# PROFIT, LOSS AND DISCOUNT

## 10.1 REVIEW

| 1. | Profit | When the selling price (**S.P.**) of an article is **more than** its cost price (**C.P.**); the article is said to be sold at a **profit** (gain)<br><br>And,  Profit = Selling Price – Cost Price<br><br>*i.e.*  Profit = S.P. – C.P. |
| 2. | Loss | When the selling price (**S.P.**) of an article is **less than** its cost price (**C.P.**); the article is said to be sold at a **loss.**<br><br>And,  Loss = Cost Price – Selling Price<br><br>*i.e.*  Loss = C.P. – S.P. |
| 3. | **Profit = S.P. – C.P.**  $\Rightarrow$ | (i)  S.P. = C.P. + Profit<br>and,  (ii)  C.P. = S.P. – Profit |
| 4. | **Loss = C.P. – S.P.**  $\Rightarrow$ | (i)  S.P. = C.P. – Loss<br>and,  (ii)  C.P. = S.P. + Loss |
| 5. | Profit (gain)% = $\dfrac{\text{Profit}}{\text{C.P.}} \times 100\%$ and Loss % = $\dfrac{\text{Loss}}{\text{C.P.}} \times 100\%$ | |
| 6. | Profit % and loss % are always calculated on cost price. | |

### TEST YOURSELF

1. If C. P.  = ₹ 800 and S. P. = ₹ 600

    $\Rightarrow$ Loss = ........................ = .......... and loss % = ................................ = ..........

2. If S. P.  = ₹ 600 and profit = ₹ 120

    $\Rightarrow$ C. P. = ........................ = .......... and profit % = ................................ = ..........

3. If S. P.  = ₹ 1,250 and loss = ₹ 250

    $\Rightarrow$ C. P. = ........................ = .......... and loss % = ................................ = ..........

4. S. P. of an article is 80% of its C. P.

    $\Rightarrow$ If C. P. = ₹ 100, S. P. = ................................ = ..........

    $\Rightarrow$ Loss = ........................ = .......... and loss % = ................................ = ..........

5. C. P. of an article is 80% of its S. P.

    $\Rightarrow$ If S. P. = ₹ 100, C. P. = ................................ = ..........

    $\Rightarrow$ Profit = ........................ = .......... and profit % = ................................ = ..........

*Example 1 :*

Articles, bought at 10 for ₹ 8, are sold at 8 for ₹ 10. Find the gain percent.

Also, find the number of articles bought and sold in order to gain ₹ 144.

**Solution :**

Whenever the cost price and the selling price are given for different number of identical articles; first of all, find the C.P. and the S.P. of equal number of articles and then calculate the profit percent or the loss percent, as the case may be.

Also, in order to have a certain gain,

$$\text{the number of articles bought and sold} = \frac{\text{Total profit}}{\text{Profit on one article}}$$

**Given :**  C.P. of 10 articles = ₹ 8

∴  C.P. of 1 article = ₹ $\frac{8}{10}$ = ₹ 0·80

Also, given :  S.P. of 8 articles = ₹ 10

∴  S.P. of 1 article = ₹ $\frac{10}{8}$ = ₹ 1·25

Profit on 1 article = S.P. – C.P. = ₹ 1·25 – ₹ 0·80 = ₹ 0·45

and,  **profit %** = $\frac{\text{Profit}}{\text{C.P.}}$ × 100%

= $\frac{₹\,0·45}{₹\,0·80}$ × 100% = **56·25%**  (Ans.)

Also, **the number of articles bought and sold**

= $\frac{\text{Total profit}}{\text{Profit on one article}}$

= $\frac{₹\,144}{₹\,0·45}$ = **320**  (Ans.)

## 10.2  OVERHEADS

When an article is purchased at one place and is taken to some other place; an additional money for transportation, labour, packing, etc. is to be spent. This additional money spent is termed as **overheads** or **overhead expenses**.

The overheads (if any) incurred is added to the actual cost price to get the total cost price of the article and then the profit or loss is calculated on this total cost price.

*Example 2 :*

Raju goes from Agra to Delhi to buy an article, which costs ₹ 6,500 in Delhi. He sells this article in Agra for ₹ 8,000. Find his gain or loss per cent. Consider that he spends ₹ 700 on transportation, food, etc.

*Solution :*

**Given :**  Actual price paid for the article = ₹ 6,500

and, overhead expenses = ₹ 700

∴  Total cost price = ₹ 6,500 + ₹ 700 = ₹ 7,200

Since,  selling price = ₹ 8,000

∴  Gain = ₹ 8,000 – ₹ 7,200  [Gain = S.P. – C.P.]

= ₹ 800

and,  **gain %** = $\frac{₹\,800}{₹\,7,200}$ × 100% = **11$\frac{1}{9}$%**  (Ans.)

**Example 3 :**

A man sold his bicycle for ₹ 810; losing one-ninth of its selling price, Find :

    (i) the loss         (ii) the cost price of the bicycle       (iii) the loss as percent.

**Solution :**

(i)     Since, S. P. = ₹ 810 ;       **loss** $= \dfrac{1}{9} \times$ ₹ 810 = ₹ 90     **(Ans.)**

(ii)         **C.P. = S.P. + loss** = ₹ 810 + ₹ 90 = ₹ 900     **(Ans.)**

(iii)         **Loss %** $= \dfrac{\text{Loss}}{\text{C.P.}} \times 100\%$

                          $= \dfrac{₹\,90}{₹\,900} \times 100\% = 10\%$     **(Ans.)**

**Example 4 :**

The selling price of a table is $\dfrac{27}{25}$ times its cost price. Find the loss or the profit as percent.

**Solution :**

        Let the cost price of the table = ₹ 100

∴         Its selling price $= \dfrac{27}{25} \times$ ₹ 100 = ₹ 108

        Profit = S.P. – C.P. = ₹ 108 – ₹ 100 = ₹ 8

∴     **Profit %** $= \dfrac{\text{Profit}}{\text{C.P.}} \times 100\% = \dfrac{₹\,8}{₹\,100} \times 100\% = 8\%$     **(Ans.)**

**Algebraic method :**

        Let the C.P. = ₹ x

⇒         S.P. = ₹ $\dfrac{27}{25}$ x

∴     Profit = S.P. – C.P. = ₹ $\dfrac{27}{25}$ x – ₹ x = ₹ $\dfrac{27-25}{25}$ x = ₹ $\dfrac{2}{25}$ x

And,        **profit %** $= \dfrac{₹\,\frac{2}{25}x}{₹\,x} \times 100\%$

                          $= \dfrac{2}{25} \times 100\% = 8\%$     **(Ans.)**

**Example 5 :**

The cost price of an article is $\dfrac{5}{4}$ times its selling price. Find the loss or the profit as percent.

**Solution :**

        Let the selling price = ₹ 100

∴         The cost price $= \dfrac{5}{4} \times$ ₹ 100 = ₹ 125

        Loss = C.P. – S.P. = ₹ 125 – ₹ 100 = ₹ 25

And,       **loss %** $= \dfrac{\text{Loss}}{\text{C.P.}} \times 100\% = \dfrac{₹\,25}{₹\,125} \times 100\%$

                             $= 20\%$     **(Ans.)**

**Algebraic method :**

$$\text{Let the selling price} = ₹\,x$$

$$\therefore \quad \text{The cost pice} = ₹\,\frac{5}{4}x$$

$$\text{Loss} = \text{C.P.} - \text{S.P.} = ₹\,\frac{5}{4}x - ₹\,x = ₹\left(\frac{5-4}{4}\right)x = ₹\,\frac{1}{4}x$$

$$\therefore \quad \textbf{Loss \%} = \frac{₹\,\frac{1}{4}x}{₹\,\frac{5}{4}x} \times 100\% = \frac{1}{4} \times \frac{4}{5} \times 100\% = \textbf{20\%} \qquad \text{(Ans.)}$$

---

## TEST YOURSELF

6. Some articles are bought for ₹ 1,000 and all of them were sold for ₹ 1,400. If profit on each article is ₹ 5; the profit on the whole .................................................... and the number of articles bought and sold ......................

7. ₹ 80 were spent on the transportation of an article, bought for ₹ 720. If the article is solid for ₹ 900; the profit made = ................................. and the profit% is ..................

8. An article is sold at $\frac{120}{100}$ of its cost price; the profit = .................%.

9. Profit = 30% of C.P. $\Rightarrow$ S.P. = .................% of C.P..

10. Loss = 15% of C.P. $\Rightarrow$ S.P. = .................% of C.P.

---

## EXERCISE 10(A)

1. Megha bought 10 note-books for ₹ 40 and sold them at ₹ 4·75 per note-book. Find, her gain percent.

2. A fruit-seller buys oranges at 4 for ₹ 3 and sells them at 3 for ₹ 4. Find his profit percent.

3. A man buys a certain number of articles at 15 for ₹ 112·50 and sells them at 12 for ₹ 108. Find :
   (i) his gain as percent;
   (ii) the number of articles sold to make a profit of ₹ 75.

4. A boy buys an old bicycle for ₹ 162 and spends ₹ 18 on its repairs. He then sells the bicycle for ₹ 207; find his gain or loss as percent.

5. An article is bought from Jaipur for ₹ 4,800 and is sold in Delhi for ₹ 5,820. If ₹ 1,200 is spent on its transportations, etc.; find the loss or the gain as percent.

6. Mohit sold a T.V. for ₹ 3,600; gaining one-sixth of its selling price. Find :
   (i) the gain.   (ii) the cost price of the T.V.
   (iii) the gain percent.

7. By selling a certain number of goods for ₹ 5,500; a shopkeeper loses equal to one-tenth of their selling price. Find :
   (i) the loss incured
   (ii) the cost price of the goods
   (iii) the loss as percent.

8. The selling price of a sofa-set is $\frac{4}{5}$ times of its cost price. Find the gain or the loss as percent.

9. The cost price of an article is $\frac{4}{5}$ times of its selling price. Find the loss or the gain as percent.

10. A shopkeeper sells his goods at 80% of their cost price. What percent does he gain or lose?

11. The cost price of an article is 90% of its selling price. What is the profit or the loss as percent ?

12. The cost price of an article is 30 percent less than its selling price. Find, the profit or the loss as percent.

13. A shopkeeper bought 300 eggs at 80 paisa each. 30 eggs were broken in transaction and then he sold the remaining eggs at one rupee each. Find, his gain or loss as percent.

14. A man sold his bicycle for ₹ 405 losing one-tenth of its cost price. Find :
(i) its cost price; (ii) the loss percent.

15. A man sold a radio-set for ₹ 250 and gained one-ninth of its cost price. Find :
(i) its cost price; (ii) the profit percent.

---

**10.3** TO FIND S.P., WHEN C.P. AND GAIN (OR LOSS) PERCENT ARE GIVEN

**Example 6 :**

Bhanu bought a fountain pen for ₹ 12. For how much should she sell it to gain 15% ?

**Solution :**

Since, C.P. of the pen = ₹ 12

∴ Gain = 15% of the C.P.

$= 15\%$ of ₹ $12 = \dfrac{15}{100} \times$ ₹ $12 =$ ₹ $1\cdot80$

**S.P. = C.P. + Gain ⇒ S.P. = ₹ 12 + ₹ 1·80 = ₹ 13·80** (Ans.)

**Alternative method :**

$$\boxed{\text{S.P.} = \dfrac{(100 + \text{gain}\%)}{100} \times \text{C.P.}}$$

⇒ S.P. $= \dfrac{100 + 15}{100} \times$ ₹ $12 = \dfrac{115}{100} \times$ ₹ $12 =$ ₹ $13\cdot80$ (Ans.)

**Example 7 :**

An article bought for ₹ 450 is sold at a loss of 20%. Find its selling price.

**Solution :**

Since, C.P. = ₹ 450

∴ Loss $= 20\%$ of ₹ $450 = \dfrac{20}{100} \times$ ₹ $450 =$ ₹ $90$

**S.P. = C.P. – Loss ⇒ S.P. = ₹ 450 – ₹ 90 = ₹ 360** (Ans.)

**Alternative method :**

$$\boxed{\text{S.P.} = \dfrac{(100 - \text{loss}\%)}{100} \times \text{C.P.}}$$

⇒ S.P. $= \dfrac{(100 - 20)}{100} \times$ ₹ $450 = \dfrac{80}{100} \times$ ₹ $450 =$ ₹ $360$ (Ans.)

**10.4** TO FIND C.P., WHEN S.P. AND GAIN (OR LOSS) PERCENT ARE GIVEN

**Example 8 :**

Ram sells an article for ₹ 360 at a gain of 20%. Find its cost price.

**Solution :**

Let C.P. of the article = ₹ 100

∴ Gain = 20% of ₹ 100 = ₹ 20

and, S.P. = ₹ 100 + ₹ 20 = ₹ 120

When S.P. is ₹ 120 ; C.P. = ₹ 100

When S.P. is ₹ 1 ; C.P. = ₹ $\dfrac{100}{120}$

When S.P. is ₹ 360 ; **C.P.** = ₹ $\dfrac{100}{120}$ × 360 = **₹ 300**        (Ans.)

**Alternative method :**

$$\boxed{\text{C.P.} = \dfrac{100}{(100 + \text{gain\%})} \times \text{S.P.}}$$

⇒        **C.P.** = $\dfrac{100}{100 + 20}$ × ₹ 360 = $\dfrac{100}{120}$ × ₹ 360 = **₹ 300**        (Ans.)

## Example 9 :

By selling an article for ₹ 382·50 a man loses 15%. Find its cost price.

## Solution :

Let C.P. = ₹ 100

∴        Loss = 15% of ₹ 100 = ₹ 15

and,        S.P. = ₹ 100 − ₹ 15 = ₹ 85

When S.P. is ₹ 85 ; C.P. = ₹ 100

When S.P. is ₹ 1 ; C.P. = ₹ $\dfrac{100}{85}$

When S.P. is ₹ 382·20 ; **C.P.** = ₹ $\dfrac{100}{85}$ × 382·50 = **₹ 450**        (Ans.)

**Alternative method :**

$$\boxed{\text{C.P.} = \dfrac{100}{(100 - \text{loss\%})} \times \text{S.P.}}$$

⇒        **C.P.** = $\dfrac{100}{100 - 15}$ × ₹ 382·50 = $\dfrac{100}{85}$ × ₹ 382·50 = **₹ 450**        (Ans.)

## Example 10 :

By selling an article for ₹ 810; a man loses 10%. At what price should he sell it in order to gain 8% ?

## Solution :

Given :  S.P. = ₹ 810 and loss = 10%

∴        C.P. = $\left(\dfrac{100}{100 - 10}\right)$ × ₹ 810        $\left[\because \text{C.P.} = \left(\dfrac{100}{100 - \text{loss\%}}\right) \times \text{S.P.}\right]$

        = $\dfrac{100}{90}$ × ₹ 810 = ₹ 900

Now,    C.P. = ₹ 900, gain = 8% and required to find S.P.

        **S.P.** = $\left(\dfrac{100 + 8}{100}\right)$ × ₹ 900        $\left[\because \text{S.P.} = \left(\dfrac{100 + \text{gain\%}}{100}\right) \times \text{S.P.}\right]$

        = $\dfrac{108}{100}$ × ₹ 900 = **₹ 972**        (Ans.)

94

*Example 11 :*

Peter sells two watches for ₹ 198 each; gaining 20% on one and losing 20% on the other. Find his gain % or loss % on the whole.

**Solution :**

**For one watch :**      S.P. = ₹ 198 and gain = 20%

$\Rightarrow$          C.P. = $\dfrac{100}{(100+20)}$ × ₹ 198          $\left[ C.P. = \dfrac{100}{(100 + gain\%)} \times S.P. \right]$

= ₹ 165

**For the other watch :**   S.P. = ₹ 198 and loss = 20%

$\Rightarrow$          C.P. = $\dfrac{100}{(100-20)}$ × ₹ 198          $\left[ C.P. = \dfrac{100}{(100 - loss\%)} \times S.P. \right]$

= ₹ 247·50

Total C.P. of both the watches = ₹ 165 + ₹ 247·50 = ₹ 412·50

Total S.P. of both the watches = ₹ 198 + ₹ 198 = ₹ 396

∴       Loss on the whole = ₹ 412·50 – ₹ 396 = ₹ 16·50

and,   **loss % on the whole** = $\dfrac{16·50}{412·50}$ × 100% = **4%**          **(Ans.)**

---

### TEST YOURSELF

11. A table is sold at 40% profit, its S.P. = ..........% of the C.P. and its C.P. = ..................... times of its S.P.

12. An article is sold at 20% loss, its S.P. = ...............% of the C.P. and its C.P. = .........................% of its S.P.

---

### EXERCISE 10(B)

1. Find the selling price, if :
   (i)  C.P. = ₹ 950 and profit = 8%
   (ii)  C.P. = ₹ 1,300 and loss = 13%

2. Find the cost price, if :
   (i)  S.P. = ₹ 1,680 and profit = 12%
   (ii)  S.P. = ₹ 1,128 and loss = 6%

3. By selling an article for ₹ 900; a man gains 20%. Find his cost price and the gain.

4. By selling an article for ₹ 704; a person loses 12%. Find his cost price and the loss.

5. Find the selling price, if :
   (i)  C.P. = ₹ 352; overheads = ₹ 28 and profit = 20%.
   (ii)  C.P. = ₹ 576; overheads = ₹ 44 and loss = 16%.

6. If John sells his bicycle for ₹ 637, he will suffer a loss of 9%. For how much should it be sold, if he desires a profit of 5% ?

7. A man sells a radio-set for ₹ 605 and gains 10%. At what price should he sell another radio of the same kind, in order to gain 16% ?

8. By selling a sofa-set for ₹ 2,500; the shopkeeper loses 20%. Find his loss percent or profit per cent; if he sells the same sofa-set for ₹ 3,150.

9. Mr. Sinha sold two tape-recorders for ₹ 990 each; gaining 10% on one and losing 10% on the other. Find his total loss or gain, as percent, on the whole transaction.

10. A tape-recorder is sold for ₹ 2,760 at a gain of 15% and a C.D. player is sold for ₹ 3,240 at a loss of 10%. Find :
    (i)  the C.P. of the tape-recorder
    (ii)  the C.P. of the C.D. player.
    (iii)  the total C.P. of both.
    (iv)  the total S.P. of both
    (v)  the gain % or the loss% on the whole.

95

11. Rajesh sold his scooter to Rahim at 8% loss and Rahim, in turn, sold the same scooter to Prem at 5% gain. If Prem paid ₹ 14,490 for the scooter; find :

   (i)  the S.P. and the C.P. of the scooter for Rahim

   (ii)  the S.P. and the C.P. of the scooter for Rajesh

12. John sold an article to Peter at 20% profit and Peter sold it to Mohan at 5% loss. If Mohan paid ₹ 912 for the article; find how much did John pay for it ?

## Example 12:

A fruit-seller buys oranges at ₹ 20 per dozen and sells them at a profit of 20%. Find the price paid by the customer for buying :

   (i)  4 oranges                       (ii)  3 dozen oranges

**Solution :**

**For one dozen** (12) **oranges** : C.P. = ₹ 20 and profit = 20%

$$\therefore \quad S.P. = \frac{100+20}{100} \times ₹\,20 \qquad \left[\because S.P. = \left(\frac{100+profit\%}{100}\right) \times C.P.\right]$$

$$= \frac{120}{100} \times ₹\,20 = ₹\,24$$

(i)  Since, S.P. of 12 oranges = ₹ 24 $\Rightarrow$ S.P. of 1 orange = ₹ $\frac{24}{12}$ = ₹ 2

   $\therefore$ **For buying 4 oranges, the customer paid** = 4 × ₹ 2 = ₹ 8              **(Ans.)**

(ii)             We know, 3 dozen = 3 × 12 = 36

   $\therefore$ **For 3 dozen oranges, the customer paid** = 36 × ₹ 2 = ₹ 72       **(Ans.)**

## Example 13 :

A fruit-seller sells 8 bananas for ₹ 6 gaining 25%. How many bananas did he buy for ₹ 6 ?

**Solution :**

**For 8 bananas** :      S.P. = ₹ 6 and gain = 25%

$$\therefore \quad C.P. = \left(\frac{100}{100+25}\right) \times ₹\,6 \qquad \left[C.P. = \left(\frac{100}{100+gain\%}\right) \times S.P.\right]$$

$$= \frac{100}{125} \times ₹\,6 = ₹.\,4\cdot80$$

$\Rightarrow$  For ₹ 4·80, the fruit-seller buys 8 bananas

$\Rightarrow$         **For ₹ 6, he buys** = $\frac{8}{4\cdot80}$ × 6 = **10 bananas**       **(Ans.)**

## Example 14 :

The cost price of 10 articles is equal to the selling price of 9 articles. Find the profit percent.

**Solution :**

Let the C.P. of 1 article be ₹ 1

$\therefore$                 C.P. of 10 articles = ₹ 10

*According to the question,*

                   S.P. of 9 articles = ₹ 10

$$\therefore \quad \text{S.P. of 1 article} = ₹ \frac{10}{9}$$

$$\text{Profit} = ₹ \left( \frac{10}{9} - 1 \right) = ₹ \frac{1}{9}$$

and, $\qquad$ profit percent $= \dfrac{\frac{1}{9}}{\frac{1}{1}} \times 100\% = 11\frac{1}{9}\%$ $\qquad$ (Ans.)

## Example 15 :

A man bought a piece of land for ₹ 15,000. He sold $\frac{1}{3}$ of this land at a loss of 5 percent. At what gain percent should he sell the remaining land in order to gain 8% on the whole ?

### Solution :

Since, $\qquad$ C.P. of the whole land = ₹ 15,000

and, $\qquad$ the gain desired on the whole = 8%

$\therefore \qquad$ Total S.P. of the whole land $= \dfrac{100 + 8}{100} \times ₹\,15,000 = ₹\,16,200$

$\qquad$ C.P. of $\frac{1}{3}$ of the land $= \frac{1}{3}$ of ₹ 15,000 = ₹ 5,000

Since, $\qquad$ loss on it = 5%

$\therefore \qquad$ S.P. of it $= \dfrac{100 - 5}{100} \times ₹\,5,000 = ₹\,4,750$

Now, $\qquad$ C.P. of remaining land = ₹ 15,000 – ₹ 5,000 = ₹ 10,000

and, $\qquad$ S.P. of the remaining land = ₹ 16,200 – ₹ 4,750 = ₹ 11,450

$\therefore \qquad$ Gain on the remaining land = ₹ 11,450 – ₹ 10,000 = ₹ 1,450

and, **gain percent on the remaining land** $= \dfrac{1,450}{10,000} \times 100\% = 14\cdot5\%$ $\qquad$ (Ans.)

## Example 16 :

A shopkeeper sells an article at 15% gain. Had he sold it for ₹ 18 more, he would have gained 18%. Find the cost price of the article.

### Solution :

Let the C.P. of the article be ₹ 100

$\qquad$ when gain = 15% ; S.P. = ₹ (100 + 15) = ₹ 115

and, $\qquad$ when gain = 18% ; S.P. = ₹ (100 + 18) = ₹ 118

$\qquad$ Difference of the two selling prices = ₹ 118 – ₹ 115 = ₹ 3

*Applying unitary method :*

When sold for ₹ 3 more, the C.P. of the article = ₹ 100

When sold for ₹ 18 more, **the C.P. of the article** $= ₹ \dfrac{100}{3} \times 18 = ₹\,600$ $\qquad$ (Ans.)

**TEST YOURSELF**

13. 3 eggs are bought for ₹ 25 and sold at a profit of 20%. The S.P. of these eggs = ..................................; the S.P. of 1 egg = ................................ and the S.P. of 5 eggs = ................

14. An article bought for ₹ 200 is sold for ₹ 300; profit = .................................. and profit% = ............................. If the cost price of the article increases by 20%, the new C.P. = .................................

15. A certain quantity of wheat is bought for ₹ 5,000. If 40% of the wheat is sold at 20% profit, the C.P. of wheat sold = ...................................

    S.P. of wheat sold = ...................................

---

## EXERCISE 10 (C)

1. A stationer buys pens at 5 for ₹ 28 and sells them at a profit of 25%. How much should a customer pay; if he buys
   (i) only one pen ?       (ii) three pens ?

2. A fruit-seller sells 4 oranges for ₹ 3, gaining 50%. Find :
   (i) C.P. of 4 oranges.
   (ii) C.P. of one orange.
   (iii) S.P. of one orange
   (iv) profit made by selling one orange
   (v) number of oranges brought and sold in order to gain ₹ 24.

3. A man sells 12 articles for ₹ 80 gaining $33\frac{1}{3}$ %. Find the number of articles bought by the man for ₹ 90.

4. The cost price of 20 articles is same as the selling price of 16 articles. Find the gain percent.

5. The selling price of 15 articles is equal to the cost price of 12 articles. Find the gain or loss as percent.

6. By selling 8 pens, Shyam loses equal to the cost price of 2 pens. Find his loss percent.

7. A shopkeeper bought rice worth ₹ 4,500. He sold one-third of it at 10% profit. If he desires a profit of 12% on the whole; find :
   (i) the selling price of the rest of the rice.
   (ii) the percentage profit on the rest of the rice.

8. Mohan bought a certain number of note-books for ₹ 600. He sold $\frac{1}{4}$ of them at 5 percent loss. At what price should he sell the remaining note-books so as to gain 10% on the whole ?

9. Raju sells a watch at 5% profit. Had he sold it for ₹ 24 more; he would have gained 11%. Find the cost price of the watch.

10. A man sold a bicycle at 5% profit. If the cost had been 30% less and the selling price ₹ 63 less, he would have made a profit of 30%. What is the cost price of the bicycle ?

11. Renu sold an article at a loss of 8 percent. Had she bought it at 10% less and sold for ₹ 36 more; she would have gained 20%. Find the cost price of the article.

---

**10.5 DISCOUNT**

In order to dispose of the old or the damaged goods; some shopkeepers offer a reduction on the marked price of their goods. This reduction is called **discount**.

1. Discount is always given on the marked price (M.P.).

2. Selling price = Marked Price – Discount

   *i.e.* S.P. = M.P. – Discount

   Also, discount = M.P. – S.P.

3. If discount = d%, S.P. = $\left(\frac{100-d}{100}\right) \times$ M.P. $\Rightarrow$ M.P. = $\left(\frac{100}{100-d}\right) \times$ S.P.

4. Marked price is also called *list price*, printed price, etc.

## Example 17 :

A tradesman marks his goods at 35 percent above the cost price and then allows purchasers a discount of 15 percent. What profit percent does he save ?

**Solution :**

Let the C.P. = ₹ 100

∴    Marked Price = ₹ (100 + 35) = ₹ 135

Discount = 15% of ₹ 135 = ₹ 20·25

∴    Selling Price = ₹ 135 − ₹ 20·25 = ₹ 114·75

∴    Profit = S.P. − C.P. = ₹ 114·75 − ₹ 100 = ₹ 14·75

and,  **profit percent** = $\dfrac{14.75}{100}$ × 100% = **14·75%**    (Ans.)

## Example 18 :

A dealer allows his customers a discount of 25% and still gains 25%. If an article costs ₹ 1,440 to the dealer; find :

(i)  its selling price            (ii)  its marked price.

**Solution :**

(i)  Since,    C.P. = ₹ 1,440  and  profit = 25%

∴    S.P. = $\left(\dfrac{100+25}{100}\right)$ × ₹ 1,440      $\left[\text{S.P.} = \left(\dfrac{100+\text{profit }\%}{100}\right)\times\text{C.P.}\right]$

= $\dfrac{125}{100}$ × ₹ 1,440 = **₹ 1,800**    (Ans.)

(ii)  Since,    S.P. = ₹ 1,800  and  discount = 25%

∴    M.P. = $\left(\dfrac{100}{100-25}\right)$ × ₹ 1,800      $\left[\text{M.P.} = \left(\dfrac{100}{100-d}\right)\times\text{S.P.}\right]$

= $\dfrac{100}{75}$ × ₹ 1,800 = **₹ 2,400**    (Ans.)

## Example 19 :

Find a single discount (as percent) equivalent to successive discounts of 10% and 20%.

**Solution :**

Let                    M.P. = ₹ 100

1st discount = 10% of ₹ 100 = ₹ 10

Since,              ₹ 100 − ₹ 10 = ₹ 90

∴              2nd discount = 20% of ₹ 90 = ₹ 18

∴              S.P. = ₹ 90 − ₹ 18 = ₹ 72

Single equivalent discount = M.P. − S.P. = ₹ 100 − ₹ 72 = ₹ 28

Since, the discount of ₹ 28 is on ₹ 100

∴ **Required single equivalent discount as percent = 28%**    (Ans.)

or, **Single equivalent discount** = Sum of all the discounts

= ₹ 10 + ₹ 18 = ₹ 28 on original M.P. = ₹ 100

∴ **Single equivalent discount as percent = 28%** (Ans.)

**Alternative method :**

∵

$$S.P. = M.P. \times \left(\frac{100 - d_1}{100}\right) \times \left(\frac{100 - d_2}{100}\right)$$

$$= ₹ 100 \times \frac{100 - 10}{100} \times \frac{100 - 20}{100} = ₹ 72$$

∴ Single equivalent discount as percent = (100 − 72)% = **28%** (Ans.)

**Example 20 :**

An article is sold at two successive discounts of 50% each. Find the single equivatent discount as percent.

**Solution :**

Let M.P. of the article = ₹ 100

∴ Price of the article, after 1st discount

= ₹ 100 − 50% of ₹ 100

$$= ₹ 100 - \frac{50}{100} \times ₹ 100 = ₹ 100 - ₹ 50 = ₹ 50$$

Now, the second discount will be on this ₹ 50

∴ Price of the article, after 2nd discount

= ₹ 50 − 50% of ₹ 50

$$= ₹ 50 - \frac{50}{100} \times ₹ 50 = ₹ 50 - ₹ 25 = ₹ 25$$

∴ **Single equivalent discount as percent** = (100 − 25)% = **75%** (Ans.)

---

**TEST YOURSELF**

16. If marked price = ₹ 750 and selling price = ₹ 600

⇒ Discount = ............................. = ..........

And, discount % = ............................. = ..........

17. If S. P. = ₹ 1,250 and discount = ₹ 250

⇒ Marked price = ............................. = ..........

And, discount % = ............................. = ..........

18. If marked price = ₹ 450 and discount % = 10%

⇒ S. P. = $\left(\frac{100 - 10}{100}\right) \times ₹ 450 = $ ............................. = ..........

And, discount = M. P. − S. P. = ............................. = ..........

19. If S. P. = ₹ 1,188 and discount % = 12%

⇒ M. P. = $\frac{100}{100 - 12} \times ₹ 1,188 = $ ............................. = ..........

---

100

## EXERCISE 10 (D)

1. An article is marked for ₹ 1,300 and is sold for ₹ 1,144. Find the discount percent.

2. The marked price of a dinning table is ₹ 23,600 and is available at a discount of 8%. Find its selling price.

3. A wrist-watch is available at a discount of 9%. If the list-price of the watch is ₹ 1,400. Find the discount given and the selling price of the watch.

4. A shopkeeper sells an article for ₹ 248.50 after allowing a discount of 10%. Find the price at which the article is marked.

5. A shopkeeper buys an article for ₹ 450. He marks it at 20% above the cost price. Find :
   (i) the marked price of the article.
   (ii) the selling price, if he sells the article at 10 percent discount.
   (iii) the percentage discount given by him, if he sells the article for ₹ 496.80.

6. The list price of an article is ₹ 800 and is available at a discount of 15 percent. Find :
   (i) the selling price of the article;
   (ii) the cost price of the article, if a profit of $13\frac{1}{3}$% is made on selling it.

7. An article is marked at ₹ 2,250. By selling it at a discount of 12%, the dealer makes a profit of 10%. Find :
   (i) the selling price of the article.
   (ii) the cost price of the article for the dealer.

8. By selling an article at 20% discount, a shopkeeper gains 25%. If the selling price of the article is ₹ 1,440; find :
   (i) the marked price of the article.
   (ii) the cost price of the article.

9. A shopkeeper marks his goods at 30 percent above the cost price and then gives a discount of 10 percent. Find his gain percent.

10. A ready-made garments shop in Delhi allows 20 percent discount on its garments and still makes a profit of 20 percent. Find the marked price of a dress which is bought by the shopkeeper for ₹ 400.

11. At 12% discount, the selling price of a pen is ₹ 13.20. Find its marked price. Also, find the new selling price of the pen, if it is sold at 5% discount.

12. The cost price of an article is ₹ 2,400 and it is marked at 25% above the cost price. Find the profit and the profit percent, if the article is sold at 15% discount.

13. Thirty articles are bought at ₹ 450 each. If one-third of these articles be sold at 6% loss; at what price must each of the remaining articles be sold in order to make a profit of 10% on the whole ?

14. The cost price of an article is 25% below the marked price. If the article is available at 15% discount and its cost price is ₹ 2,400; find :
   (i) its marked price    (ii) its selling price
   (iii) the profit percent.

15. Find a single discount (as percent) equivalent to following successive discounts :
   (i) 20% and 12%    (ii) 10%, 20% and 20%
   (iii) 20%, 10% and 5%

16. Find the single discount (as percent) equivent to successive discounts of :
   (i) 80% and 80%    (ii) 60% and 60%
   (iii) 60% and 80%

## ANSWERS

### TEST YOURSELF

1. ₹ 800 − ₹ 600, ₹ 200, $\frac{200}{800}$ × 100%, 25%   2. ₹ 600 − ₹ 120, ₹ 480, $\frac{120}{480}$ × 100%, 25%

3. ₹ 1250 + ₹ 250, ₹ 1500, $\frac{250}{1500}$ × 100%, $16\frac{2}{3}$%   4. 80% of ₹ 100, ₹ 80, ₹ 100 − ₹ 80, ₹ 20,

$\frac{20}{100}$ × 100%, 20%   5. 80% of ₹ 100, ₹ 80, ₹ 100 − ₹ 80, ₹ 20, $\frac{20}{80}$ × 100%, 25%   6. ₹ 1400 − ₹ 1000

= ₹ 400, $\frac{400}{5}$ = 80   7. ₹ 900 − ₹ 800 = ₹ 100, $\frac{100}{800}$ × 100% = 12·5%   8. 20%  9. 130  10. 85

11. 140, $\frac{100}{140}$ = $\frac{5}{7}$   12. 80, $\frac{100}{80}$ × 100% = 125   13. $\frac{120}{100}$ × ₹ 25 = ₹ 30, $\frac{₹30}{3}$ = ₹ 10, 5 × ₹ 10 = ₹ 50

14. ₹ 300 − ₹ 200 = ₹ 100, $\frac{100}{200}$ × 100% = 50%, $\frac{120}{100}$ × ₹ 200 = 240, 15. 40% of ₹ 5000 = ₹ 2000,

$\dfrac{120}{100}$ × ₹ 2000 = ₹ 2400   **16.** ₹ 750 − ₹ 600; ₹ 150; $\dfrac{150}{750}$ × 100%, 20%   **17.** ₹ 1250 + ₹ 250; ₹ 1500,

$\dfrac{250}{1500}$ × 100%; $16\dfrac{2}{3}$%   **18.** $\dfrac{90}{100}$ × ₹ 450, ₹ 405, ₹ 450 − ₹ 405, ₹ 45   **19.** $\dfrac{100}{88}$ × ₹ 1188 = ₹ 1350

## EXERCISE 10(A)

**1.** $18\dfrac{3}{4}$%  **2.** $77\dfrac{7}{9}$%  **3.** (i) 20% (ii) 50  **4.** Gain = 15%  **5.** Loss = 3%  **6.** (i) ₹ 600 (ii) ₹ 3,000 (iii) 20%

**7.** (i) ₹ 550  (ii) ₹ 6,050  (iii) $9\dfrac{1}{11}$%  **8.** Loss = 20%  **9.** gain = 25%  **10.** 20% loss

**11.** $11\dfrac{1}{9}$% profit  **12.** $42\dfrac{6}{7}$% profit  **13.** 12·5% gain **14.** (i) ₹ 450 (ii) 10%  **15.** (i) ₹ 225 (ii) $11\dfrac{1}{9}$%

## EXERCISE 10(B)

**1.** (i) ₹ 1,026  (ii) ₹ 1,131   **2.** (i) ₹ 1,500  (ii) ₹ 1,200   **3.** ₹ 750 and ₹ 150   **4.** ₹ 800 and
₹ 96  **5.** (i) ₹ 456  (ii) ₹ 520·80  **6.** ₹ 735   **7.** ₹ 638   **8.** 0·8% profit   **9.** 1% loss   **10.** (i) ₹ 2,400
(ii) ₹ 3,600   (iii) ₹ 6,000   (iv) ₹ 6,000   (v) there is no gain and no loss on the whole.
**11.** (i) For Rahim : S.P. = ₹ 14,490 and C.P. = ₹ 13,800  (ii) For Rajesh : S.P. = ₹ 13,800  and
C.P. = ₹ 15,000   **12.** ₹ 800.

## EXERCISE 10(C)

**1.** (i) ₹ 7  (ii) ₹ 21   **2.** (i) ₹ 2  (ii) ₹ 0.50  (iii) ₹ 0·75  (iv) ₹ 0·25  (v) 96   **3.** 18   **4.** 25%
**5.** 20% loss  **6.** 25%  **7.** (i) ₹ 3,390 (ii) 13%   **8.** ₹ 517·50   **9.** ₹ 400 **10.** ₹ 450 **11.** ₹ 225

## EXERCISE 10(D)

**1.** 12%  **2.** ₹ 21,712   **3.** ₹ 126 and ₹ 1,274   **4.** ₹ 276·11   **5.** (i) ₹ 540  (ii) ₹ 486  (iii) 8%
**6.** (i) ₹ 680  (ii) ₹ 600   **7.** (i) ₹ 1,980  (ii) ₹ 1,800   **8.** (i) ₹ 1,800  (ii) ₹ 1,152   **9.** 17%
**10.** ₹ 600   **11.** (i) ₹ 15  (ii) ₹ 14·25   **12.** ₹ 150 and 6·25%   **13.** ₹ 531   **14.** (i) ₹ 3,200  (ii) ₹ 2,720
(iii) $13\dfrac{1}{3}$%   **15.** (i) 29·6%  (ii) 42·4%  (iii) 31·6% **16.** (i) 96%  (ii) 84%  (iii) 92%