Simple Interest

POINTS TO REMEMBER

1. **Simple Interest :** $\frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

(*i*) or S.I. or Interest $= \frac{P \times R \times T}{100}$ where, P = Principal, R = Rate % and T = Time or pe

(*ii*) $P = \frac{S.I. \times 100}{R \times T}$ (*iii*) $R = \frac{S.I. \times 100}{P \times T}$ and (*iv*) $T = \frac{S.I. \times 100}{P \times R}$

2. **Amount ;** Principal + S. Interest

i.e. $A = P + S.I.$ or $A = P + I = P + \frac{PRT}{100}$

Question 1.

Find the S.I. and amount on :

(i) Rs. 150 for 4 years at 5% per year.

(ii) Rs. 350 for $3\frac{1}{2}$ years at 8% p.a.

(iii) Rs. 620 for 4 months at 8 p. per rupee per month.

(iv) Rs. 3,380 for 30 months at $4\frac{1}{2}$ % p.a.

(v) 600 from July 12 to Dec. 5 at 10% p.a.

(vi) Rs. 850 from 10th March to 3rd August at $2\frac{1}{2}$ % p.a.

(vii) Rs. 225 for 3 years 9 months at 16% p.a.

Solution:

(*i*) P = Rs. 150, R = 5% per year

T = 4 years

$\therefore$ S.I. $= \frac{P.R.T.}{100} = \frac{150 \times 5 \times 4}{100}$

= Rs. 30

and amount = P + S.I.

= Rs. 150 + Rs. 30 = Rs. 180

(*ii*) P = Rs. 350, R = 8% p.a.

$T = 3\frac{1}{2}$ years $= \frac{7}{2}$ years

$$\therefore \text{ S.I. } = \frac{P \times R \times T}{100} = \frac{350 \times 8 \times 7}{100 \times 2}$$

= Rs. 98

Amount = P + S.I. = Rs. 350 + Rs. 98

= Rs. 448

(*iii*) P = Rs. 620

R = 8 p. per rupee per month = 8% p.m.

T = 4 months

$$\therefore \text{ S.I. } = \frac{P.R.T.}{100} = \frac{620 \times 8 \times 4}{100}$$

$$= \text{Rs.}\frac{19840}{100} = \text{Rs. } 198{\cdot}40$$

$\therefore$ Amount = P + S.I.

= Rs. 620 + Rs. 198·40 = Rs. 818·40

(*iv*) Principal (P) = Rs. 3380

$$\text{Rate} = 4\frac{1}{2}\% \text{ p.a.} = \frac{9}{2}\%$$

$$\text{Period} = 30 \text{ months} = \frac{30}{12} \text{ years}$$

$$\text{S.I.} = \frac{PRT}{100} = \frac{3380 \times 9 \times 30}{100 \times 2 \times 12}$$

$$= \text{Rs. } \frac{1521}{4} = \text{Rs. } 380.25$$

Amount = P + S.I.

= Rs. 3380 + 380.25 = Rs. 3760.25

(*v*) P = Rs. 600, R = 10% p.a.

T = July 12 to Dec. 5

July	= 19 Days
Aug.	= 31 Days
Sep.	= 30 Days
Oct.	= 31 Days
Nov.	= 30 Days
Dec.	= 05 Days
Total	146 Days

$$= \frac{146}{365} \text{ years} = \frac{2}{5} \text{ years}$$

$\therefore$ S.I. $= \dfrac{\text{P.R.T.}}{100} = \dfrac{600 \times 10 \times 2}{100 \times 5} = \text{Rs. } 24$

$\therefore$ Amount = P + S.I. = Rs. 600 + Rs. 24

= Rs. 624

(*vi*) P = Rs. 850,

$R = 2\dfrac{1}{2}\% = \dfrac{5}{2}\%$ p.a.

T = 10th march to 3rd Aug.

March	= 21 days
April	= 30 days
May	= 31 days
June	= 30 days
July	= 31 days
Aug.	= 03 days
Total	146 days

$= \dfrac{146}{365} = \dfrac{2}{5}$ years

$\therefore$ S.I. $= \dfrac{\text{P.R.T.}}{100} = \dfrac{850 \times 5 \times 2}{100 \times 2 \times 5} = \dfrac{850}{100}$

= Rs. 8·50

$\therefore$ Amount = P + S.I.

= Rs. 850 + Rs. 8·50 = Rs. 858·50

(*vii*) P = Rs. 225, R = 16% p.a.

T = 3 years 9 months

$= 3\dfrac{9}{12} = 3\dfrac{3}{4}$ years $= \dfrac{15}{4}$ years

$\therefore$ S.I. $= \dfrac{\text{P.R.T.}}{100} = \dfrac{225 \times 16 \times 15}{100 \times 4} = \text{Rs. } 135$

$\therefore$ Amount = P + S.I. = Rs. 225 + Rs. 135

= Rs. 360

Question 2.

On what sum of money does the S.I. for 10 years at 5% become Rs. 1,600 ?

Solution:

S.I. = Rs. 1600, R = 5% p.a.

T = 10 years

$$\therefore P = \frac{S.I. \times 100}{R \times T} = \frac{1600 \times 100}{5 \times 10} = \text{Rs. } 3200$$

Question 3.

Find the time in which Rs. 2,000 will amount to Rs. 2,330 at 11% p.a. ?

Solution:

Amount (A) = Rs. 2,330

Principal (P) = Rs. 2,000

$\therefore$ S.I. = A – P = Rs. 2,330 – Rs. 2,000

= Rs. 330

R = 11% p.a.

$$\therefore \text{Time} = \frac{S.I. \times 100}{P \times R} = \frac{330 \times 100}{2000 \times 11}$$

$$= \frac{3}{2} = 1\frac{1}{2} \text{ years}$$

Question 4.

In what time will a sum of money double it self at 8% p.a ?

Solution:

Let the principal (P) = ₹100

$\therefore$ Amount (A) = ₹100 × 2 = ₹200

$\therefore$ S.I. = A – P = ₹200 – ₹100

= ₹100

Rate (R) = 8% p.a.

$$\therefore \text{Time} = \frac{S.I. \times 100}{P \times R} = \frac{100 \times 100}{100 \times 8}$$

$$= \frac{25}{2} = 12\frac{1}{2} \text{ years}$$

Question 5.

In how many years will be ₹870 amount to ₹1,044, the rate of interest being $2\frac{1}{2}$ % p.a ?

Solution:

Principal (P) = ₹870

Amount (A) = ₹1044

$\therefore$ S.I. = P – A = ₹1044 – ₹870

= ₹174

$$\text{Rate (R)} = 2\frac{1}{2} = \frac{5}{2}\% \text{ p.a.}$$

$$\therefore \text{ Time} = \frac{\text{S.I.} \times 100}{\text{P} \times \text{R}} = \frac{174 \times 100 \times 2}{870 \times 5}$$

= 8 years.

Question 6.

Find the rate percent if the S.I. on ₹275 is 2 years is ₹22.

Solution:

Principal (P) = ₹275, S.I. = ₹22

Time = 2 years

$$\therefore \text{ Rate} = \frac{\text{S.I.} \times 100}{\text{P} \times \text{T}} = \frac{22 \times 100}{275 \times 2}$$

= 4% p.a.

Question 7.

Find the sum which will amount to ₹700 in 5 years at 8% rate p.a.

Solution:

Amount = ₹700, Rate (R) = 8% p.a.

Time (T) = 5 years

Let principal (P) = ₹100

$$\text{then S.I.} = \frac{\text{P.R.T.}}{100} = \frac{100 \times 8 \times 5}{100} = ₹40$$

$\therefore$ Amount (A) = P + S.I.

= ₹100 + 40 = ₹140

If amount is ₹140, then principal = ₹100

and, if amount is Rs. 700, then principal

$$= ₹\frac{100 \times 700}{140} = ₹500$$

Question 8.

What is the rate of interest, if ₹3,750 amounts to ₹4,650 in 4 years ?

Solution:

Principal (P) = ₹3,750

Amount (A) = ₹4,650

$\therefore$ S.I. = A – P = ₹4,650 – 3,750

= ₹900

Time (T) = 4 years.

$$\therefore \quad \text{Rate} = \frac{\text{S.I.} \times 100}{\text{P} \times \text{T}} = \frac{900 \times 100}{3750 \times 4}$$

= 6% p.a.

Question 9.

In 4 years, ₹6,000 amount to ₹8,000. In what time will ₹525 amount to ₹700 at the same rate ?

Solution:

In first case, Principal (P) = ₹6,000

Amount (A) = ₹8,000

$\therefore$ S.I. = A – P = ₹8,000 – ₹6,000

= ₹2000

Time (T) = 4 years

$$\therefore R = \frac{S.I. \times 100}{P \times T} = \frac{2000 \times 100}{6000 \times 4}$$

$$= \frac{25}{3}\% = 8\frac{1}{3}\% \text{ p.a.}$$

In second case, Principal (P) = ₹525

Amount (A) = ₹700

$\therefore$ S.I. = A – P = ₹700 – ₹525

= ₹175

Rate (R) = $\frac{25}{3}$% of p.a.

$$\therefore \text{Time} = \frac{S.I. \times 100}{P \times R} = \frac{\text{Rs. } 175 \times 100 \times 3}{525 \times 25} = 4 \text{ years}$$

Question 10.

The interest on a sum of money at the end of $2\frac{1}{2}$ years is $\frac{4}{5}$ of the sum. What is the rate percent ?

Solution:

Let the sum (P) = Rs. 100

$$\therefore \text{S.I.} = \text{Rs. } 100 \times \frac{4}{5} = \text{Rs. } 80$$

$$\text{Period (T)} = 2\frac{1}{2} = \frac{5}{2} \text{ years.}$$

$$\therefore \text{Rate} = \frac{S.I. \times 100}{P \times T} = \frac{80 \times 100 \times 2}{100 \times 5} = 32\% \text{ p.a.}$$

Question 11.

What sum of money lent out at 5% for 3 years will produce the same interest as Rs. 900 lent out at 4% for 5 years ?

Solution:

In second case, Principal (P) = Rs. 900

Rate (R) = 4%, Time (T) = 5 years

$$\therefore \text{S.I.} = \frac{P \times R \times T}{100} = \frac{900 \times 4 \times 5}{100} = \text{Rs. } 180$$

In first case, S.I. = Rs. 180

Rate = 5%, Time = 3 years

$$\therefore \text{Sum} = \frac{\text{S.I.} \times 100}{R \times T} = \frac{180 \times 100}{5 \times 3} = \text{Rs. } 1200.$$

Question 12.

A sum of Rs. 1,780 become Rs. 2,136 in 4 years,
Find :
(i) the rate of interest.
(ii) the sum that will become Rs. 810 in 7 years at the same rate of interest ?

Solution:

(*i*) In first case, Principal (P) = Rs. 1,780

Amount (A) = Rs. 2,136

$\therefore$ S.I. = A – P = Rs. 2,136 – 1,780 = Rs. 356

Time (T) = 4 years

$$\therefore \quad \text{Rate} = \frac{\text{S.I.} \times 100}{P \times T} = \frac{356 \times 100}{1780 \times 4} = 5\% \text{ p.a.}$$

(*ii*) In second case, Let principal (P) = Rs. 100

Rate (R) = 5% p.a., Time (T) = 7 years

$$\therefore \text{S.I.} = \frac{P \times R \times T}{100} = \frac{100 \times 5 \times 7}{100} = \text{Rs. } 35$$

$\therefore$ Amount = P + S.I. = Rs. 100 + 35 = Rs. 135

If amount is Rs. 135, then principal = Rs. 100

and if amount is Rs. 810, then principal

$$= \text{Rs.} \frac{100 \times 810}{135} = \text{Rs. } 600$$

Question 13.

A sum amounts to Rs. 2,652 in 6 years at 5% p.a. simple interest.
Find :
(i) the sum
(ii) the time in which the same sum will double itself at the same rate of interest.

Solution:

.(*i*) In first case, Let principal (P) = Rs. 100

Rate (R) = 5% p.a., Time (T) = 6 years

$$\therefore \text{S.I.} = \frac{P \times R \times T}{100} = \frac{100 \times 5 \times 6}{100} = \text{Rs. } 30$$

and, amount = Rs. 100 + Rs. 30 = Rs. 130

If amount is Rs. 130, then principal = Rs. 100

and, if amount is Rs. 2652, then principal

$$= \frac{100 \times 2,652}{130} = \text{Rs. } 2040$$

In second case, Let sum (P) = Rs. 100

Amount (A) = Rs. 100 × 2 = Rs. 200

S.I. = A – P = Rs. 200 – 100 = Rs. 100

Rate = 5% p.a.

$$\text{Time} = \frac{\text{S.I.} \times 100}{P \times R} = \frac{100 \times 100}{100 \times 5} = 20 \text{ years}$$

Question 14.

P and Q invest Rs. 36,000 and Rs. 25,000 respectively at the same rate of interest per year. If at the end of 4 years, P gets Rs. 3,080 more interest than Q; find the rate of interest.

Solution:

P's investment (P_1) = Rs. 36000

and Q's investment (P_2) = Rs. 25000

Period (T) = 4 years, Let rate of interest = x %

$$\text{Q's interest} = \text{Rs. } \frac{36000 \times x \times 4}{100}$$

$$= \text{Rs. } 1440x \qquad \left(\because \text{S.I.} = \frac{PRT}{100}\right)$$

$$\text{and Q's interest} = \frac{25000 \times x \times 4}{100} = \text{Rs. } 1000x$$

Difference in their interest

= Rs.$(1440 - 1000)\,x$ = Rs. $440x$

But difference = Rs. 3080

$$\therefore 440x = 3080 \Rightarrow x = \frac{3080}{440} \Rightarrow x = 7\%$$

$\therefore$ Rate of interest = 7% p.a.

Question 15.

A sum of money is lent for 5 years at R% simple interest per annum. If the interest earned be one-fourth of the money lent, find the value of R.

Solution:

Let the sum (P) = ₹100

$$\therefore \text{S.I.} = \frac{1}{4} \times ₹100 = ₹25$$

Period (T) = 5 years

$$\therefore \text{Rate\%} = \frac{\text{S.I.} \times 100}{P \times T} = \frac{25 \times 100}{100 \times 5} = 5\%$$

Question 16.

The simple interest earned on a certain sum in 5 years is 30% of the sum. Find the rate of interest.

Solution:

Let the sum (P) = ₹100

$$\text{S.I.} = \frac{30}{100} \times ₹100 = ₹30$$

Period (T) = 5 years

$$\therefore \text{Rate} = \frac{\text{S.I.} \times 100}{\text{P} \times \text{T}} = \frac{30 \times 100}{100 \times 5} = 6\%$$