

# PROFIT & LOSS

In this chapter, the use of “*Rule of Fraction*” is dominant. We should understand this rule very well because it is going to be used in almost all the questions.

## The Rule of Fraction

If our required value is greater than the supplied value we should multiply the supplied value with a fraction which is more than one. And if our required value is less than the supplied value, we should multiply the supplied value with a fraction which is less than one.

1. If there is a gain of  $X\%$ , the calculating figures would be 100 and  $(100 + X)$ .

2. If there is a loss of  $Y\%$ , the calculating figures would be 100 and  $(100 - Y)$ .

3. If the required value is more than the supplied value, our multiplying fractions should be

$$\frac{100 + X}{100}, \frac{100}{100 - Y} \text{ (both are greater than 1).}$$

4. If the required value is less than the supplied value, our multiplying fractions should be

$$\frac{100}{100 + X}, \frac{100 - Y}{100} \text{ (both are less than 1).}$$

## Some Defined Terms

1. *Cost Price (CP)*: It is price at which an article is purchased. Profit and loss both are calculated at cost price.

2. *Selling Price (SP)*: It is the price at which the article is sold.

3. (I) *Profit or Gain*. If SP is greater than CP, there is profit or gain.

$$\text{Profit} = \text{SP} - \text{CP}$$

(II) *Loss*. If SP is less than the CP, there is loss.

$$\text{Loss} = \text{CP} - \text{SP}$$

(III) If  $\text{SP} = \text{CP}$  Then there is no loss or gain.

4. Gain on ₹ 100 is gain per cent and loss on ₹ 100 is loss per cent.

## General Formula :

$$1. \text{ Gain \%} = \left( \frac{\text{Gain}}{\text{CP}} \times 100 \right) \%$$

$$2. \text{ Loss \%} = \left( \frac{\text{Loss}}{\text{CP}} \times 100 \right) \%$$

$$3. \text{ SP} = \left( \frac{100 + \text{Gain \%}}{100} \right) \times \text{CP}$$

$$4. \text{ SP} = \left( \frac{100 - \text{Loss \%}}{100} \right) \times \text{CP}$$

$$5. \text{ CP} = \left( \frac{100}{100 + \text{Gain \%}} \right) \times \text{SP}$$

$$6. \text{ CP} = \left( \frac{100}{100 - \text{Loss \%}} \right) \times \text{SP}$$

## Formula For Short-cut Solution :

*Type 1 :*

## Conditional Trick

If cost price of  $X$  goods = Selling price of  $Y$  goods then,

$$\text{I. Gain \%} = \frac{X - Y}{Y} \times 100 \text{ (In case of } X > Y \text{)}$$

$$\text{II. Loss \%} = \frac{Y - X}{Y} \times 100 \text{ (in case of } X < Y \text{)}$$

**Type 2 :**

**I.** If  $X_1$  and  $X_2$  both are the rate of gain or both are the rate of loss, then,  $CP = \left( \frac{100}{X_1 - X_2} \right) \times$   
amount of difference between SPs.

**II.** If in  $X_1$  and  $X_2$  one is the rate of gain and another is the rate of loss, then  $CP = \left( \frac{100}{X_1 + X_2} \right) \times$   
amount of difference between SPs

**Type 3 :****Miscellaneous Trick**

**I.** When a man buys two things on equal price and in those things one is sold on the profit of  $X\%$  and another is sold on the loss of  $X\%$ , then there is no loss or gain per cent.

**Example :** If Ravi buys two cows at ₹ 824 each and sells one at a gain of  $14\%$  and another one at a loss of  $14\%$ . How much does he gain or loss in the whole transaction?

**Ans.** No loss, no gain.

**II.** When a man sells two things at the same price each and in this process his loss on first thing is  $X\%$  and gain on second thing is  $X\%$  then in such type of questions, there is always a loss.

$$\text{Loss \%} = X \% \text{ of } X = \frac{X^2}{100} = \left( \frac{X}{10} \right)^2$$

**Example :** A man sold two watches at ₹ 450 each. He sold one at a loss of  $15\%$  and the other at a gain of  $15\%$ . His loss or gain is

- (a)  $15\%$  gain
- (b)  $2.25\%$  loss
- (c)  $30\%$  loss
- (d) Neither loss nor gain
- (e) None of these

**Ans.** (b)  $\text{Loss \%} = \left( \frac{15}{10} \right)^2 = 2.25\%$

**III. Dishonest dealer and less weight**

$$\text{Gain\%} = \frac{\text{Error}}{\text{True value} - \text{Error}} \times 100$$

Where, error =  $1000 \text{ gm} - \text{used weight of goods}$

**Example :** Dealer professes to sell his goods at cost price, but used a weight of 950 gms for a kilogram weight. His real gain per cent is

- (a)  $5\%$
- (b)  $5.26\%$
- (c)  $4\%$
- (d)  $4.75\%$
- (e) None of these

**Solution. (b) :**

$$\text{Gain \%} = \frac{50}{1000 - 50} \times 100 = \frac{50}{950} \times 100 = 5.26\%$$

**IV.** If A sells a thing to B at a gain of  $R_1\%$ , B sells it to C at a gain of  $R_2\%$  and C sells it to D at a gain of  $R_3\%$  then, CP for D = CP for A  $(1 + R_1/100)(1 + R_2/100)(1 + R_3/100)$

**Example :** A sells a watch to B at a gain of  $20\%$ , B sells it to C at a gain of  $25\%$  and C sells it to D at a gain of  $10\%$ . If D pays ₹ 330, what did it cost A ?

- (a) ₹ 250
- (b) ₹ 300
- (c) ₹ 200
- (d) ₹ 225
- (e) None of these

**Solution. (c) :**

$$330 = X(1 + 20/100)(1 + 25/100)(1 + 10/100)$$

$$\Rightarrow X = \frac{330 \times 100 \times 100 \times 100}{120 \times 125 \times 110} = ₹ 200$$

Where X is supposed the cost price of A.

**V.** If A sells a thing to B at a loss of  $R_1\%$ , B sells it to C at a loss of  $R_2\%$  and C sells it to D at a loss of  $R_3\%$  then, CP for D = CP for A  $(1 - R_1/100)(1 - R_2/100)(1 - R_3/100)$

**Example :** A sells a radio to B at a loss of  $20\%$ , B sells it to C at a loss of  $30\%$  and C sells it to D at a loss of  $10\%$ . If A pays ₹ 2,000 then cost price for D is

- (a) ₹ 1280
- (b) ₹ 1190
- (c) ₹ 1305
- (d) ₹ 1008
- (e) None of these

**Solution. (d) :** CP for D

$$= 2000 \times (1 - 20/100)(1 - 30/100)(1 - 10/100)$$

$$= \frac{2000 \times 80 \times 70 \times 90}{100 \times 100 \times 100} = ₹ 1008$$

## EXERCISE

1. By selling 66 metres of cloth, a person gains the cost of 22 metres. Find his gain %.  
 (a)  $33\frac{1}{2}\%$  (b)  $33\frac{1}{3}\%$   
 (c) 33% (d)  $34\frac{1}{3}\%$   
 (e) None of these
2. Madan buys 87 goods at the cost of ₹ 890 and sell 60 goods at the same cost of ₹ 890. What is the value of gain per cent?  
 (a) 55.5% (b) 50.9%  
 (c) 40% (d) 45%  
 (e) None of these
3. If an article is sold at a loss of 34.8% instead of at a loss of 17.8% then the seller gets ₹ 19.50 less. The CP of the article is :  
 (a) ₹ 330.50 (b) ₹ 337.50  
 (c) ₹ 300.70 (d) ₹ 331.50  
 (e) None of these
4. A motorcycle is sold at a gain of 18%. If it had been sold for ₹ 490 more, 23% would have been gained. The cost price of the motor cycle is :  
 (a) ₹ 10,500 (b) ₹ 9,500  
 (c) ₹ 9,800 (d) ₹ 12,000  
 (e) None of these
5. A man buys two horses for ₹ 1350, he sells one as to lose 6% and the other so as to gain 7.5 %. On the whole he neither gains nor loses. What does each horse cost?  
 (a) ₹ 750, ₹ 600 (b) ₹ 650, ₹ 500  
 (c) ₹ 700, ₹ 650 (d) ₹ 600, ₹ 750  
 (e) None of these
6. *K* sells a book to *L* at a gain of 20%, *L* sells it to *M* at a gain of 10% and *M* sells it to *N* at a gain of 12.5 %. If *N* pays ₹ 14.85, then what is the selling price of this book for *K*?  
 (a) ₹ 8.75 (b) ₹ 12.50  
 (c) ₹ 10 (d) ₹ 15  
 (e) None of these
7. Each of the two cars is sold at the same price. A profit of 10% is made on the first and a loss of 7% is made on the second. What is the combined loss or gain?  
 (a) 160/206 % gain (b) 160/203 % gain  
 (c) 160/205 % loss (d) 160/203 % loss  
 (e) None of these
8. A man purchased two cows for ₹ 500. He sells the first at 12 % loss and the second at 8% gain. In this bargain, he neither gains nor loses. Find the selling price of each cow.  
 (a) ₹ 176, 324 (b) ₹ 175, 325  
 (c) ₹ 324, 180 (d) ₹ 176, 325  
 (e) None of these
9. An article is marked for sale at ₹ 275. The shopkeeper allows a discount of 5% on the marked price. His net profit is 4.5%. What did the shopkeeper pay for the article?  
 (a) ₹ 250 (b) ₹ 300  
 (c) ₹ 350 (d) ₹ 225  
 (e) None of these
10. A shopkeeper bought 15 kg rice at the rate of ₹ 9.50 per kg and 25 kg rice at the rate of ₹ 7.25 per kg. He sold mixture of both types of rice at the rate of ₹ 10.50 per kg. In this transaction his profit is :  
 (a) ₹ 96.25 (b) ₹ 105.20  
 (c) ₹ 95.00 (d) ₹ 108.45  
 (e) None of these

## EXPLANATORY ANSWERS

1. (b) : Gain % =  $\frac{22}{66} \times 100 = 33\frac{1}{3}\%$ .

2. (d) : Gain % =  $\left(\frac{87-60}{60} \times 100\right)\% = 45\%$ .

3. (e) : CP = ₹  $\left(\frac{100}{34.8-17.8}\right) \times 19.50 = ₹ 114.70$

4. (c) : CP = ₹  $\left(\frac{100}{23-18}\right) \times 490 = ₹ 9,800$ .

- 5. (a) :** Loss on one horse = gain on the other  
 So, 6 % of the cost of first horse  
 = 7.5 % of the cost of the second horse

$$\text{So, } \frac{\text{Cost of first horse}}{\text{Cost of second horse}} = \frac{7.5\%}{6\%}$$

$$= \frac{15}{12} = \frac{5}{4}$$

$$\text{Cost of first horse} = \frac{5}{9} \times 1350 = ₹ 750$$

$$\text{Cost of second horse} = \frac{4}{9} \times 1350 = ₹ 600$$

- 6. (c) : Trick :** CP for  $N$

$$= \text{CP of } K \left(1 + \frac{20}{100}\right) \left(1 + \frac{10}{100}\right) \left(1 + \frac{12.5}{100}\right)$$

$$\Rightarrow 14.85 = X (120/100) \times (110/100) \times (225/200)$$

$$\Rightarrow X = ₹ \frac{14.85 \times 100 \times 100 \times 200}{120 \times 110 \times 225}$$

$$= ₹ 10$$

**7. (b) :**  $\frac{100(10 - 7) - 2 \times 10 \times 7}{200 + 10 - 7}$

$$= \frac{300 - 140}{203} = \frac{160}{203} \%$$

gain as the sign is + ve.

**8. (a) :** Cost price of first cow =  $\frac{500 \times 8}{12 + 8} = ₹ 200$

$$\text{So, SP of first cow} = 200 \left( \frac{100 - 12}{100} \right) = ₹ 176$$

$$\text{And CP of second cow} = \frac{500 \times 12}{12 + 8} = ₹ 300$$

$$\text{So, SP of second cow} = 300 (108/100) = ₹ 324$$

- 9. (a) :** We know that if the shopkeeper marked  $X$  % higher then

$$4.5 = X - 5 - \frac{5X}{100} \Rightarrow X = 10 \%$$

$$\text{Therefore, cost price} = 275 \left( \frac{100}{100 + 10} \right) = ₹ 250$$

**10. (a) : Trick :** Profit = SP - CP

$$= (15 + 25) 10.50 - (15 \times 9.50 + 25 \times 7.25)$$

$$= 420.00 - 323.75 = ₹ 96.25$$