# **COMPARING QUANTITIES**

# PROFIT, LOSS AND DISCOUNT

# Profit and Loss :

In our daily routine, we have to buy some articles from various shops. The shopkeepers purchase these articles either from wholesalers or directly from the manufacturers by paying a certain price. Generally, the shopkeeper sells his articles at a different price. These prices and difference in these prices are given special names such as cost price, selling price, profit, loss etc.

### **Cost Price :**

The price for which an article is purchased is called the cost price and abbreviated as C.P.

## Selling Price :

The price for which an article is sold is called the selling price and abbreviated as S.P.

## Profit :

If selling price is more than cost price, then the difference between selling price and the cost price is called the profit.

 $\therefore$  Profit = Selling Price - Cost Price

### Loss :

If selling price is less than cost price, then the difference between the selling price and cost price is called loss.

 $\therefore$  Loss = Cost Price – Selling Price

# **Overheads :**

Usually, a merchant has to spend some money on freight or transport, labour or maintenance of the purchased articles. These extra expenditures are called overheads. The overheads are an essential part of cost price.

 $\therefore$  Cost Price = (Payment made while purchasing the articles) + overhead charges

# Some useful Formulae to Find the above defined Terms :

- A. Profit or Gain (S.P. > C.P.)
- 1. Profit = S.P. C.P.

$$2. S.P. = Profit + C.P.$$

4. Profit 
$$\% = \frac{\text{Profit}}{\text{C.P.}} \times 100$$

5. 
$$\operatorname{Profit} = \frac{\operatorname{C.P.} \times \operatorname{Profit} \%}{100}$$

6. S.P. = C.P. 
$$\left(\frac{100 + \text{Profit }\%}{100}\right)$$

7. C.P. = 
$$\left(\frac{100 \times \text{S.P.}}{100 + \text{Pr ofit \%}}\right)$$

# B. Loss (S.P. > C.P.)

1. 
$$Loss = C.P. - S.P.$$

$$S.P. = C.P. - Loss$$

$$3. \qquad C.P. = Loss + S.P.$$

4. Loss 
$$\% = \frac{\text{Loss}}{\text{C.P.}} \times 100$$

5. 
$$Loss = \frac{C.P.\times Loss\%}{100}$$

6. S.P. = C.P. 
$$\left(\frac{100 - \text{Loss\%}}{100}\right)$$

7. C.P. = 
$$\frac{100 \times \text{S.P.}}{(100 - \text{Loss\%})}$$

Ex.1 Anshul purchased 100 oranges at the rate of Rs 2 per orange. He sold 60% of the oranges at the rate of Rs 2.50 per orange and the remaining oranges at the rate of Rs 2 per orange. Find his profit percent.

**Sol.**S.P. of 100 oranges =  $\text{Rs } 2 \times 100 = \text{Rs } 200$ 

60% of 100 oranges = 
$$\frac{60}{100} \times 100$$
 oranges

= 60 oranges

Now S.P. of 60 oranges =  $\text{Rs } 2.50 \times 60 = \text{Rs } 150$ 

and S.P. of the remaining (100 - 60), i.e.,

40 oranges = Rs  $2 \times 40$  = Rs 80

: S.P. of all the 100 oranges

= Rs 150 + Rs 80 = Rs 230

Therefore, profit = S.P. - C.P.

= Rs (230 - 200) = Rs 30

Hence, Profit percent =  $\frac{30}{200} \times 100 = 15\%$ 

Thus, Anshul's profit is 15%.

**Ex.2** By selling 144 eggs, Anuj lost the S.P. of 6 eggs. Find his loss percent.

**Sol.**Let S.P. of 1 egg = Rs 1

 $\therefore$  S.P. of 144 eggs = Rs 144 × 1 = Rs 144

and, Loss = S.P. of 6 eggs

= Re 1  $\times$  6 = Rs 6

 $\therefore$  C.P. of 144 eggs = S.P. + Loss

= Rs 144 + Rs 6 = Rs 150

Therefore, loss  $\% = \frac{\text{Loss}}{\text{C.P.}} \times 100$ 

$$=\frac{6}{150} \times 100 = 4$$

Thus, Anuj's loss is 4%.

**Ex.3** Mahender bought two cows at Rs 20,000 each. He sold one cow at 15% gain. But he had to sell the second cow at a loss. If he had suffered a loss of Rs 1,800 on the whole dealing, find the selling price of the second cow.

**Sol.**Total C.P. of the two cows =  $2 \times \text{Rs} 20000 = \text{Rs} 40000$ 

Loss = Rs 1800

 $\therefore$  Total S.P. = Rs 40000 - Rs 1800 = Rs 38200 ... (i)

Now, S.P. of the first cow at 15% profit

$$= C.P. \left(\frac{100 + Profit \%}{100}\right)$$
  
= Rs 20000 ×  $\frac{(100 + 15)}{100}$   
= Rs 20000 ×  $\frac{115}{100}$   
= Rs 200 × 115 = Rs 23000 ... (ii)

 $\therefore$  S.P. of the second cow = Rs 38200 - Rs 23000

[From (i) and (ii)]

= Rs 15200

Thus, the selling price of the second cow is Rs 15,200.

Ex.4 A man buys 60 pens at Rs 10 per pen and sells 40 pens at Rs 12 per pen and remaining 20 pens at Rs 9 per pen. Find his gain or loss percent.

**Sol.**Cost of 60 pens = Rs  $10 \times 60$  = Rs 600

S.P. of 40 pens =  $Rs 12 \times 40 = Rs 480$ 

- S.P. of 20 pens =  $Rs 9 \times 20 = Rs 180$
- $\Rightarrow$  Total S.P. = Rs 480 + Rs 180 = Rs 660

Since, S.P. > C.P.

 $\therefore \text{ Profit} = \text{Rs} 660 - \text{Rs} 600 = \text{Rs} 60$ 

$$\therefore \text{ Profit percent} = \frac{\text{Profit}}{\text{C.P.}} \times 100$$

$$=\frac{60}{600}\times 100=10\%.$$

- **Ex.5** By selling an air-cooler for Rs 6,800, Mr. Avinash lost 15%. For what price should he sell it to get a profit of 10% ?
- **Sol.**This sum will be solved in two parts. In 1st part, we find the C.P. and in 2nd part, we find the required S.P.

Part I :

S.P. of the air cooler = Rs 6800

Loss = 15% i.e., for every Rs 100 he is losing Rs 15.

∴ If C.P. is Rs 100,



Rs 8,800 in order to make a profit of 10%.

**Ex.6** A man sold two scooters for Rs 18000 each. On one, he gained 20% and on the other, he lost 20%. Find his total loss or gain.

**Sol.**S.P. of the first scooter = Rs 18000

Gain = 20%

Therefore,

$$C.P. = \frac{100 \times S.P.}{(100 + Profit \%)}$$

$$= Rs \frac{100 \times 18000}{(100 + 20)}$$

$$= Rs \frac{100 \times 18000}{120}$$

$$= Rs 100 \times 150$$

$$= Rs 15000 \qquad ... (i)$$
S.P. of the second scooter = Rs 18000  
Loss = 20%  
Therefore, C.P. =  $\frac{100 \times S.P.}{(100 - Loss\%)}$   

$$= Rs \frac{100 \times 18000}{(100 - 20)}$$

$$= \frac{100 \times 18000}{80}$$

$$= Rs 100 \times 225$$

$$= Rs 100 \times 225$$

$$= Rs 22500 \qquad ... (ii)$$
Now, total C.P.= Rs 15000 + Rs 22500

[From (i) and (ii)]

= Rs 37500

and total S.P.  $= 2 \times \text{Rs} \ 18000 = \text{Rs} \ 36000$ 

Hence, loss = C.P. - S.P.

= Rs 37500 - Rs 36000

= Rs 1,500.

**Ex.7** The cost price of 10 tables is equal to the selling price of 8 tables. Find the loss or profit percent.

**Sol.**Let the C.P. of each table = Rs 100

- $\therefore$  C.P. of 10 tables = Rs 1000
- $\therefore$  S.P. of 8 tables = Rs 1000

So, S.P. of 1 table = Rs  $\frac{1000}{8}$  = Rs 125

- $\therefore$  Profit on 1 table = Rs 125 Rs 100 = Rs 25
- or Profit percent =  $\frac{25}{100} \times 100 = 25\%$ .

### DISCOUNT

We read advertisements in our day-to-day life in newspapers. magazines, banners, posters given by various companies and shopkeepers declaring discounts such as :

"Off Season Discount",

"Grand Puja Discount",

"Goods at Throw away prices",

"Now get 1100 g Desi Ghee for the cost of just 1 kg.",

"Get a Steel Glass free with every 500 g pack of tea", etc.

When discount is given, a certain price is attached to the article which the shopkeeper professes to be the cost of the article for the customer. This price is called the marked price (or list price). Then, the shopkeeper offers discount on this marked price. Customer pays the difference between the marked price and the discount.

Some useful formulae regarding Discount, Marked Price, Selling Price, etc.

- 1. Net Selling Price = Marked Price Discount
- 2. Discount = Marked Price Net Selling Price
- 3. Marked Price = Net Selling Price + Discount

4. Discount % = 
$$\left(\frac{\text{Discount}}{\text{Marked Price}}\right) \times 100\%$$

5. S.P. = M.P. - 
$$\frac{\text{Discount \% \times M.P.}}{100}$$

6. S.P. = M.P. 
$$\left(1 - \frac{\text{Discount \%}}{100}\right)$$

7. S.P. = M.P. 
$$\left(\frac{100 - \text{Discount \%}}{100}\right)$$

8. M.P. = 
$$\frac{100 \times \text{S.P.}}{(100 - \text{Discount \%})}$$

Let us now consider some examples to illustrate the above facts.

**Ex.8** Marked price of a pen is Rs 20. It is sold at a discount of 15%. Find the discount allowed on the pen and its selling price.

**Sol.**Marked Price of the pen = Rs 20

Rate of discount = 15%

 $\therefore$  Discount allowed = 15% of Rs 20

$$=\frac{15}{100}$$
 × Rs 20 = Rs 3

Therefore, selling price of the pen = Rs 20 - Rs 3 = Rs 17.

**Ex.9** A chain with marked price Rs 1,200 was sold to a customer for Rs 1,000. Find the rate of discount allowed on the chain.

**Sol.**Marked Price = Rs 1200

Selling Price = Rs 1000

Discount = Rs 1200 - Rs 1000 = Rs 200

Rate of discount =  $\frac{\text{Discount}}{\text{M.P.}} \times 100\%$ 

$$=\frac{200}{1200}\times100\%=16.66\%$$

**Ex.10** A shopkeeper offers 15% season discount to the customers and still makes a profit of 19%. What is the cost price for the shopkeeper on a saree marked at Rs 2,240 ?

**Sol.**M.P. = Rs 2240

Rate of discount = 15%

Discount allowed = Rs  $\frac{15}{100} \times 2240 =$ Rs 336

Thus, S.P. of the saree = Rs (2240 - 336) = Rs 1904

Now, profit % of the shopkeeper = 19%

Therefore, C.P. =  $\frac{100 \times \text{S.P.}}{(100 + \text{Profit \%})}$ 

$$= \text{Rs} \ \frac{100 \times 1904}{(100 + 19)}$$

$$= \text{Rs} \ \frac{100 \times 1904}{119}$$

$$=$$
 Rs 100  $\times$  16  $=$  Rs 1600

Thus, the cost price of the saree is Rs 1,600.

Ex.11 A Jacket was sold for Rs 680 after allowing a discount of 15% on the marked price.Find the marked price of the Jacket.

Sol.Let M.P. be Rs x.

 $\therefore$  Discount = 15% on Rs x

$$= \text{Rs} \ \frac{15}{100} \times \text{x} = \text{Rs} \ \frac{3x}{20}$$

$$\therefore \text{ S.P.} = \text{Rs}\left(x - \frac{3x}{20}\right) = \text{Rs}\left(\frac{20x - 3x}{20}\right) = \text{Rs}\left(\frac{17x}{20}\right)$$

According to the given condition,  $\frac{17x}{20} = 680$ 

or 
$$x = \frac{680 \times 20}{17} = \text{Rs } 800$$

Thus, marked price of the Jacket is Rs 800.

Ex.12 Abbas and Tony run a ready-made garments shop. They mark the garments at such a price that even after allowing a discount of 12.5%, gain a profit of 25%. Find the marked price of a ladies suit which costs them Rs 2,100.

**Sol.**First method : C.P. of a suit = Rs 2100

Profit = 25% of Rs 2100

$$= \text{Rs} \ \frac{25}{100} \times 2100 = \text{Rs} \ 525$$

:. S.P. of the suit = Rs (2100 + 525)

Let the marked price be Rs 100.

Then, Discount = 12.5% of Rs 100

$$=\frac{12.5}{100} \times 100 = \text{Rs}\ 12.50$$

 $\therefore$  S.P. = Rs (100 - 12.50) = Rs 87.50

Now, if S.P. is Rs 87.50, M.P. = Rs 100

:. If S.P. is Rs 2625, M.P. = Rs  $\frac{100}{87.50} \times 2625$ 

$$=\frac{100 \times 2625 \times 100}{8750}$$

Thus, the marked price of the ladies suit is Rs 3,000.

### Alternate Method : (after S.P. in above)

Let the marked price be Rs x.

We have M.P. =  $\frac{100 \times \text{S.P.}}{(100 - \text{Discount\%})}$ 

or  $x = \frac{100 \times 2625}{(100 - 12.5)} = \frac{262500}{87.5}$ 

= Rs 3000

Thus, the marked price of the suit is Rs 3,000