

**APTITUDE**  
**TOPIC: PROFIT AND LOSS**  
**STUDY MATERIAL**



**CONCEPT 1:**

**Introduction**

- This unit would comprise of six main terms at large namely:
  1. Cost Price (CP): Cost Price or CP in layman's term is the price at which an article has been purchased.
  2. Selling Price (SP): Selling price or SP is the price at which the item has been sold.
  3. Profit: Profit is the amount one has gained in carrying out a transaction, i.e., by selling an item.
  4. Loss: Loss in the same way is the amount one loses in selling an item.
  5. Marked Price (MP): Marked price or MP is the price that a shopkeeper or your shopping sites label for the item.
  6. Discount: Discount is the term which we all want for everything we buy. Ok, Jokes apart, it is the amount that is provided we need not to pay of the MP.
- Now, to explain the first four items above and to form a clearer picture I would like to tell you a story. Look at the picture below.



- CASE 1: There was a trade fair, in which livestock was being sold. A farmer bought a cow from one trader at Rs. 10000. In this transaction the trader earned a profit of Rs. 2000.

So, from this transaction we could easily infer that the trader earned a profit on selling the cow to the farmer, so the cost price for the trader comes out to be Rs. 8000/-.

Now consider another case,

- CASE 2: The farmer sells the cow to his brother at Rs.12000, now the selling price of the previous transaction become the cost price of this transaction, since the seller and buyer have changed. Now CP here is Rs. 10000.

So, what we conclude is that we need to first chalk out the transaction that is being discussed before advancing towards any calculations.

Students, we would be analyzing the underlying concepts rather than relying on ready-made formulae, so that we could solve any problem related to this topic, and at the end of all this concept building, you would be in a position to write all the formulas on you own.

Just remember basic things like, if SP is greater that means profit is made, and if CP is greater than SP, loss is incurred.

Also, profit % or loss % would always be calculated by keeping CP as reference, as evident from the previous statement.

- This unit requires just basic arithmetic and knowledge of percentage to cover entire concepts.

Let's take an example and understand all the concepts one by one.

- Example 1: A boy sells his bicycle at Rs. 600, and in this situation, he gains 20%. Calculate profit, CP and SP.

Solution: Here we have a situation in which a boy is selling his bicycle.

We get the selling price that is given in the question itself, i.e., Rs. 600.

Now, as stated earlier we need to focus on the transaction involved, upon selling the bicycle at Rs.600, he gains 20%, so we get an idea that the SP is 20% more than the CP.

So, we easily calculate CP as Rs. 500, and profit as Rs. 100.

Till now, we have not discussed any formulae, rather solely relied on concepts and analysis of transaction involved.

- Example 2: Ram purchased a TV at Rs. 12000, and sold it at Rs. 15000, find the loss or profit involved.

Solution: Here, we have the purchase price, that is the CP = Rs.12000, also the selling price is 15000, so we see that the  $SP > CP$ , therefore we have profit involved here.

So, profit would be how higher the SP is than CP, so we get,

Profit =  $SP - CP$ .

So, Profit =  $15000 - 12000 = 3000$

Now, bonus question, lets calculate profit % here, for that again concepts come into play, since profit is calculate by keeping the CP as the reference, therefore for calculating Profit %, we need to take CP as reference again and calculate that how much % more is SP than CP. Or in more simpler terms, Profit is what % of CP. Task done!!!!

So, Profit % =  $(\text{Profit}/CP) \times 100$

OR Profit % =  $((SP - CP)/CP) \times 100$ .

Now, calculate...

- Now, coming to the last two topics left, and as the customary approach that we have been following, I would be again telling you a story for perfect visualization.
- So, you visit a shopping complex and see your favourite watch out there, now you see the label on it that states Rs. 4000. Now, the salesman approaches you and starts telling you about the functions of it, but what is more important is the discount about which he tells you would be provided, being 25%. You find the deal nice and buy it.

Now, from the above case, we deduce that the MP of the watch is Rs.4000, and the discount provided is 25%.

Since discount is provided over the MP so, we calculate the value of discount as 25% of MP, i.e., Rs.1000.



And we get the SP as  $MP - \text{Discount} = \text{Rs.}3000$ .

NOTE: Since discount is provided on MP, therefore for calculating discount, using discount%, we would always use MP as the reference. As was the case with Profit or Loss %, in which we used CP as the reference.

Let's take a quick example to brush up the concepts discussed.

- Example 1: The price of one banana is Rs.5, Ram buys two dozen, when told that he would be getting a discount of Rs.6 per dozen of the bananas bought. Find the price Ram needs to pay and the discount % provided.

Solution: Here we see that one banana costs Rs.5, so for 24 bananas, Ram needs to pay Rs.  $24 \times 5 = \text{Rs.}120$ . But, for each dozen he gets a discount of Rs. 6, so the net discount comes out to be = Rs.12.

Therefore, the SP comes out to be Rs.  $120 - 12 = \text{Rs.}108$  (This is the amount Ram need to pay to get 2 dozen of bananas).

Now, for discount %, as discussed earlier, we need to consider MP as the reference value for calculating the same. So,  $\text{discount \%} = (\text{Discount}/\text{MP}) \times 100$ . Which comes out to be:  $(12/120) \times 100 = 10\%$ .

- Everything discussed above employs only basic aptitude and the concepts underlying these terms. Having said that, it could be inferred now that we are in a position to work out any problem given to us.
- Here are the formulas, just for reference,

$$\text{Profit or Gain} = \text{Selling price} - \text{Cost Price}$$

$$\text{Loss} = \text{Cost Price} - \text{Selling Price}$$

$$\text{Profit percentage} = \frac{(\text{Profit} / \text{Cost Price}) \times 100}{}$$

$$\text{Loss percentage} = \frac{(\text{Loss} / \text{Cost price}) \times 100}{}$$

- When discount is given,

$$\text{SP} = \text{MP} - \text{Discount}$$

$$\text{Discount \%} = \frac{(\text{Discount}/\text{MP}) \times 100}{}$$

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





## PROBLEMS ON PROFIT AND LOSS

### FOUNDATION

1. A man buys an article for Rs. 27.50 and sells it for Rs. 28.60. find the gain percent?
  - a. 4 %
  - b. 3 %
  - c. 5 %
  - d. 10 %
  - e. None of these
2. If a radio is purchased for Rs. 490 and sold for Rs. 465.50. Find the loss percent?
  - a. 6 %
  - b. 5 %
  - c. 4 %
  - d. 3 %
  - e. None of these
3. A person incurs 5 % loss by selling a watch for Rs. 1140. At what price should the watch be sold to earn 5 % profit?
  - a. Rs. 1380
  - b. Rs. 1160
  - c. Rs. 1260
  - d. Rs. 1400
  - e. None of these
4. A man sold two cows at Rs. 1995 each. On one he lost 10 % and on the other he gained 10 %. What his gain or loss percent?
  - a. 4 %
  - b. 2 %
  - c. 0.5 %
  - d. 1 %
  - e. None of these
5. A vendor bought toffees at 6 for a rupee. How many for a rupee must he sell to gain 20 %?
  - a. 3
  - b. 4
  - c. 5
  - d. 6
  - e. None of these

**MODERATE**

1. The cost of an article including the sales tax is Rs. 616. The rates of sales tax is 10 %, if the shopkeeper has made a profit of 12 %, then the cost price of the articles is?
  - a. Rs. 350
  - b. Rs. 500
  - c. Rs. 650
  - d. Rs. 800
  - e. None of these
  
2. The profit earned by selling an article for Rs. 900 is double the loss incurred when the same article is sold for Rs. 450. At what price should the article be sold to make 25 % profit?
  - a. Rs. 400
  - b. Rs. 500
  - c. Rs. 700
  - d. Rs. 750
  - e. None of these
  
3. A trader Mixes 26 kg of rice at Rs. 20 per kg with 30 kg of rice of other variety at Rs. 36 per kg and sells the mixture at Rs. 30 per kg. His profit percent is:
  - a. No profit, No loss
  - b. 5 %
  - c. 8 %
  - d. 10 %
  - e. None of these
  
4. Aditya purchased 14 shirt & 25 pants at Rs. 45 and Rs. 55 respectively. What should be the Approximate overall average selling price of shirt and pant so that 40 % profit is earned?
  - a. Rs. 72.5
  - b. Rs. 71
  - c. Rs. 72
  - d. Rs. 70
  - e. None of these
  
5. An electric pump was sold at a profit of 15 %. Had it been sold for Rs. 600, the profit would have been 20 %. The former selling price is:
  - a. Rs. 500
  - b. Rs. 540
  - c. Rs. 575
  - d. Rs. 600
  - e. None of these

## HOTS -HIGH ORDER THINKING SKILLS

1. Ravi purchases 90 pens and sells 40 pens at a gain of 10% and 50 pens at a gain of 20%. Had he sold all of them at a uniform profit of 15% he would have got Rs. 40 less. Find the cost price of each pen.
  - a. Rs. 80
  - b. Rs. 75
  - c. Rs. 90
  - d. Rs. 100
  - e. None of these
  
2. At a cost of 60 paise per article, Sarika produces 750 articles. She puts the selling price such that if only 600 articles are sold, she would have made a profit of 40% on the outlay. However, 120 articles got spoilt and she was able to sell 630 articles at this price. Find her actual profit or loss percent as the percentage of the total outlay assuming that the unsold articles are useless.
  - a. 47% profit
  - b. 51% profit
  - c. 36% loss
  - d. 28% loss
  - e. None of these
  
3. Kritika bought 25 i-pads and i-phone for Rs. 205000. She sold 80% of the i-pads and 12 i-phones for a profit of Rs. 40000. Each i-pad was marked up by 20% over cost and each i-phone was sold at a profit of RS. 2000. The remaining i-pads and 3 i-phones could not be sold. What is Kritika's overall profit/loss?
  - a. Rs. 500 profit
  - b. Rs. 1000 loss
  - c. Rs. 1500 profit
  - d. No profit, no loss
  - e. None of these
  
4. APD printed 3000 copies of a magazine at a cost of Rs. 240000. It gave 500 copies free to different philanthropic institutions. It allowed a discount of 25% on the published price and gave one copy free for every 25 copies bought at a time. It was able to sell all the copies in this manner. If the published price is Rs. 325, then what is its overall gain or loss percentage in the whole transaction?
  - a. 89% gain
  - b. 120% loss
  - c. 140% loss
  - d. 143.75% gain
  - e. None of these
  
5. A cab driver makes a profit of 20% on every trip when he carries 3 passengers, and the price of petrol is Rs. 30 a litre. Find the percentage profit for the same journey if he goes with four passengers per trip and the price of petrol reduces to Rs. 24 a litre? (Assume that revenue per passenger is the same in both the cases)
  - a. 100%
  - b. 76%
  - c. 54%
  - d. 43%
  - e. None of these

**SOLUTIONS**  
**FOUNDATION**

1. (a)

$$CP = \text{Rs. } 27.50, SP = \text{Rs. } 28.60$$

$$\text{Then Gain} = SP - CP = 28.60 - 27.50 = \text{Rs. } 1.10$$

$$\text{Since, Gain \%} = (\text{gain} \times 100/CP) \%$$

$$\gg \text{Gain \%} = (1.10 \times 100/27.50) \% = 4\%$$

2. (b)

$$CP = \text{Rs. } 490, SP = \text{Rs. } 465.50$$

$$\text{Loss} = CP - SP = 490 - 465.50 = \text{Rs. } 24.50$$

$$\text{Loss\%} = (\text{loss} \times 100/CP) \% = (24.50 \times 100/490) \% = 5\%$$

3. (c)

Let the new SP be Rs. X then

$$100 - \text{loss\%/1st SP} = 100 + \text{gain\%/2nd SP}$$

$$\gg 100 - 5/1140 = 100 + 5/X$$

$$\gg X = 105 \times 1140/95 = \text{Rs. } 1260$$

4. (d)

Here, since both gain and loss percent is same, hence the resultant value would be loss percent only.

$$\gg \text{Loss \%} = a^2/100 \text{ [where } a = 10 \text{ \%]}$$

$$= 1 \%$$

5. (c)

$$CP \text{ of } 6 \text{ toffees} = \text{Rs. } 1, CP \text{ of } 1 \text{ toffee} = \text{Rs. } 1/6$$

$$SP \text{ of } X \text{ toffee} = \text{Rs. } 1 \text{ [where } X \text{ is no. of toffees to sell]}$$

$$SP \text{ of } 1 \text{ toffee} = \text{Rs. } 1/X$$

$$\text{Gain \%} = 20/100 = \{(1/X) - (1/6)\} / (1/6)$$

$$\gg 1/5 \times 1/6 = 1/X - 1/6$$

$$\gg X = 5$$



**MODERATE**

1. (b)

110 % of SP = 616 (Rate of sales tax = 10 %)

SP =  $616 \times 100/110$  = Rs. 560

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

=  $(100 \times 560) / (100 + 12)$  = Rs. 500

2. (d)

Let CP be Rs. X

then,  $900 - X = 2(X - 450)$  [Profit = 2 Loss]

$3X = 1800$

X = Rs. 600

CP = Rs. 600, gain required = 25 %

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

SP =  $(100 + 25) \times 600/100$  = Rs. 750

3. (b)

Total CP of mixture =  $26 \times 20 + 30 \times 36$

$520 + 1080$  = Rs. 1600,

SP =  $30 \times 56$  = Rs. 1680

% profit =  $80/1600 \times 100$  = 5 %

4. (c)

Price of 14 shirts =  $14 \times 45$  = Rs. 630

25 pants =  $25 \times 55$  = Rs. 1375

Total price of 39 items = Rs. 2005

Price =  $(2005/39) \times 1.40$  [Overall profit = 40 %]

= 71.97 = Rs. 72 (Approx.)

5. (b)

Old Profit % =  $15/100 = \{(SP)1 - CP\}/CP$  ... (i)

New Profit % =  $20/100 = \{(SP)2 - CP\}/CP$  ... (ii) [ Here, (SP)2 = Rs. 600]

From (ii), we get CP = Rs. 500

Divide (i) and (ii):

$\frac{3}{4} = \{(SP)1 - 500\} / (600 - 500)$

Hence, (SP)1 = Former Selling price = Rs. 575

**HOTS- HIGH ORDER THINKING SKILLS**

1. (a)

Let the CP of each pen be Rs. 100  
 At the profit of 10 %, SP of 40 pens  
 $= (100 + 10) \times 40 = \text{Rs. } 4400$   
 At the profit of 20 %, SP of 50 pens  
 $= (100 + 20) \times 50 = \text{Rs. } 6000$   
 SP of 90 pens = Rs. (4400 + 6000) = Rs. 10400  
 CP of 90 pens = Rs. (90 × 100) = Rs. 9000  
 At the profit of 15 %, SP of 90 pens  
 $= \text{Rs. } (90 \times 115) = \text{Rs. } 10350$   
 Difference in SP = Rs. (10400 – 10350) = Rs. 50  
 If the difference is Rs. 50, then CP = Rs. 100  
 If the difference is Rs. 40, then CP  
 $= (100 \times 40) / 50 = \text{Rs. } 80$   
 Hence, the cost price of each pen is Rs. 80

2. (a)

Total CP of articles =  $750 \times 0.6 = \text{Rs. } 450$  [CP of 1 article = Rs. 0.6]  
 By selling 600 articles, Sarika should make a 40 % profit on the outlay. This means that the selling price for 600 articles should be  
 $1.4 \times 450 = \text{Rs. } 630$   
 Thus, selling price per article  
 $= 630/600 = 63/60 = \text{Rs. } 1.05$  [ SP of 1 article]  
 Since, Sarika sells only 630 articles at this price, her total recovery  
 $= 1.05 \times 630 = \text{Rs. } 661.5$   
 Hence, actual profit percent  
 $= \{(661.5 - 450) / 450\} \times 100$   
 $= 47 \%$   
 Thus, Sarika earns 47 % profit on her total investment.

3. (b)

Total number of i-phones = 15  
 $\therefore$  Total number of i-pads =  $25 - 15 = 10$   
 Total CP = Rs. 205000  
 Since, Kritika sells 80 % of both goods at a profit of Rs. 40000,  
 therefore, cost of 80 % of the goods =  $0.8 \times 205000 = \text{Rs. } 164000$   
 Total amount recovered (or SP)  
 $= \text{Rs. } (164000 + 40000) = \text{Rs. } 204000$   
 Hence, loss = Rs. (205000 – 204000) = Rs. 1000  
 Hence, Kritika's overall loss is Rs. 1000

4. (d)

Cost price = Rs. 240000 [Total 3000 copies]  
 Published price = Rs. 325 [Published price]  
 Content Powered by Leap Skills <https://www.leapskills.in/>  
 Selling price =  $(75/100) \times 325 = \text{Rs. } 243.75$   
 No. of free copies =  $500 + (2500/25) = 500 + 100 = 600$   
 So, total selling price =  $2400 \times 243.75 = \text{Rs. } 585000$

Hence, percentage gain =  $\{(585000 - 240000) / 240000\} \times 100$   
 $= (345000/240000) \times 100 = 143.75 \%$   
Hence, the overall gain is 143.75 %

5. (a)

Let CP of cab driver be price of petrol = Rs. 30 per litre

His, SP would be to carry 3 passengers

Let cost of 1 passenger be Rs. X

Initially he made profit of 20 %

$$\gg P\% = 20/100 = (SP - CP) / CP$$

$$\gg 20/100 = (3x - 30) / 30$$

$$\gg X = \text{Rs. } 12$$

Now, CP of petrol = Rs. 24 per litre

SP = 4 (cost of 1 passenger) = Rs. 48

$$= \text{profit \%} = \{(48 - 24) / 24\} \times 100 = 100 \%$$