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QUANTITATIVE APTITUDE · FREE STUDY MATERIAL

Profit and Loss

Formulas & Shortcut Tricks

Every important formula, shortcut and exam trick for Profit and Loss in one place – with solved examples, common mistakes and a one-page revision sheet.

WHAT'S INSIDE

1. Topic introduction
2. Important formulas
3. Shortcut tricks & smart techniques
4. Solved examples
5. Important exam tips
6. Quick revision sheet
7. A message from LearnFrenzy

USEFUL FOR

- SSC CGL / CHSL / MTS
- Bank PO & Clerk (IBPS, SBI, RBI)
- Railways (RRB NTPC, Group D)
- Campus placements (TCS, Infosys, Wipro, Accenture)
- UPSC CSAT & state PSC exams

Practise **Profit and Loss** free on LearnFrenzy – questions with instant explanations →

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1 Topic introduction

What it is, why it matters and how it is asked

Profit and Loss studies what happens between buying and selling. The cost price (CP) is what a trader pays; the selling price (SP) is what the customer pays. If SP is higher there is a profit, if lower a loss – and both are always measured as a percentage of the cost price unless a question says otherwise.

Shops add two more ideas: the marked price (MP) printed on the tag and the discount given on it. Almost every question in this chapter is a chain of percentage changes – mark-up, discount, profit – so the multiplying-factor method from the Percentage chapter does most of the work.

Why it matters in exams

- SSC, bank and railway papers ask 2–4 profit-and-loss questions in every paper.
- Placement tests love discounts, “CP of x = SP of y”, dishonest dealers and two articles sold at the same price.
- The same ideas drive real decisions about pricing, offers and GST.

Where it is used

- Shop pricing: mark-up, sale discounts and “buy 2 get 1 free” offers.
- Business planning: overheads, wastage and target profit.
- Comparing offers when shopping online or in stores.

Common question patterns

Basic CP / SP
Profit or loss percent, or CP from SP.

Discounts
Marked price, single and successive discounts.

Mark-up
How much to mark up for a target profit after a discount.

CP of x = SP of y
Find the profit or loss percent.

Same selling price
Two articles, one at a gain and one at a loss.

Dishonest dealer
False weights, with or without a price increase.

Chain of sellers
Manufacturer → wholesaler → retailer → customer.

Wastage and overheads
Breakage, transport costs and GST.

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2 Important formulas

Cards marked MOST USED are the ones to revise first

Cost price, selling price, profit and loss

Profit and loss percent

MOST USED

$$\text{Profit} = SP - CP;\ \text{Loss} = CP - SP;\ \text{Profit \%} = \text{Profit}/CP \times 100;\ \text{Loss \%} = \text{Loss}/CP \times 100$$

Percentages are on the cost price unless the question says “on selling price”.

EXAMPLE CP ₹640, SP ₹800 → profit 160 → 160/640 × 100 = **25%**.

Selling price from cost price

MOST USED

$$SP = CP \times (1 + p/100) \text{ for a profit; } SP = CP \times (1 - l/100) \text{ for a loss}$$

A profit or loss is just a percentage change on CP.

EXAMPLE CP ₹2,400 sold at 12.5% loss → 2,400 × 0.875 = **₹2,100**.

Cost price from selling price

MOST USED

$$CP = SP \div (1 + p/100) \text{ or } SP \div (1 - l/100)$$

Divide by the factor – never take the percentage of SP.

EXAMPLE SP ₹920 at 15% profit → CP = 920 ÷ 1.15 = **₹800**.

Marked price and discount

Discount

MOST USED

$$\text{Discount} = MP - SP;\ \text{Discount \%} = \text{Discount}/MP \times 100;\ SP = MP \times (1 - d/100)$$

Discount is always on the marked price, profit always on the cost price.

EXAMPLE MP ₹1,500 with 20% discount → SP = 1,500 × 0.8 = **₹1,200**.

Successive discounts

$$d_1\% \text{ then } d_2\% = \text{single discount of } d_1 + d_2 - d_1 d_2/100\ \%$$

The second discount is on the already-reduced price.

EXAMPLE 20% then 10% → 20 + 10 − 2 = **28%**.

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Mark-up and discount together

MOST USED

Mark up m%, then discount d% → profit % = m − d − md/100

It is the successive-change formula with a minus for the discount.

EXAMPLE Mark up 40%, discount 25% → 40 − 25 − 10 = **5%** profit.

Mark-up needed for a target profit

MOST USED

MP/CP = (100 + p)/(100 − d)

Work out how high the tag must be so that, after the discount, the profit is still p%.

p – target profit % **d** – discount %

EXAMPLE 20% profit after a 25% discount → MP/CP = 120/75 = 1.6 → mark up **60%**.

Special situations

"CP of x articles = SP of y articles"

MOST USED

Profit % = (x − y)/y × 100 (loss if y > x)

Divide by the number of articles sold (y), not bought.

EXAMPLE CP of 25 = SP of 20 → (25 − 20)/20 × 100 = **25%** profit.

"Buy n, get m free"

Effective discount = m/(n + m) × 100 %

The customer takes n + m items for the price of n.

EXAMPLE Buy 4 get 1 free → 1/5 × 100 = **20%** discount.

Two articles at the same selling price

MOST USED

One at r% gain and one at r% loss → always an overall loss of $r^2/100$ %

The article sold at a loss cost more, so the loss outweighs the gain.

EXAMPLE Both sold for ₹1,200 at ±20% → CPs 1,000 and 1,500 → loss **₹100** (4%).

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False weights (dishonest dealer)

MOST USED

> **Profit % = (true weight − false weight)/false weight × 100; with a price rise of p%: profit = (1 + p/100) × true/false − 1**

The dealer gives less goods for the full price.

EXAMPLE 900 g given for 1 kg → 100/900 × 100 = **11.11%** profit.

Chains, wastage and taxes

Chain of sellers

> **Final price = first CP × (1 + p_1/100) × (1 + p_2/100) × …**

Each seller's SP is the next seller's CP.

EXAMPLE A → B at 20% profit, B → C at 25% profit, C pays ₹1,500 → A's CP = 1,500 ÷ 1.5 = **₹1,000**.

Wastage and overheads

MOST USED

> **Total cost = purchase + expenses; SP per unit = total cost × (1 + p/100) ÷ units left to sell**

Damaged or wasted goods still have to be paid for.

EXAMPLE 50 kg at ₹30, 10% wasted, 20% profit wanted → 1,500 × 1.2 ÷ 45 = **₹40** per kg.

GST on the selling price

> **Price paid = SP × (1 + g/100)**

Profit is worked on the price before tax.

EXAMPLE SP ₹2,500 with 18% GST → customer pays 2,500 × 1.18 = **₹2,950**.

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3 Shortcut tricks & smart techniques

Each trick says when to use it – that matters as much as the trick

Fraction ratio of CP and SP

MOST USED

USE WHEN Profit or loss percentages that are simple fractions.

Profit / loss	As a fraction	CP : SP
10% profit	1/10	10 : 11
12.5% profit	1/8	8 : 9
20% profit	1/5	5 : 6
25% profit	1/4	4 : 5
20% loss	1/5	5 : 4
25% loss	1/4	4 : 3

EXAMPLE 20% loss and SP ₹640 → CP : SP = 5 : 4 → CP = 640 × 5/4 = **₹800**.

Single equivalent of successive discounts

USE WHEN Two or three discounts in a row.

Discounts	Single discount
10% and 10%	19%
20% and 10%	28%
20% and 20%	36%
25% and 20%	40%
30% and 20%	44%

EXAMPLE 25% then 20% on ₹2,000 → 40% off → **₹1,200**.

Difference of two selling prices

MOST USED

USE WHEN "Had he sold at x% profit instead of y% loss, he would have got ₹D more."

1. The difference in percentages (profit counts +, loss counts –) equals D rupees.
2. CP = D ÷ (difference of percentages) × 100.

EXAMPLE 15% profit vs 10% loss differ by ₹150 → CP = 150/25 × 100 = **₹600**.

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Net effect of mark-up and discount

USE WHEN A shopkeeper marks up and then offers a discount.

1. Use m − d − md/100.
2. Or multiply factors: (1 + m/100)(1 − d/100).

EXAMPLE Mark up 50%, discount 20% → 50 − 20 − 10 = **20%** profit.

False weight with a price increase

USE WHEN A dealer both raises the price and gives short weight.

1. Write the price factor (e.g. 1.10 for +10%).
2. Multiply by true ÷ false weight (e.g. 1000/900).
3. Subtract 1 for the profit.

EXAMPLE +10% price and 900 g for 1 kg → 1.10 × 1000/900 = 1.2222 → **22.22%** profit.

Use 100 as the cost price

USE WHEN Only percentages are given.

1. Take CP = 100, apply mark-up, discount, profit step by step.
2. Read the answer directly as a percentage.

EXAMPLE CP 100 → MP 125 → 12% discount → SP 110 → **10%** profit.

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4 Solved examples

The full method on the left, the exam shortcut on the right

1 CP FROM SP

A trader sells an article for ₹1,512 and makes a profit of 8%. What did it cost him?

STEP BY STEP

1. SP = CP × 1.08.
2. CP = 1,512 ÷ 1.08 = 1,400.

SHORTCUT

8% = 2/25 → CP : SP = 25 : 27 → CP = 1,512 × 25/27 = 1,400.

Why it works: The profit is a percentage of CP, so divide SP by 1.08.

Answer: ₹1,400

2 SUCCESSIVE DISCOUNTS

A shirt marked at ₹1,800 is sold after successive discounts of 20% and 10%. What does the customer pay?

STEP BY STEP

1. After 20%: 1,800 × 0.8 = 1,440.
2. After 10%: 1,440 × 0.9 = 1,296.

SHORTCUT

Single discount 28% → 1,800 × 0.72 = 1,296.

Why it works: The second discount is on ₹1,440, not on ₹1,800.

Answer: ₹1,296

3 MARK-UP AND DISCOUNT

A shopkeeper marks his goods 30% above cost and allows a 10% discount. What is his profit percent?

STEP BY STEP

1. CP = 100 → MP = 130.
2. SP = 130 × 0.9 = 117.
3. Profit = 17%.

SHORTCUT

30 − 10 − 300/100 = 17%.

Why it works: The discount is on the higher marked price, so it costs less than 10% of CP.

Answer: 17%

4 TARGET PROFIT

A trader wants a profit of 26% even after giving a 10% discount. By what percentage above cost must he mark his goods?

STEP BY STEP

1. Let CP = 100; required SP = 126.
2. SP = 90% of MP → MP = 126 ÷ 0.9 = 140.
3. Mark-up = 40%.

SHORTCUT

(100 + 26) ÷ (100 − 10) = 1.4 → 40% above cost.

Why it works: The tag must be high enough that 90% of it still equals 126% of cost.

Answer: 40%

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5 CP OF X = SP OF Y

The cost price of 18 pens equals the selling price of 15 pens. Find the profit percent.

STEP BY STEP

1. Let each pen cost ₹1 → 15 pens sell for ₹18.
2. CP of 15 pens = 15 → profit 3 on 15.
3. Profit % = 3/15 × 100 = 20%.

SHORTCUT

(18 − 15)/15 × 100 = 20%.

Why it works: The profit is compared with the cost of the pens actually sold.

Answer: 20%

6 SAME SELLING PRICE

Two phones are sold for ₹9,600 each – one at a 20% gain and the other at a 20% loss. What is the overall result?

STEP BY STEP

1. CP of first = 9,600 ÷ 1.2 = 8,000.
2. CP of second = 9,600 ÷ 0.8 = 12,000.
3. Total CP 20,000, total SP 19,200 → loss ₹800.

SHORTCUT

Loss % = $20^2/100$ = 4% of 20,000 = ₹800.

Why it works: The phone sold at a loss had the bigger cost, so the loss is larger than the gain.

Answer: Loss of ₹800

7 FALSE WEIGHT

A grocer claims to sell at cost price but uses a 950 g weight for 1 kg. What is his gain percent?

STEP BY STEP

1. He gives 950 g but charges for 1,000 g.
2. Gain = 50 g on 950 g.
3. Gain % = 50/950 × 100 = 5 5/19%.

SHORTCUT

(1,000 − 950)/950 × 100 = 100/19 = 5 5/19%.

Why it works: His cost is for what he actually gives (950 g), so divide by 950.

Answer: 5 5/19%

8 TWO SELLING PRICES

If an article is sold at 18% profit instead of 12% profit, the seller gets ₹54 more. What is its cost price?

STEP BY STEP

1. Extra 6% of CP = ₹54.
2. CP = 54 ÷ 0.06 = 900.

SHORTCUT

54 ÷ (18 − 12) × 100 = 900.

Why it works: The gap between the two percentages is worth exactly the gap in rupees.

Answer: ₹900

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9 CHAIN OF SELLERS

A manufacturer sells to a wholesaler at 10% profit, who sells to a retailer at 15% profit. The retailer pays ₹3,795. What did it cost the manufacturer?

STEP BY STEP

1. Retailer pays = cost × 1.10 × 1.15 = cost × 1.265.
2. Cost = 3,795 ÷ 1.265 = 3,000.

SHORTCUT

Divide by the product of factors: 3,795 ÷ 1.265 = ₹3,000.

Why it works: Each seller's selling price is the next seller's cost price.

Answer: ₹3,000

10 WASTAGE

A vendor buys 200 eggs at ₹6 each. 20 eggs break. At what price must he sell each remaining egg to make 20% profit on his total outlay?

STEP BY STEP

1. Total cost = 200 × 6 = ₹1,200.
2. Required SP = 1,200 × 1.2 = ₹1,440.
3. Eggs left = 180 → 1,440 ÷ 180 = ₹8 each.

SHORTCUT

1,200 × 1.2 ÷ 180 = ₹8.

Why it works: The broken eggs were paid for, so their cost is spread over the good ones.

Answer: ₹8

11 BUY N GET M FREE

A shop offers "buy 3, get 1 free" and also gives a further 10% discount on the bill. What is the overall discount on the goods taken?

STEP BY STEP

1. 4 items for the price of 3 → 25% discount.
2. Further 10% off → single discount = 25 + 10 − 2.5 = 32.5%.

SHORTCUT

Factors: 0.75 × 0.90 = 0.675 → 32.5% off.

Why it works: The free item and the bill discount combine like successive discounts.

Answer: 32.5%

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5 Important exam tips

Patterns, traps and habits that save marks

Frequently asked question patterns

- CP from SP with a given profit or loss percent.
- Successive discounts and their single equivalent.
- Mark-up needed for a target profit after a discount.
- “CP of x = SP of y” and “buy n get m free”.
- Two articles sold at the same price, one at a gain and one at a loss.
- Dishonest dealers with false weights.
- Chains of sellers, wastage, overheads and GST.

Common mistakes to avoid

- Taking profit % on SP instead of CP.
- Taking discount % on CP instead of MP.
- Adding successive discounts (20% + 10% ≠ 30%).
- Finding CP by subtracting p% of SP instead of dividing by (1 + p/100).
- Dividing by the articles bought instead of sold in “CP of x = SP of y”.
- Thinking equal gain and loss on two articles cancel out.
- Forgetting that wasted goods were also paid for.

Points to remember

- Profit and loss are on CP; discount is on MP.
- Mark up m%, discount d% → profit m − d − md/100.
- MP/CP = (100 + p)/(100 − d).
- Same SP, ±r% → loss of $r^2/100$ %.
- False weight profit = (true − false)/false × 100.

Speed and accuracy

- Use CP = 100 when only percentages are given.
- Learn the CP : SP ratios for 10%, 12.5%, 20% and 25%.
- Multiply factors for every chain of changes.
- Check the answer by working forwards from it.

Preparation strategy

- Learn the three prices (CP, MP, SP) and which base each percentage uses.
- Practise on LearnFrenzy in order: Easy → Medium → Hard → Exam Pattern Mix → Data Sufficiency.
- Aim for 40–60 seconds per question.
- Keep an error log of base mistakes (CP vs SP vs MP).
- Read the Quick Revision Sheet (next page) the night before the exam.

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6 Quick revision sheet

Everything on one page for the night before the exam

Formulas

Profit %	**(SP − CP)/CP × 100**	Loss %	**(CP − SP)/CP × 100**
SP (profit p%)	**CP × (1 + p/100)**	CP from SP	**SP ÷ (1 ± p/100)**
Discount %	**(MP − SP)/MP × 100**	SP after discount	**MP × (1 − d/100)**
Successive d_1, d_2	**$d_1 + d_2 - d_1d_2/100$**	Mark-up m, discount d	**m − d − md/100**
MP/CP	**(100 + p)/(100 − d)**	CP of x = SP of y	**(x − y)/y × 100**
Buy n get m	**m/(n + m) × 100**	Same SP, ±r%	**loss r^2/100 %**
False weight	**(true − false)/false × 100**	Two SPs differ by D	**CP = D/(% gap) × 100**
Chain	**CP × factors**	GST	**SP × (1 + g/100)**

Shortcut tricks

- Profit on CP, discount on MP.
- 25% profit → CP : SP = 4 : 5.
- 20% + 10% discount = 28%.
- CP = 100 for percent-only questions.
- ±r% on equal SPs → loss.
- Short weight: divide by what is given.

Must-know numbers

CP : SP (profit)	10% 10:11 · 12.5% 8:9 · 16.67% 6:7 · 20% 5:6 · 25% 4:5 · 33.33% 3:4 · 50% 2:3
CP : SP (loss)	10% 10:9 · 12.5% 8:7 · 20% 5:4 · 25% 4:3
Successive discounts	10+10 → 19 · 20+10 → 28 · 20+20 → 36 · 25+20 → 40 · 30+20 → 44 · 25+25 → 43.75

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7 A message from LearnFrenzy

For everyone preparing for placements, competitive and government exams

Keep going – you are closer than you think

Success in examinations is not just about how many hours you study. It is about how effectively you understand concepts, practise questions, and improve yourself every day.

Every formula you learn, every problem you solve, and every mistake you correct brings you one step closer to your goal.

Whether you are preparing for campus placements, competitive examinations, or government jobs, remember that consistency, confidence, and smart preparation make a real difference.

Don't just memorize formulas. Understand the concepts, practise smart techniques, and develop the confidence to solve problems independently.

Your hard work today can create the opportunities you dream of tomorrow.

— Team LearnFrenzy

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