcomes, n(S) = total possible outcomes.

Principles

- $0 \leq P(E) \leq 1$
- $P(S) = 1$ (Sure event)
- $P(\Phi) = 0$ (Impossible event)
- $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- $P(A') = 1 - P(A)$

Card Deck: 52 cards (26 Red, 26 Black). 4 Suits (Spades, Clubs, Hearts, Diamonds). 12 Face cards (Kings, Queens, Jacks).

10. MENSURATION

3D Shapes

Shape	Volume	Surface Area
Cuboid	l x b x h	2(lb + bh + lh)
Cube	a^3	6a^2
Cylinder	πr^2h	2πrh (Curved)
Cone	1/3 πr^2h	πrl (Curved)
Sphere	4/3 πr^3	4πr^2
Hemisphere	2/3 πr^3	2πr^2 (Curved)

Diagonal Formulas:
- Cuboid: √(l^2 + b^2 + h^2)
- Cube: a√3

11. ALGEBRAIC IDENTITIES

Constant use of these identities helps in Simplification and Quadratic Equations.

(a + b)^2 = a^2 + b^2 + 2ab

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

(a^2 - b^2) = (a + b)(a - b)

(a + b + c)^2 = a^2+b^2+c^2+2(ab+bc+ca)

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

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

Special Condition

If (a + b + c) = 0, then:

```
a^3 + b^3 + c^3 = 3abc
```

12. PARTNERSHIP

When two or more persons run a business jointly.

Ratio of Divisions of Gains

Case I: Same Time Period

Ratio of Profit = Ratio of Investment

Case II: Different Time Periods

```
Profit Ratio = (P1 x T1) : (P2 x T2)
```

Partner Types

- **Working Partner:** Manages the business.
- **Sleeping Partner:** Only invests the money.

CONGRATULATIONS!

You are now ready for a quick overview of Quant Aptitude.

LEVEL UP YOUR PREP

Visit LearnFrenzy to get:

✓ Interactive Practice Quizzes

✓ Daily Current Affairs

✓ Handwritten Notes

✓ Sectional Mock Tests

VISIT LEARNFRENZY.COM