

## Profit and loss - Simple problems on profit &amp; loss

## Definition of 'profit and loss statement (P&amp;L)

A profit and loss statement (P&L) is a financial statement that summarizes the revenues, costs and expenses incurred during a specific period of time, usually a year. These records provide information about a company's ability - to generate profit by increasing revenue, reducing costs, or both. The P&L statement is also referred to as "statement of profit and loss", "income statement", "statement of operations", "statement of financial results" and "income and expenditure statement".

## Profit and loss

## Important facts

## Cost price

The price, at which an article is purchased is called its cost price, abbreviated as C.P.

## Selling price

The price at which an article is sold, is called its selling price, abbreviated as S.P.

## Profit or gain

If S.P. is greater than C.P., the seller is said to have a profit or gain.

## Loss

If S.P. is less than C.P., the seller is said to have incurred a loss.

## Discount

The reduction given to the selling price of a product is the discount.

## Important formulae

$$1 \text{ Profit or Gain} = (\text{S.P.}) - (\text{C.P.})$$

$$2 \text{ Loss} = (\text{C.P.}) - (\text{S.P.})$$

$$3 \text{ Loss or gain always depends on C.P.}$$

$$4 \text{ Profit/gain is always expressed in \%}$$

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

$$5 \text{ Loss percentage: (Loss \%)}$$

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

$$6 \text{ Selling price: (S.P)}$$

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

$$7 \text{ Selling price: (S.P)}$$

$$\text{SP} = \left( \frac{(100 - \text{loss\%})}{100} \times \text{C.P.} \right)$$

$$8 \text{ Cost price: (C.P)}$$

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

$$9 \text{ Cost price: (C.P)}$$

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

$$10 \text{ If an article is sold at a gain of say 35\%, then S.P.} = 135\% \text{ of C.P.}$$

$$11 \text{ If an article is sold at a loss of say, 35\% then S.P.} = 65\% \text{ of C.P.}$$

## Example

1 A dealer bought a television set for Rs.10,000 and sold it for Rs.12,000. Find the profit made by him for 1 television set. If he had sold 5 television sets, find the total profit?

## Solution

$$\text{Selling price of the television set} = \text{Rs.12,000}$$

$$\text{Cost price of the television set} = \text{Rs.10,000}$$

$$\text{S.P.} > \text{C.P.}, \text{ there is a profit}$$

$$\text{Profit} = \text{S.P.} - \text{C.P.}$$

$$= 12000 - 10000$$

$$\text{Profit} = \text{Rs.2,000}$$

$$\text{Profit on 1 television set} = \text{Rs.2000}$$

$$\text{Profit on 5 television sets} = 2000 \times 5$$

$$= \text{Rs.10,000}$$

2 Sanjay bought a bicycle for Rs.5000. He sold it for Rs.600 less after two years. Find the selling price and the loss percent?

## Solution

$$\text{Cost price of the bicycle} = \text{Rs.5000}$$

$$\text{Loss} = \text{Rs.600}$$

$$\text{Selling price} = \text{Cost price} - \text{loss}$$

$$= 5000 - 600$$

$$\text{Selling price of the bicycle} = \text{Rs.4400}$$

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

$$= \frac{600}{5000} \times 100$$

$$\text{Loss} = 12\%$$

3 A man bought an old bicycle for Rs.1250. he spent Rs.250 on its repairs. He then sold it for Rs.1400. Find his loss %?

## Solution

$$\text{Cost price of the bicycle} = \text{Rs.1250}$$

Repair Charges = Rs.250  
 Total cost price = 1250+250 = Rs.1500  
 Selling price = Rs.1400  
 C.P > S.P, there is a loss

Loss = Cost price - Selling price

$$1500 - 1400 = 100$$

Loss = Rs.100

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

$$= \frac{100}{1500} \times 100$$

$$= \frac{20}{3} = 6\frac{2}{3}\% \text{ (or) } 6.67\%$$

Loss = 6.67%

**Profit percentage or loss percentage is always calculated on the cost price of the article.**

**4 A fruit seller bought 8 boxes of grapes at Rs.150 each. One box was damaged. He sold the remaining boxes at Rs.190 each. Find the profit percent?**

**Solution**

Cost price of 1 box of grapes = Rs.150

Cost price of 8 boxes of grapes = 150 x 8  
 = Rs.1200

Number of boxes damaged = 1

Number of boxes sold = 8 - 1 = 7

Selling price of 1 box of grapes = Rs.190

Selling price of 7 boxes of grapes = 190 x 7  
 = Rs.1330

S.P.>C.P, there is a profit

Profit = Selling price - Cost price

$$= 1330 - 1200$$

$$= 130$$

Profit = Rs.130

$$\text{Percentage of profit} = \frac{\text{Profit}}{\text{C.P}} \times 100$$

$$= \frac{130}{1200} \times 100$$

$$= 10.83$$

Profit = 10.83%

**5 Ram, the shopkeeper bought a pen for Rs.50 and then sold it at a loss of Rs.5. Find his selling price.**

**Solution**

Cost price of the pen = Rs.50

Loss = Rs.5

S.P. = C.P. - Loss

$$= 50 - 5 = 45$$

**Selling price of the pen = Rs.45**

**6 Find the initial amount if 12% of the total amount it is ₹ 1080**

Let the initial amount be 'x'

Given: 12% of the total amount = Rs.1080

$$\frac{12}{100} \times x = 1080$$

$$x = \frac{1080 \times 100}{12}$$

$$= ₹ 9000$$

**∴ The initial amount = Rs.9000**

**Applications of profit and loss**

In this section, we learn to solve problems on applications of profit and loss.

**i Illustration of the formula for S.P.**

Consider the following situation

Rajesh buys a pen for Rs.80 and sells it to his friend.

If he wants to make a profit of 5%, can you say the price for which he would have sold?

(Rajesh bought the pen for Rs.80 which is the cost price (C.P.). When he sold, he makes a profit of 5% which is calculated on the C.P.)

$$\therefore \text{Profit} = 5\% \text{ of C.P.} = \frac{5}{100} \times 80 = \text{Rs.}4$$

Since there is a profit, S.P > C.P.

S.P. = C.P. + Profit

$$= 80 + 4 = \text{Rs.}84$$

**∴ The price for which Rajesh would have sold = Rs.84**

**The same problem can be done using the formula.**

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

$$= \frac{(100 + 5)}{100} \times 80$$

$$= \frac{105}{100} \times 80 = \text{Rs.} 84$$

**ii Illustration of the formula for C.P**

Consider the following situation

Suppose a shopkeeper sells a wrist watch for Rs. 540 making a profit of 5%, then what would have been the cost of the watch?

(The shopkeeper had sold the watch at a profit of 5% on the C.P. Since C.P. is not known, let us take it as Rs. 100)

Profit of 5% is made on the C.P.

$$\begin{aligned} \therefore \text{Profit} &= 5\% \text{ of C.P.} \\ &= \frac{5}{100} \times 100 = \text{Rs. } 5 \end{aligned}$$

$$\begin{aligned} \text{We know S.P.} &= \text{C.P.} + \text{Profit} \\ &= 100 + 5 \\ &= \text{Rs. } 105 \end{aligned}$$

Here, if S.P. is Rs.105, then C.P. is Rs. 100

$$\begin{aligned} \text{When S.P. of the watch is Rs. } 540, \text{ C.P.} &= \frac{540 \times 100}{105} \\ &= \text{Rs. } 514.29 \end{aligned}$$

$\therefore$  The watch would have cost Rs.514.29 for the shopkeeper.

The above problem can also be solved by using the formula method.

$$\begin{aligned} \text{C.P.} &= \left( \frac{100}{100 + \text{Profit \%}} \right) \times \text{S.P.} \\ &= \left( \frac{100}{100 + 5} \times 540 \right) \\ &= \frac{100}{105} \times 540 = \text{Rs. } 514.29 \end{aligned}$$

We now summarize the formulae to calculate S.P. and C.P. as follows.

<p><b>1 When there is a profit</b></p> $\text{C.P.} = \left( \frac{100}{100 + \text{Profit \%}} \right) \times \text{S.P.}$	<p><b>1 When there is a loss</b></p> $\text{C.P.} = \left( \frac{100}{100 - \text{Loss \%}} \right) \times \text{S.P.}$
<p><b>2 When there is a profit</b></p> $\text{S.P.} = \left( \frac{100 + \text{Profit \%}}{100} \right) \times \text{C.P.}$	<p><b>2 When there is a loss</b></p> $\text{S.P.} = \left( \frac{100 - \text{Loss \%}}{100} \right) \times \text{C.P.}$

### Example

**1 Hameed buys a colour T.V. set for Rs. 15,200 and sells it at a loss of 20%. What is the selling price of the T.V. set?**

#### Solution

##### Method - I

Loss is 20% of the C.P.

$$\frac{20}{100} \times 15200 = \text{Rs. } 3040$$

$$\text{S.P.} = \text{C.P.} - \text{Loss}$$

$$15200 - 3040 = \text{Rs. } 12160$$

##### Method - II

$$\text{C.P.} = \text{Rs. } 15,200$$

$$\text{Loss} = 20\%$$

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

$$= \frac{100 - 20}{100} \times 15200$$

$$= \frac{80}{100} \times 15200$$

$$= \text{Rs. } 12,160$$

**2 A scooty is sold for Rs. 13600 and fetches a loss of 15%. Find the cost price of the scooty.**

#### Method - I

Loss of 15% means,

$$\text{If C.P. is Rs. } 100, \text{ Loss} = \text{Rs. } 15$$

Therefore, S.P. would be

$$(100 - 15) = \text{Rs. } 85$$

If S.P. is Rs. 85, C.P. is Rs. 100

When S.P. is Rs. 13600 then

$$\text{C.P.} = \frac{100 \times 13600}{85} = \text{Rs. } 16000$$

#### Method - II

$$\text{Loss} = 15\%$$

$$\text{S.P.} = \text{Rs. } 13600$$

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

$$= \frac{100}{100 - 15} \times 13600$$

$$= \frac{100}{85} \times 13600$$

$$= \text{Rs. } 16000$$

Hence the cost price of the scotty is Rs. 16000

### Discount

Discount is the reduction in value on the marked price or list price of the article.

The market price of a product is Rs.550

Amount paid by pooja to the shop keeper is Rs. 440

$$\text{Discount} = \text{Rs. } 550 - \text{Rs. } 440$$

$$= \text{Rs. } 110$$

$$= \text{Marked price} - \text{Selling price}$$

Hence we conclude the following

$$\text{Discount} = \text{Marked price} - \text{Selling price}$$

$$\text{Selling price} = \text{Marked price} - \text{Discount}$$

$$\text{Marked price} = \text{Selling price} + \text{Discount}$$

### Example

**1 A bicycle marked at Rs. 1500 is sold for Rs. 1350. What is the percentage of discount?**

Marked price = Rs. 1500

Selling price = Rs. 1350

Amount of discount = Marked price - Selling price

$$= 1500 - 1350$$

$$= \text{Rs. } 150$$

Discount for Rs. 1500 = Rs. 150

$$\text{Discount for Rs. } 100 = \frac{150}{1500} \times 100$$

Percentage of discount = 10%

**2 The list price of a Frock is Rs.220. A discount of 20% on sales is announced. What is the amount of discount on it and its selling price?**

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

$$\text{Amount of discount} = \frac{20}{100} \times 220 = \text{Rs. } 44$$

Selling price of the frock = Marked price - Discount

$$220 - 44 = \text{Rs. } 176$$

**3 An almirah is sold at Rs. 5225 after allowing a discount of 5%. Find its marked price.**

### Solution

#### Method - I

The discount is given in percentage

Hence, the M.P. is taken as Rs. 100

$$\text{Rate of discount} = 5\%$$

$$\text{Amount of discount} = \frac{5}{100} \times 100$$

$$\text{Selling price} = \text{M.P.} - \text{Discount}$$

$$= 100 - 5 = \text{Rs. } 95$$

If S.P. is Rs. 95, then M.P. is Rs.100

When S.P. is Rs. 5225

$$\text{M.P.} = \frac{100}{95} \times 5225$$

$$\text{M.P. of the almirah} = \text{Rs. } 5500$$

#### Method - II

$$\text{S.P.} = \text{Rs. } 5225$$

$$\text{Discount} = 5\%$$

$$\text{M.P.} = ?$$

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

$$= \left( \frac{100}{100 - 5} \right) \times 5225$$

$$= \text{Rs. } 5500$$

**4 A shopkeeper allows a discount of 10% to his customers and still gains 20%. Find the marked price of an article which costs Rs.450 to the shopkeeper.**

### Solution

#### Method - I

Let M.P be Rs. 100

$$\text{Discount} = 10\% \text{ of M.P.}$$

$$= \frac{10}{100} \text{ of M.P.} = \frac{10}{100} \times 100$$

$$= \text{Rs. } 10$$

$$\text{S.P.} = \text{M.P.} - \text{Discount}$$

$$= 100 - 10$$

$$= \text{Rs. } 90$$

$$\text{Gain} = 20\% \text{ of C.P.}$$

$$= \frac{20}{100} \times 450 = \text{Rs. } 90$$

$$\text{S.P.} = \text{C.P.} + \text{Gain}$$

$$= 450 + 90 = \text{Rs. } 540$$

If S.P. is Rs. 90, then M.P. is Rs. 100

$$\text{M.P.} = \frac{540 \times 100}{90} = \text{Rs. } 600$$

The M.P. of an article = Rs. 600

### Method - II

Discount = 10%, Gain = 20%

C.P. = Rs. 450, M.P. = ?

$$\begin{aligned}\text{M.P.} &= \frac{100 + \text{Gain}\%}{100 - \text{Discount}\%} \times \text{C.P.} \\ &= \frac{(100 + 20)}{(100 - 10)} \times 450 \\ &= \frac{120}{90} \times 450 \\ &= \text{Rs. } 600\end{aligned}$$

**5 A dealer allows a discount of 10% and still gains 10%. What is the cost price of the book which is marked at Rs. 220?**

### Solution

#### Method - I

$$\begin{aligned}\text{M.P.} &= \text{Rs. } 220 \\ \text{Discount} &= 10\% \text{ of M.P.} \\ &= \frac{10}{100} \times 220 \\ &= \text{Rs. } 22 \\ \text{S.P.} &= \text{M.P.} - \text{Discount} \\ &= 220 - 22 \\ &= \text{Rs. } 198 \\ \text{Let, C.P. be Rs. } 100 \\ \text{Gain} &= 10\% \text{ of C.P.} \\ &= \frac{10}{100} \times 100 \\ &= \text{Rs. } 10 \\ \text{S.P.} &= \text{C.P.} + \text{Gain} \\ &= 100 + 10 \\ &= \text{Rs. } 110\end{aligned}$$

If S.P. is Rs. 110, then C.P. is Rs. 100

When S.P. is Rs. 198,

$$\begin{aligned}&= \frac{198 \times 100}{110} \\ &= \text{Rs. } 180\end{aligned}$$

### Method - II

$$\begin{aligned}\text{Discount} &= 10\% \\ \text{Gain} &= 10\% \\ \text{M.P.} &= \text{Rs. } 220 \\ \text{C.P.} &= \frac{100 - \text{Discount}\%}{100 + \text{Gain}\%} \times \text{M.P.} \\ &= \frac{100 - 10}{100 + 10} \times 220 \\ &= \frac{90}{110} \times 220 \\ &= \text{Rs. } 180\end{aligned}$$

**6 A trader buys an article for Rs. 1200 and marks it 30% above the C.P. He then sells it after allowing a discount of 20%. Find the S.P. and profit percent.**

### Solution

Let C.P. of the article be Rs. 100

M.P. = 30% above C.P. = Rs. 130

If C.P. is Rs. 100, then M.P. is Rs. 130

When C.P. is Rs. 1200,

$$\text{M.P.} = \frac{1200 \times 130}{100} = \text{Rs. } 1560$$

$$\text{Discount} = 20\% \text{ of } 1560 = \frac{20}{100} \times 1560$$

$$\text{Discount} = 20\% \text{ of } 1560 = \frac{20}{100} \times 1560$$

$$= \text{Rs. } 312$$

$$\begin{aligned}\text{S.P.} &= \text{M.P.} - \text{Discount} \\ &= 1560 - 312 \\ &= \text{Rs. } 1248\end{aligned}$$

$$\begin{aligned}\text{Profit} &= \text{S.P.} - \text{C.P.} \\ &= 1248 - 1200 \\ &= \text{Rs. } 48\end{aligned}$$

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

$$= \frac{48}{1200} \times 100$$

$$= 4\%$$

## Summary

Percent means per hundred. A fraction with its denominator 100 is called a percent.

**In case of profit, we have Profit = S.P - C.P.**

**In case of loss, we have Loss = C.P - S.P.**

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

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

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

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

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

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

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

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

$$\text{C.P.} = \frac{100 - \text{Discount \%}}{100 + \text{Profit \%}} \times \text{M.P.}$$

$$\text{M.P.} = \frac{100 + \text{Profit \%}}{100 - \text{Discount \%}} \times \text{C.P.}$$

$$\text{Discount percent} = \frac{\text{Discount}}{\text{M.P.}} \times 100$$

Discount is the reduction given on the Marked price.

Selling price is the price payable after reducing the discount from the marked price.

$$\text{Discount} = \text{M.P.} - \text{S.P.}$$

## Assignment

- 1 Find the cost price if the product is sold at Rs. 572 with a profit of Rs. 72.
- 2 Find the C.P if the product is sold at Rs.1973 with a profit of Rs. 273
- 3 Find the selling price if the cost price is Rs. 7282 with a profit of Rs. 208
- 4 Find out the S.P. if the C.P. is Rs. 9684 with a loss of Rs. 684
- 5 Find out the profit percentage if the C.P is Rs. 320 and S.P is Rs. 384.
- 6 Find out the profit amount if the C.P. and S.P. are Rs. 2500 and Rs. 2700 respectively.
- 7 Calculate the percentage of loss if the C.P. and S.P are Rs. 40 and Rs. 38 respectively.
- 8 A computer table bought at Rs. 1150 with Rs. 50 as a transport charge. Calculate the S.P. if the profit is of 5%
- 9 By selling a table for Rs. 1320 with a gain of 10%. Find the C.P.
- 10 The C.P. of 16 bolts is equal to the S.P. of 12 bolts. Find the gain percent.

Profit and loss - Simple and compound interest

Interest

When we borrow (or lent) money we pay (or receive) some additional amount in addition to the original amount. This additional amount that we receive is termed as Interest. It is denoted as 'I'. Money can be borrowed/lent deposited in banks to get Interest. The amount borrowed//lent is called the principal. (P)

The principal added to the Interest is called the Amount(A).

$$\text{Amount} = \text{Principal} + \text{Interest}$$

$$A = P + I$$

Interest depends on principal and duration of time. But it also depends on one more factor called the rate of interest. Rate of interest is the amount calculated annually for ₹100. (ie) if rate of interest is 10% per annum, then interest is ₹10 for ₹100 for 1 year.

So,

Interest depends on

Amount deposited or borrowed/lent - Principal - P

Period of time - mostly expressed in years - n

Rate of interest - r

This interest is termed as Simple interest.

When the interest is paid on the principal only, it is called simple interest.

Calculation of interest

If 'r' is the rate of interest, Principal is 100,

$$\text{The interest for 1 year} = 100 \times 1 \times \frac{r}{100}$$

$$\text{for 2 years} = 100 \times 2 \times \frac{r}{100}$$

$$\text{for 3 years} = 100 \times 3 \times \frac{r}{100}$$

$$\text{for n years} = 100 \times n \times \frac{r}{100}$$

So,

$$I = \frac{Pnr}{100}$$

$$A = P + I$$

$$A = P + \frac{Pnr}{100}$$

$$A = P \left( 1 + \frac{nr}{100} \right)$$

$$\text{Interest} = \text{Amount} - \text{Principal}$$

The other formulae derived from

$$I = \frac{Pnr}{100}$$

$$r = \frac{100I}{Pn}$$

$$n = \frac{100I}{Pr}$$

$$P = \frac{100I}{rn}$$

'n' is always calculated in years. When 'n' is given in months or days, convert it into years.

Example :

12 Months = 1 year

$$6 \text{ Months} = \frac{6}{12} \text{ year} = \frac{1}{2} \text{ year}$$

$$3 \text{ Months} = \frac{3}{12} \text{ year} = \frac{1}{4} \text{ year}$$

$$146 \text{ days} = \frac{146}{365} \text{ year} = \frac{2}{5} \text{ year}$$

Example

1 Vimal invested ₹ 3000 for 1 year at 7% per annum. Find the simple interest and the amount received by him at the end of one year.

Solution

Principal (P) = ₹ 3,000

Number of years (n) = 1

Rate of interest (r) = 7%

$$\text{Interest(I)} = \frac{Pnr}{100}$$

$$= \frac{3000 \times 1 \times 7}{100}$$

$$I = 210$$

Amount(A) = P + I

$$= 3000 + 210$$

Amount received by him (A) = ₹ 3,210

2 Ramani invested ₹ 5000 for 2 years at 11% per annum. Find the simple interest and the amount received by him at the end of 2 years.

Solution

Principal (P) = ₹ 5,000

Number of years (n) = 2 yrs

Rate of interest (r) = 11%

$$\text{Interest(I)} = \frac{Pnr}{100}$$

$$= \frac{5000 \times 2 \times 11}{100}$$

$$= 1100$$

$$I = ₹ 1100$$

$$\text{Amount(A)} = P + I$$

$$= 5000 + 1100$$

**Amount received by him (A) = ₹ 6,100**

**3 Find the simple interest and the amount due on ₹ 7,500 at 8% per annum for 1 year 6 months.**

**Solution**

$$\text{Principal (P)} = ₹ 7,500$$

$$\text{Number of years (n)} = 1 \text{ yr. 6 months}$$

$$= 1 \frac{6}{12} \text{ yrs}$$

$$= 1 \frac{1}{2} \text{ yrs} = \frac{3}{2} \text{ yrs.}$$

$$r = 8\%$$

$$\text{Interest(I)} = \frac{Pnr}{100}$$

$$= \frac{7500 \times \frac{3}{2} \times 8}{100}$$

$$= \frac{7500 \times 3 \times 8}{2 \times 100}$$

$$= 900$$

$$I = ₹ 900$$

$$\text{Amount} = P + I$$

$$= 7500 + 900$$

$$\text{Amount due on} = ₹ 8,400$$

$$\text{Interest} = ₹ 900, \text{Amount} = ₹ 8,400$$

**Alternative method**

$$\text{Principal (P)} = ₹ 7,500$$

$$\text{Number of years (n)} = \frac{3}{2} \text{ yrs}$$

$$\text{Rate of interest (r)} = 8\%$$

$$A = P \left( 1 + \frac{nr}{100} \right)$$

$$= 7500 \left( 1 + \frac{\frac{3}{2} \times 8}{100} \right)$$

$$= 7500 \left( 1 + \frac{3 \times 8}{2 \times 100} \right)$$

$$= 7500 \left( \frac{28}{25} \right)$$

$$= 300 \times 28$$

$$= 8400$$

$$A = ₹ 8400$$

$$\text{Interest (I)} = A - P$$

$$= 8400 - 7500$$

$$\text{Interest(I)} = ₹ 900, \text{Amount} = ₹ 8,400$$

**4 Find the simple interest and the amount due on ₹ 6,750 for 219 days at 10% per annum.**

**Solution**

$$\text{Principal (P)} = ₹ 6,750$$

$$\text{Number of years (n)} = 219 \text{ days}$$

$$= \frac{219}{365} \text{ year} = \frac{3}{5} \text{ year}$$

$$r = 10\%$$

$$I = \frac{Pnr}{100}$$

$$= \frac{6750 \times 3 \times 10}{5 \times 100}$$

$$= 405$$

$$I = ₹ 405$$

$$\text{Amount} = P + I$$

$$= 6750 + 405$$

$$\text{Amount due on} = ₹ 7,155$$

$$\text{Interest(I)} = ₹ 405, \text{Amount} = ₹ 7,155$$

**5 Ravi borrowed ₹ 4000 on 7<sup>th</sup> June 2006 and returned it on 19<sup>th</sup> August 2006. Find the amount he paid, if the interest is calculated at 5% per annum.**

**Solution**

$$\text{Principal (P)} = ₹ 4,000$$

$$r = 5\%$$

$$\text{Number of days, June} = 24(30 - 6)$$

$$\text{July} = 31$$

$$\text{August} = 18$$

$$\text{Total number of days} = 73$$

$$n = 73 \text{ days}$$

$$= \frac{73}{365} \text{ year}$$

$$= \frac{1}{5} \text{ year} = \frac{100 \times 1000}{10000 \times 5} = 2 \text{ years.}$$

Amount  $= P \left( 1 + \frac{nr}{100} \right)$

Number of years = 2 years.

**Alternative method**

$$A = P \left( 1 + \frac{nr}{100} \right)$$

$$11000 = 10000 \left( 1 + \frac{n \times 5}{100} \right)$$

$$\frac{11}{10} = \frac{20 + n}{20}$$

$$\frac{11}{10} \times 20 = 20 + n$$

$$22 = 20 + n$$

$$22 - 20 = n$$

Number of years = 2

Amount = ₹ 4,040

6 Find the rate percent per annum when a principal of ₹ 7,000 earns a S.I. of ₹ 1,680 in 16 months.

**Solution**

Principal (P) = ₹ 7,000

n = 16 months

$$= \frac{16}{12} \text{ yr} = \frac{4}{3} \text{ yr}$$

I = ₹ 1,680

r = ?

$$r = \frac{100I}{Pn}$$

$$= \frac{100 \times 1680}{7000 \times \frac{4}{3}}$$

$$= \frac{100 \times 1680 \times 3}{7000 \times 4}$$

$$= 18$$

Rate of interest (r) = 18%

7 Vijayan invested ₹10,000 at the rate of 5% simple interest per annum. He received ₹ 11,000 after some years. Find the number of years.

**Solution**

A = ₹ 11,000

P = ₹ 10,000

r = 5%

I = A - P

$$= 11,000 - 10,000$$

$$= 1,000$$

I = ₹ 1,000

$$n = \frac{100I}{Pr}$$

8 A sum of money triples itself at 8% per annum over a certain time. Find the number of years.

**Solution**

Let principal = ₹ P

Amount = triple the principal

$$= ₹ 3P$$

Let, P = 100

$$3P = 3 \times 100$$

$$r = 8\%$$

$$I = A - P$$

$$= 300 - 100$$

$$I = ₹ 200$$

$$n = \frac{100I}{Pr} = \frac{100 \times 200}{100 \times 8}$$

$$n = \frac{200}{8} = 25$$

Number of years = 25

9 A certain sum of amounts to ₹ 10,080 in 5 years at 8%. Find the principal.

**Solution**

A = ₹ 10,080

n = 5 years

r = 8%

P = ?

Amount (A)  $= P \left( 1 + \frac{nr}{100} \right)$

$$₹ 10080 = P \left( 1 + \frac{5 \times 8}{100} \right)$$

$$₹ 10080 = P \left( 1 + \frac{5 \times 8}{100} \right) = \frac{50000 \times 1 \times 4}{100} = ₹ 2,000$$

$$₹ 10080 = P \left( \frac{7}{5} \right)$$

$$₹ 10080 \times \frac{5}{7} = P$$

$$7,200 = P$$

$$\text{Principal} = ₹ 7,200$$

**10 A certain sum of amounts to ₹ 7,920 in 4 years and ₹ 8,880 in 6 years respectively. Find the principal and rate percent.**

**Solution**

Amount at the end of 6 years = Principal + interest for 6 years

$$= P + I_6 = 8880$$

Amount at the end of 4 years = Principal + interest for 4 years

$$= P + I_4 = 7920$$

$$I_2 = 8880 - 7920$$

$$= 960$$

Interest at the end of 2 years = ₹ 960

Interest at the end of 1<sup>st</sup> years =  $\frac{960}{2}$

$$= 480$$

Interest at the end of 4 years =  $480 \times 4$

$$= 1,920$$

$$P + I_4 = 7920$$

$$P + 1920 = 7920$$

$$P = 7920 - 1920$$

$$P = 6,000$$

Principal = ₹ 6,000

$$r = \frac{100I}{Pn}$$

$$= \frac{100 \times 1920}{6000 \times 4}$$

$$\text{Rate of interest (r)} = 8\%$$

**Compound Interest**

Rajesh borrowed ₹ 50,000 from a bank for a fixed time period of 2 years. at the rate of 4% per annum.

Rajesh has to pay for the first year.

$$\text{Simple interest} = \frac{P \times n \times r}{100}$$

Suppose he fails to pay the simple interest ₹ 2,000 at the end of first year, then the interest ₹ 2,000 is added to the old principal ₹ 50,000 and now the sum = P + I = ₹ 52,000 becomes the new principal for the second year for which the interest is calculated.

Now in the second year he will have to pay an interest of

$$\text{Simple interest} = \frac{P \times n \times r}{100}$$

$$= \frac{52000 \times 1 \times 4}{100} = ₹ 2,080$$

Therefore Rajesh will have to pay more interest for the second year.

This way of calculating interest is called compound Interest.

If the interest is paid on the principal as well as on the accrued interest, it is called compound interest.

Generally in banks, insurance companies, post offices and in other companies which lend money and accept deposits, compound interest is followed to find the interest.

**Example**

Ram deposited ₹ 8,000 with a finance company for 3 years at an interest of 15% per annum. What is the compound interest that Ram gets after 3 years?

**Solution**

**Step 1 :**

Principal for the first year = ₹ 8,000

Interest for the first year =  $\frac{P \times n \times r}{100}$

$$= \frac{80000 \times 1 \times 15}{100}$$

$$= ₹ 1,200$$

Amount at the end of first year = P + I

$$= 8,000 + 1,200$$

$$= ₹ 9,200$$

**Step 2 :**

Principal for the 2<sup>nd</sup> year = ₹ 9,200

Interest for the 2<sup>nd</sup> year =  $\frac{P \times n \times r}{100}$

$$= \frac{9200 \times 1 \times 15}{100}$$

$$= ₹ 1,380$$

$$\begin{aligned} \text{Amount at the end of 2}^{\text{nd}} \text{ year} &= P + I \\ &= 9,200 + 1,380 \\ &= ₹ 10,580 \end{aligned}$$

$$\begin{aligned} \text{Interest for the 2}^{\text{nd}} \text{ year} &= P \left(1 + \frac{r}{100}\right) \times \frac{1 \times r}{100} \\ &\text{(using the Simple Interest formula)} \end{aligned}$$

**Step 3 :**

$$\text{Principal for the 3}^{\text{rd}} \text{ year} = ₹ 10,580$$

$$= P \left(1 + \frac{r}{100}\right) \times \frac{r}{100}$$

$$\begin{aligned} \text{Interest for the 3}^{\text{rd}} \text{ year} &= \frac{P \times n \times r}{100} \\ &= \frac{10580 \times 1 \times 15}{100} \\ &= ₹ 1,587 \end{aligned}$$

$$\text{Amount at the end of 2}^{\text{nd}} \text{ year} = P + I$$

$$= P \left(1 + \frac{r}{100}\right) + P \left(1 + \frac{r}{100}\right) \times \frac{r}{100}$$

$$= P \left(1 + \frac{r}{100}\right) \left(1 + \frac{r}{100}\right)$$

$$\begin{aligned} \text{Amount at the end of 3}^{\text{rd}} \text{ year} &= P + I \\ &= 10,580 + 1,587 \\ &= ₹ 12,167 \end{aligned}$$

$$= P \left(1 + \frac{r}{100}\right)^2$$

Hence, the compound interest that Ram gets after 3 years is

$$A - P = 12,167 - 8,000 = ₹ 4,167$$

**Step 3 :**

$$\text{Principal for the 3}^{\text{rd}} \text{ year} = P \left(1 + \frac{r}{100}\right)^2$$

### Deduction of formula for compound interest

The above method which we have used for the calculation of compound interest is quite lengthy and cumbersome, especially when the period of time very large. Hence, we shall obtain a formula for the computation of amount and compound interest.

$$\text{Interest for the 3}^{\text{rd}} \text{ year} = P \left(1 + \frac{r}{100}\right)^2 \times \frac{1 \times r}{100}$$

(using the Simple interest formula)

$$= P \left(1 + \frac{r}{100}\right)^2 \times \frac{r}{100}$$

### Example

If the principal is P, Rate of interest per annum is r% and the period of time or the number of years is n, then we deduce the compound interest formula as follows:

$$\text{Amount at the end of 3}^{\text{rd}} \text{ year} = P + I$$

$$= P \left(1 + \frac{r}{100}\right)^2 + P \left(1 + \frac{r}{100}\right)^2 \times \frac{r}{100}$$

Step 1:

$$\text{Principal for the first year} = P$$

$$= P \left(1 + \frac{r}{100}\right)^2 \left(1 + \frac{r}{100}\right)$$

$$\text{Interest for the first year} = \frac{P \times n \times r}{100}$$

$$= P \left(1 + \frac{r}{100}\right)^3$$

$$= \frac{P \times 1 \times r}{100} = \frac{Pr}{100}$$

Similarly, Amount at the end of n<sup>th</sup> year is

$$\text{Amount at the end of first year} = P + I$$

$$A = P \left(1 + \frac{r}{100}\right)^n \text{ and C.I. at the end of 'n' years is given}$$

$$= P + \frac{Pr}{100}$$

by

$$\text{Compound Interest (C.I.)} = A - P$$

$$= P \left(1 + \frac{r}{100}\right)$$

$$\text{(ie.) Compound Interest (C.I.)} = P \left(1 + \frac{r}{100}\right)^n - P$$

**Step 2 :**

**To compute compound interest**

$$\text{Principal for the 2}^{\text{nd}} \text{ year} = P \left(1 + \frac{r}{100}\right)$$

### Case 1 : Compounded Annually

When the interest is added to the principal at the end of each year, we say that the interest is compounded annually.

Here,

$$A = P \left( 1 + \frac{r}{100} \right)^n \text{ and C.I.} = A - P$$

### Case 2 : Compounded half-yearly (semi-annually)

When the interest is compounded half-yearly, there are two conversion periods in a year each after 6 months. In such situations, the half-yearly rate will be half of the annual rate, that is  $\left(\frac{r}{2}\right)$ .

In this case,

$$A = P \left( 1 + \frac{1}{2} \left( \frac{r}{100} \right) \right)^{2n} \text{ and C.I.} = A - P$$

### Case 3 : Compounded quarterly

When the interest is compounded quarterly, there are four conversion periods in a year and the quarterly rate will be one-fourth of the annual rate, that is  $\left(\frac{r}{4}\right)$ .

In this case,

$$A = P \left( 1 + \frac{1}{4} \left( \frac{r}{100} \right) \right)^{4n} \text{ and C.I.} = A - P$$

### Case 4 : Compounded when time being fraction of a year

When interest is compounded annually but time being a fraction.

In this case, when interest is compounded annually but time being a fraction of a year, say  $5\frac{1}{4}$  years, then amount A is given by

$$A = P \left( 1 + \frac{r}{100} \right)^5 \left[ 1 + \frac{1}{4} \left( \frac{r}{100} \right) \right] \text{ and C.I.} = A - P$$

for 5 years for  $\frac{1}{4}$  years

### Example

Find the C.I. on ₹ 15,625 at 8% p.a. for 3 years compounded annually.

### Solution

We know,

$$\begin{aligned} \text{Amount after 3 years} &= P \left( 1 + \frac{r}{100} \right)^3 \\ &= 15625 \left( 1 + \frac{8}{100} \right)^3 \\ &= 15625 \left( 1 + \frac{2}{25} \right)^3 \\ &= 15625 \left( \frac{27}{25} \right)^3 \\ &= 15625 \times \frac{27}{25} \times \frac{27}{25} \times \frac{27}{25} \\ &= ₹ 19,683 \end{aligned}$$

$$\begin{aligned} \text{Now, compound interest} &= A - P \\ &= 19,683 - 15,625 \\ &= ₹ 4,058 \end{aligned}$$

To find the C.I. when the interest is compounded annually or half-yearly.

Let us see what happens to ₹ 100 over a period of one year if an interest is compounded annually or half-yearly.

S. No.	Annually	Half yearly
1	P = ₹ 100 at 10% per annum compounded annually.	P = ₹ 100 at 10% per annum compounded half-yearly.
2	The time period taken is 1 year.	The time period is 6 months or 1/2 year.
3	$I = \frac{100 \times 10 \times 1}{100} = ₹ 10$	$I = \frac{100 \times 10 \times \frac{1}{2}}{100} = ₹ 5$
4	A = 100 + 10 = ₹ 110	A = 100 + 5 = ₹ 105 For the next 6 months, P = ₹ 105
5	A = ₹ 110	So, $I = \frac{105 \times 10 \times \frac{1}{2}}{100} = ₹ 5.25$ and A = 105 + 5.25 = ₹ 110.25 A = ₹ 110.25

Thus, if interest is compounded half-yearly, we compute the interest two times and rate is taken as half of the annual rate.

**Example**

**1 Find the compound interest on ₹ 1000 at the rate of 10% per annum for 18 months when interest is compounded half-yearly.**

**Solution**

Here, P = ₹ 1000, r = 10% per annum.

and n = 18 months =  $\frac{18}{12}$  years =  $\frac{3}{2}$  years =  $1\frac{1}{2}$  years

$$\therefore \text{Amount after 18 months} = P \left[ 1 + \frac{1}{2} \left( \frac{r}{100} \right) \right]^{2n}$$

$$= 1000 \left[ 1 + \frac{1}{2} \left( \frac{10}{100} \right) \right]^{2 \times \frac{3}{2}}$$

$$= 1000 \left[ 1 + \frac{10}{200} \right]^3$$

$$= 1000 \left( \frac{21}{20} \right)^3$$

$$= 1000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

$$= ₹ 1157.625$$

$$= ₹ 1157.63$$

$$\text{C.I} = A - P$$

$$= 1157.63 - 1000$$

$$\text{Compound Interest} = ₹ 157.63$$

**2 Find the compound interest on ₹ 20,000 at 15% per annum for  $2\frac{1}{3}$  years.**

**Solution**

Here, P = ₹ 20,000, r = 15% per annum. and n =  $2\frac{1}{3}$  years.

$$\text{Amount after } 2\frac{1}{3} \text{ years } A = P \left( 1 + \frac{r}{100} \right)^2 \left( 1 + \frac{1}{3} \left( \frac{r}{100} \right) \right)$$

$$= 20000 \left( 1 + \frac{15}{100} \right)^2 \left( 1 + \frac{1}{3} \left( \frac{15}{100} \right) \right)$$

$$= 20000 \left( 1 + \frac{3}{20} \right)^2 \left( 1 + \frac{1}{20} \right)$$

$$= 20000 \left( \frac{23}{20} \right)^2 \left( \frac{21}{20} \right)$$

$$= 20000 \times \frac{23}{20} \times \frac{23}{20} \times \frac{21}{20}$$

$$= ₹ 27,772.50$$

$$\text{C.I} = A - P$$

$$= 27,772.50 - 20,000$$

$$\text{Compound Interest} = ₹ 7,772.50$$

**Inverse problems on compound interest**

We have already learnt the formula,  $A = P \left( 1 + \frac{r}{100} \right)^n$

Where four variable A, P, r and n are involved. Out of these four variables, if any three variables are known, then we can calculate the fourth variable.

**Example**

**1 At what rate per annum will ₹ 640 amount to ₹ 774.40 in 2 years, interest being compounded annually?**

**Solution**

Given : P = ₹ 640, A = ₹ 774.40, n = 2 years, r = ?

We know,

$$A = P \left( 1 + \frac{r}{100} \right)^n$$

$$\frac{774.40}{640} = \left( 1 + \frac{r}{100} \right)^2$$

$$\frac{774.40}{640} = \left( 1 + \frac{r}{100} \right)^2$$

$$\frac{77440}{64000} = \left( 1 + \frac{r}{100} \right)^2$$

$$\frac{121}{100} = \left( 1 + \frac{r}{100} \right)^2$$

$$\left( \frac{11}{10} \right)^2 = \left( 1 + \frac{r}{100} \right)^2$$

(∴ Remove square root on both side)

$$\frac{11}{10} = \frac{100 + r}{100}$$

$$\frac{11}{10} \times 100 = 100 + r$$

$$110 = 100 + r$$

$$r = 110 - 100$$

$$r = 10\%$$

$$\text{Rate } r = 10\% \text{ per annum}$$

2 In how much time will a sum of ₹ 1600 amount to ₹ 1852.20 at 5% per annum compound interest.

**Solution**

Given : P = ₹1600, A = ₹ 1852.20, r = 5% per annum, n = ?

We know,

$$A = P \left( 1 + \frac{r}{100} \right)^n$$

$$1852.20 = 1600 \left( 1 + \frac{5}{100} \right)^n$$

$$\frac{1852.20}{1600} = \left( \frac{105}{100} \right)^n$$

$$\frac{185220}{160000} = \left( \frac{21}{20} \right)^n$$

$$\frac{9261}{8000} = \left( \frac{21}{20} \right)^n$$

$$\left( \frac{21}{20} \right)^3 = \left( \frac{21}{20} \right)^n$$

$$\therefore n = 3 \text{ years}$$

3 Find the principal that will yield a compound interest of ₹ 1632 in 2 years at 4% rate of interest per annum.

**Solution**

Given : C.I = ₹ 1632, n = 2 years, r = 4% p.a

$$P = ?$$

We know,

Amount - Principal = Compound interest

$$A - P = C.I$$

$$- P = C.I - A$$

$$+ P = A - C.I$$

$$P = P \left( 1 + \frac{r}{100} \right)^n - C.I$$

$$= P \left( 1 + \frac{4}{100} \right)^2 - 1632$$

$$= P \times \frac{104}{100} \times \frac{104}{100} - 1632$$

$$P = 1.0816P - 1632$$

$$1P - 1.0816P = -1632$$

$$-0.0816P = -1632$$

$$0.0816P = 1632$$

$$P = \frac{1632}{0.0816}$$

$$= 20,000$$

$$\text{Principal} = ₹ 20,000$$

**Difference between simple interest and compound interest**

When P is the Principal, n = 2 years and r is the rate of interest.

$$\text{Difference between C.I and S.I for 2 years} = P \left( \frac{r}{100} \right)^2$$

**Example**

Find the difference between simple interest and compound interest for a sum of ₹ 8,000 lent at 10% p.a. in 2 years.

**Solution**

Here, P = ₹ 8000, n = 2 years, r = 10% p.a.

Difference between compound interest and simple interest

$$\text{for 2 years} = P \left( \frac{r}{100} \right)^2$$

$$= 8000 \left( \frac{10}{100} \right)^2$$

$$= 8000 \left( \frac{1}{10} \right)^2$$

$$= 8000 \times \frac{1}{10} \times \frac{1}{10}$$

$$= ₹ 80$$

## Assignment A

- 1 If principal = Rs. 5000, Interest = Rs. 500. Find the amount.
- 2 If principal = Rs. 12500, Amount = Rs. 17500. Find the Interest.
- 3 If the amount is Rs. 25000, its interest is 6000, calculate its principal.
- 4 If principal = Rs. 8450, Interest is 750. Calculate the amount.
- 5 If principal = Rs. 12000, Amount = Rs. 15600. Find the Interest.

## Assignment B

### Convert the following

- 6 Months = \_\_\_\_\_ year.
- 10 Months = \_\_\_\_\_ year.
- 259 days into week.
- 22 weeks into days.
- 170 days into year.
- 292 days into year.
- The month of July and August = \_\_\_\_\_ days
- 2 year 6 months = \_\_\_\_\_ years
- 15 years = \_\_\_\_\_ months
- 144 Months = \_\_\_\_\_ years.

## Assignment C

- Ramani invested Rs. 1000 for 2 years at 10% per annum. Find the simple interest.
- Find the S.I. and the amount on ₹ 5,000 at 10% per annum for 5 years.
- Find the S.I. and the amount on ₹ 1,200 at 12½% per annum for 3 years.
- Kamesh invested ₹ 10,000 in a bank that pays an interest of 10% per annum. He withdraws the amount after 2 years and 3 months. Find the interest, he receives.
- Find the amount when ₹ 2,500 is invested for 146 days at 13% per annum.
- Find the S.I. and the amount on ₹ 12,000 from May 21<sup>st</sup> 1999 to August 2<sup>nd</sup> 1999 at 9% per annum.
- Shanthi deposited ₹ 6,000 in a bank and received ₹ 7,500 at the end of 5 years. Find the rate of interest.
- Find the principal that earns ₹ 250 as S.I. in 2½ years at 10% per annum.
- In how many years will a sum of ₹ 5,000 amount to ₹ 5,800 at the rate of 8% per annum.
- A sum of money doubles itself in 10 years. Find the rate of interest.
- A sum of money doubles itself in 12½ per annum over a certain period of time. Find the number of years.
- A certain sum of money amounts to ₹ 6,372 in 3 years at 6%. Find the principal.
- A certain sum of money amounts to ₹ 6,500 in 3 years and ₹ 5,750 in 1½ years respectively. Find the principal and the rate percent.
- Find the S.I. and the amount on ₹ 3,600 at 15% per annum for 3 years and 9 months.
- Find the principal that earns ₹ 2,080 as S.I. in 3¼ years at 16% p.a.

## Assignment D

- Find the amount and compound interest in the following cases:

Sl. No.	Principal in Rs.	Rate % per annum	Time in years
a	1000	5%	3
b	4000	10%	2
c	18000	10%	2½

- Sankari borrowed Rs. 8,000 from Alex for 2 years at 12½% per annum. What interest did Sankari pay to Alex if the interest is compounded annually.
- Find the compound interest on Rs. 24,000 compounded semi annually (half yearly) for 1½ years at the rate of 10% per annum.
- Find the amount that Divakar would receive if he invests Rs. 8,192 for 18 months at 12½% per annum, the interest being compounded half-yearly.
- Anbu took a loan of Rs. 80,000 from a bank for 1½ years at 10% per annum. What interest did Anbu pay to bank if the interest is compounded annually.
- Find the amount that Manimegalai would receive if she invests Rs. 80,000 for 18 months at 10% per annum, the interest being compounded half-yearly.
- Find the compound interest on Rs. 15,625 for 9 months at 16% per annum compounded quarterly.
- Raju took a loan of Rs. 80,000 from a bank. If the rate of interest is 10% p.a. Find the difference in amounts he would be paying after 1½ years if the interest compounded annually is Rs. 92,400, compounded half yearly is Rs. 92,610.
- Guna borrowed Rs. 26,400 from a bank to buy a scooter at the rate of 15% p.a. compounded yearly. What amount will he pay at the end of 2 years to clear the loan.

10 Find the difference between simple interest and compound interest on ₹ 2400 at 2 years at 5% per annum compounded annually.

11 Find the difference between simple interest and compound interest on ₹ 6400 for 2 years at 6¼% p.a. compounded annually.

## Assignment E

### I MCQ (Multiple Choice Questions)

1 Reduction from original selling price is called \_\_\_\_\_

- A loss  
B list price  
C profit  
D marked price

2 A man buys an article for Rs. 27.50 and sells it for Rs. 28.60. Find his gain percent

- A 1%  
B 2%  
C 3%  
D 4%

3 A TV is purchased at Rs. 5000 and sold at Rs. 4000, find the lost percent.

- A 10%  
B 20%  
C 25%  
D 28%

4 A person incurs a loss of 5% by selling a watch for Rs. 1140. At what price should the watch be sold to earn 5% profit.

- A Rs. 1200  
B Rs. 1230  
C Rs. 1260  
D Rs. 1290

5 A book was sold for Rs. 27.50 with a profit of 10%. If it were sold for Rs. 25.75, what would have been percentage of profit and loss?

- A 2% profit  
B 3% profit  
C 2% loss  
D 3% loss

6 Alfred buys an old scooter for Rs. 4700 and spends Rs. 800 on its repairs. If he sells the scooter for Rs. 5800 his gain percent is \_\_\_\_\_

- A 6.19%  
B 6.17%  
C 5.4545%  
D 3.5111%

7 If the cost price is 25% of selling price. Then what is the profit percent?

- A 150%  
B 200%  
C 300%  
D 350%

8 The cost price of 20 articles is the same as the selling price of  $x$  articles. If the profit is 25%, find out the value of  $x$ .

- A 13  
B 14  
C 15  
D 16

9 A man buys an item at Rs. 1200 and sells it at a loss of 20 percent. Then what is the selling price of that item.

- A 660  
B 760  
C 860  
D 960

10 A plot is sold for Rs. 18,700 with a loss of 15%. At what price it should be sold to get profit of 15%.

- A Rs. 25300  
B Rs. 22300  
C Rs. 24300  
D Rs. 21300

11 A man gains 20% by selling an article for a certain price. If he sells it at double the price, the percentage of profit will be

- A 130%  
B 140%  
C 150%  
D 160%

12 If the cost price of 12 pens is equal to the selling price of 8 pens, the gain percent is?

- A 12%  
B 30%  
C 50%  
D 60%

13 Ryan buys a clock for Rs. 75 and sells it for Rs. 100. His gain percent is \_\_\_\_\_

- A 25%  
B 33⅓%  
C 20%  
D 37½%

14 A bat is bought for Rs. 120 and sold for Rs. 105, the loss percent is \_\_\_\_\_

- A 15⅓%  
B 14⅓%  
C 15%  
D 16⅓%

15 A man bought apples at the rate of 8 for Rs. 34 and sold them at the rate of 12 for Rs. 57. How many apples should be sold to earn a net profit of Rs. 45?

- A 90  
B 100  
C 135  
D 150

16 A tradesman sold an article at a loss of 20%. Had he sold it for Rs. 100 more, he should have gained 5%. The cost price of the article was \_\_\_\_\_

- A Rs. 360  
B Rs. 400  
C Rs. 425  
D Rs. 450

17 At what percentage above the cost price must an article be marked so as to gain 33% after allowing a customer a discount of 5%?

- A 35%  
B 38%  
C 40%  
D 42%

18 A shopkeeper earns a profit of 12% on selling a book at 10% discount on the printed price. The ratio of the cost price and the printed price of the book is

- A 45:56  
B 45:51  
C 47:56  
D 47:51

- 19 By selling a bicycle for Rs. 2,850 a shopkeeper gains 14%. If the profit is reduced to 8%, then the selling price will be  
 A Rs. 2600                      B Rs. 2700  
 C Rs. 2800                      D Rs. 3000
- 20 A person sold a horse at a gain of 15%. Had he bought it for 25% less and sold it for Rs. 600 less, he would have made a profit of 32%. The cost price of the horse was:  
 A Rs. 3750                      B Rs. 3250  
 C Rs. 2750                      D Rs. 2250
- 21 If a man were to sell his chair for Rs. 720, he would lose 25%. To gain 25% he should sell it for:  
 A Rs. 1200                      B Rs. 1000  
 C Rs. 960                        D Rs. 900
- 22 If harsh sold a match ticket for Rs. 340 at a profit of 25%, at what price did he purchase the ticket?  
 A 280                              B 255  
 C 300                              D 272
- 23 Eleven bags are bought for Rs. 1000 and sold at 10 for Rs. 1100. What is the gain or loss in percentage?  
 A 10%                              B 21%  
 C 25%                              D 20%
- 24 A man buys an article for Rs. 27.50 and sells it for rs. 28.60. Find its gain percent?  
 A 1%                                B 2%  
 C 3%                                D 4%
- II MCQ**
- 1 Find the simple interest on Rs. 5200 for 2 years at 6% per annum.  
 A Rs. 450                        B Rs. 524  
 C Rs. 600                        D Rs. 624
- 2 Rs. 1200 is lent out at 5% per annum simple interest for 3 years. Find the amount after 3 years  
 A Rs. 1380                      B Rs. 1290  
 C Rs. 1470                      D Rs. 1200
- 3 Interest obtained on a sum of Rs. 5000 for 3 years is Rs. 1500. Find the rate percent.  
 A Rs. 8%                        B Rs. 9%  
 C Rs. 10%                      D Rs. 11%
- 4 Rs. 2100 is lent at compound interest of 5% per annum for 2 years. Find the amount after two years.  
 A Rs. 2300                      B Rs. 2315.25  
 C Rs. 2310                      D Rs. 2320
- 5 Find the difference between the simple interest and the compound interest at 5% per annum for 2 years on principal of Rs. 2000?  
 A Rs. 5                            B Rs. 10.5  
 C Rs. 4.5                        D Rs. 5.5
- 6 A bank offers 5% compound interest calculated on half yearly basis. A customer deposits Rs. 1600 each on 1<sup>st</sup> January and 1<sup>st</sup> July of a year. At the end of the year, the amount he would have gained by way of interest is:  
 A Rs. 120                        B Rs. 121  
 C Rs. 122                        D Rs. 123
- 7 There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest of Rs. 12,000 after 3 years at the same rate?  
 A Rs. 2160                      B Rs. 3120  
 C Rs. 3972                      D Rs. 6240
- 8 What is the difference between the compound interest on Rs. 5000 for 1½ years at 4% per annum compounded yearly and half-yearly?  
 A Rs. 2.04                      B Rs. 3.06  
 C Rs. 4.80                      D Rs. 8.30
- 9 The compound interest on Rs. 30,000 at 7% per annum is Rs. 4347. Their period (in years) is  
 A Rs.2                            B Rs.2½  
 C Rs.3                            D Rs.4
- 10 What will be the compound interest on a sum of Rs. 25000 after 3 years at the rate of 12 p.c.p.a?  
 A Rs. 9000.30                    B Rs. 9720  
 C Rs. 10123.20                D Rs. 10483.20
- 11 At what rate of compound interest per annum will a sum of Rs. 1200 become Rs. 1348.32 in 2 years?  
 A 6%                            B 6.5%  
 C 7%                            D 7.5%
- 12 Albert invested an amount of Rs. 8000 in a fixed deposit scheme for 2 years at compound interest rate 5 P.C.P.A. How much amount will Albert get on maturity of the fixed deposit?  
 A Rs. 8600                      B Rs. 8620  
 C Rs. 8820                      D Rs. 8940