COMPARING QUANTITIES

SIMPLE INTEREST

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Interest :

Interest is the amount paid in lieu of using some money which is not owned by us.

- The amount of money deposited, lent or borrowed is called principal (P).
- The additional money given at the end of a period for using the principal is called interest.
- The total money we receive or pay is called the amount due at that time. Thus the sum of principal and interest is called amount.

  i.e. amount = principal + interest
- The time for which the money is kept in the bank or for which the loan has been borrowed is called the time period.

  To find the simple interest on a certain amount of money we need to know three quantities.

  (i) Amount deposited or borrowed is called principal (P)

  (ii) Rate of interest (R)

  (iii) Time period (T)

  So, simple Interest = $\frac{P \times R \times T}{100}$

Note : If the rate of interest is given per annum then the time period must be expressed in terms of year.

For Example

Time period T = 3 month should be written as $\frac{3}{12} = \frac{1}{4}$ year

T = 6 month should be written as $\frac{6}{12} = \frac{1}{2}$ year

T = 9 month should be written as $\frac{9}{12} = \frac{3}{4}$ year

Ex.1 Find the simple interest when; Principal = ₹600, Rate = 2% per annum and Time = 20 months.

Sol. We have, P = Principal = ₹600,

R = Rate percent per annum = 2

And T = Time = 20 months = $\frac{20}{12}$ year

Therefore, simple interest (S.I.)

$= \frac{P \times R \times T}{100} = ₹\left(\frac{600 \times 2 \times 20}{100 \times 12}\right)$

Thus S.I. = ₹20.

Ex.2 Find the principal when Simple Interest = ₹72, Rate = 3% per annum and Time = 3 months.

Sol. We have, SI = ₹72, R = 3%,

T = 3 months = $\frac{3}{12} = \frac{1}{4}$ year

Therefore, Principal (P) = $\frac{100 \times S.I.}{R \times T}$

$P = ₹\left(\frac{100 \times 72 \times 4}{3 \times 1}\right) = ₹(100 \times 24 \times 4)$

$= ₹9600$

Ex.3 Find the rate when Principal = ₹700, Simple Interest = ₹168 and Time = 16 months

Sol. We have, P = ₹700, SI = ₹168,

T = 16 months = $\frac{16}{12}$ year

Therefore, Rate = $\frac{100 \times S.I.}{P \times T}$ %

$$\text{Rate} = \frac{168\times100\times12}{700\times16}\% = \left(\frac{168\times12}{7\times16}\right)\%$$

$$= \frac{2016}{112}\% = 18\%$$

Ex.4 Find the time when principal = ₹640, Rate $=12\frac{1}{2}\%$ per annum and Simple Interest = ₹40.

Sol. We have, P = ₹640,

$R = 12\frac{1}{2}\% = \frac{25}{2}$ per annum, SI = ₹40

Therefore, $T = \frac{S.I\times100}{P\times R} = \frac{40\times100\times2}{640\times25} = \frac{1}{2}$

Thus, $T = \frac{1}{2}$ year or 6 months.

Ex.5 Neeraj borrowed a sum of money at $10\frac{1}{2}\%$ per annum from a bank. If he paid ₹ 1863.75 as interest for $2\frac{1}{2}$ years, find the sum.

Sol. We have, $R = 10\frac{1}{2}\% = \frac{21}{2}$,

S.I.= ₹1863.75 and

$T = 2\frac{1}{2}$ years $= \frac{5}{2}$ years.

We have to find the sum.

Now, Principal (P) $= \frac{S.I.\times100}{R\times T}$

$$= \frac{1863.75\times100\times2\times2}{21\times5} = 1775\times4$$

= ₹7100

Hence, the required sum = ₹7100

Ex.6 A sum of money becomes $\frac{7}{4}$ of itself in 6 years at a certain rate of interest. Find the rate of interest.

Sol. Let the Principal be ₹ P. Then amount = ₹ $\frac{7}{4}$P

We have, principal = ₹ P, Amount = ₹ $\frac{7}{4}$P,

T = 6 years.

We have to find the rate (R)

Then, Amount = Principal + S.I.

$\frac{7P}{4}$ = P + S.I.

S.I. = $\frac{7P}{4}$ – P = $\frac{7P-4P}{4}$ = $\frac{3P}{4}$

We know that,

S.I. = $\frac{P \times R \times T}{100}$

$\frac{3P}{4} = \frac{P \times R \times 6}{100}$

$3P \times 100 = 4 \times P \times R \times 6$

$300\ P = 24\ P \times R$

Therefore, Rate (R)

= $\frac{300P}{24P}$% or R = $\frac{300P}{24P} = \frac{300}{24}$%

$\Rightarrow R = \frac{300 \div 12}{24 \div 12}\% = \frac{25}{2}\% = 12\frac{1}{2}\%$

Hence, required rate percent

= $12\frac{1}{2}$% per annum

Ex.7 If Meena gives an interest of ₹ 45 for one year at 9% rate p.a., what is the sum she has borrowed ?

Sol. S.I. = 45, R = 9%, T = 1 year

S.I. = $\frac{P \times R \times T}{100}$

$$45 = \frac{P \times 9 \times 1}{100}$$

$$P = \frac{45 \times 100}{9} = 500$$

Hence, Meena has borrowed ₹ 500

Ex.8 What rate gives ₹ 280 as interest on a sum of ₹ 56,000 in 2 years ?

Sol. We have, P = ₹ 56000, T = 2, R = ?

S.I. = ₹ 280

$$\text{S.I.} = \frac{P \times R \times T}{100}$$

$$280 = \frac{56000 \times R \times 2}{100} \Rightarrow R = \frac{280 \times 100}{56000 \times 2}$$

Hence Rate (R) = 0.25%

Ex.9 Find the amount to be paid at the end of 3 years in each case :

(i) Principal = ₹ 1200 at 12% p.a.

(ii) Principal = ₹ 7500 at 5% p.a.

Sol. (i) We have, P = ₹ 1200, R = 12%,

T = 3 years

$$\text{S.I.} = \frac{P \times R \times T}{100} = \frac{1200 \times 12 \times 3}{100}$$

S.I. = ₹ 432.

A = P + S.I. = ₹ (1200 + 432)

A = ₹ 1632.

(ii) We have, P = ₹ 7500, R = 5%, T = 3 years

$$\text{S.I.} = \frac{P \times R \times T}{100} = \frac{7500 \times 5 \times 3}{100}$$

S.I. = 1125

A = P + S.I. = 7500 + 1125

A = ₹ 8625

Ex.10 Amina buys a book for ₹ 275 and sells it at a loss of 15%. How much does she sell it for ?

Sol. We have

C.P. = ₹ 275

Loss % = 15%

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

$$15 = \frac{\text{Loss}}{275} \times 100$$

$$\text{Loss} = \frac{15 \times 275}{100} = ₹ 41.25.$$

S.P. = C.P. – Loss = 275 – 41.25

Hence, S.P. = ₹ 233.75

Ex.11 Juhi sells a washing machine for ₹ 13,500. She loses 20% in the bargain. What was the price at which she bought it ?

Sol. We have

S.P. = ₹ 13500

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

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

$$\text{C.P.} = \frac{100 \times \text{S.P.}}{(100 - \text{loss\%})} = \frac{100 \times 13500}{100 - 20}$$

$$= \frac{100 \times 13500}{80}$$

Hence C.P. = ₹ 16,875

Ex.12 I bought a T.V. for ₹ 10,000 and sold it at a profit of 20%. How much money do I get for it?

Sol. We have, C.P. = ₹ 10,000

Profit % = 20%

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

$$\text{Profit} = \frac{\text{Profit\%} \times \text{C.P.}}{100} = \frac{20 \times 10{,}000}{100}$$

Profit = ₹ 2000

S.P. = C.P. + Profit

= ₹ (10,000 + 2000)

= ₹ 12,000

Hence I got ₹ 12000 for T.V.

Ex.13 An article was bought for ₹ 400 and sold for ₹ 350. Find the loss and loss percent.

Sol. We have

C.P = ₹ 400

S.P = ₹ 350

As C.P. > S.P.

Loss = C.P. – S.P.

= ₹ (400 – 350)

Loss = ₹ 50

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

$$= \frac{50}{400} \times 100$$

Loss % = 12.5%

Ex.14 An article was purchased for ₹ 500 and sold for ₹ 550. Find the gain and gain percent.

Sol. We have, C.P. = ₹ 500

S.P. = ₹ 550

As S.P. > C.P.

∴ Profit = ₹ 50

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

$$= \frac{50}{500} \times 100 = 10\%$$

Hence, Profit % = 10%