

21. SIMPLE INTEREST

IMPORTANT FACTS AND FORMULAE

- 1.. **Principal:** The money borrowed or lent out for a certain period is called the **principal** or the **sum**.
 2. **Interest:** Extra money paid for using other's money is called **interest**.
 3. **Simple Interest (S.I.)** : If the interest on a sum borrowed for a certain period is reckoned uniformly, then it is called **simple interest**.
- Let Principal = P, Rate = R% per annum (p.a.) and Time = T years. Then,

$$(i) \quad S.I. = (P \times R \times T) / 100$$

$$(ii) \quad P = (100 \times S.I.) / (R \times T) ; R = (100 \times S.I.) / (P \times T) \text{ and } T = (100 \times S.I.) / (P \times R)$$

SOLVED EXAMPLES

Ex. 1. Find the simple interest on Rs. 68,000 at 16 $\frac{2}{3}$ % per annum for 9 months.

Sol. P = Rs.68000, R = $50/3$ % p.a and T = $9/12$ years = $3/4$ years.

$$\therefore S.I. = (P \times R \times T) / 100 = \text{Rs.} \left(68,000 \times (50/3) \times (3/4) \times (1/100) \right) = \text{Rs.} 8500$$

Ex. 2. Find the simple interest on Rs. 3000 at 6 $\frac{1}{4}$ % per annum for the period from 4th Feb., 2005 to 18th April, 2005.

Sol. Time = (24+31+18)days = 73 days = $73/365$ years = $1/5$ years.

$$P = \text{Rs.} 3000 \text{ and } R = 6 \frac{1}{4} \% \text{ p.a} = 25/4 \% \text{ p.a}$$

$$\therefore S.I. = \text{Rs.} \left(3,000 \times (25/4) \times (1/5) \times (1/100) \right) = \text{Rs.} 37.50.$$

Remark : The day on which money is deposited is not counted while the day on which money is withdrawn is counted .

Ex. 3. A sum at simple interests at 13 $\frac{1}{2}$ % per annum amounts to Rs.2502.50 after 4 years find the sum.

$$\text{Sol. Let sum be Rs. } x \text{ then , } S.I. = \text{Rs.} \left(x \times (27/2) \times 4 \times (1/100) \right) = \text{Rs.} 27x/50$$

$$\therefore \text{amount} = \left(\text{Rs. } x + (27x/50) \right) = \text{Rs. } 77x/50$$

$$\therefore 77x/50 = 2502.50 \Leftrightarrow x = \frac{2502.50 * 50}{77} = 1625$$

Hence, sum = Rs.1625.

Ex. 4. A sum of Rs. 800 amounts to Rs. 920 in 8 years at simple interest. If the interest rate is increased by 8%, it would amount to how much?

Sol. S.I. = Rs. (920 - 800) = Rs. 120; P = Rs. 800, T = 8 yrs. _

$$R = \left((100 \times 120) / (800 \times 8) \right) \% = 5\%.$$

New rate = (5 + 3)% = 8%.

New S.I. = Rs. (800 * 8 * 8) / 100 = Rs. 512.

: New amount = Rs. (800 + 512) = Rs. 1312.

Ex. 5. Adam borrowed some money at the rate of 6% p.a. for the first two years, at the rate of 9% p.a. for the next three years, and at the rate of 14% p.a. for the period beyond five years. If he pays a total interest of Rs. 11,400 at the end of nine years, how much money did he borrow?

Sol. Let the sum borrowed be x. Then,

$$(x \times 6 \times 2) / 100 + (x \times 9 \times 3) / 100 + (x \times 14 \times 4) / 100 = 11400$$

$$\Leftrightarrow \left(\frac{3x}{25} + \frac{27x}{100} + \frac{14x}{25} \right) = 11400 \quad \Leftrightarrow \frac{95x}{100} = 11400 \Leftrightarrow x = (11400 \times 100) / 95 = 12000.$$

Hence, sum borrowed = Rs.12,000.

Ex. 6. A certain sum of money amounts to Rs. 1008 in 2 years and to Rs.1164 in 3 1/2 years. Find the sum and rate of interest.

Sol. S.I. for 1 1/2 years = Rs.(1164-1008) = Rs.156.

S.I. for 2 years = Rs.(156 * (2/3) * 2) = Rs.208

Principal = Rs. (1008 - 208) = Rs. 800.

Now, P = 800, T = 2 and S.I. = 208.

Rate = (100 * 208) / (800 * 2) % = 13%

Ex. 7. At what rate percent per annum will a sum of money double in 16 years.

Sol. Let principal = P. Then, S.I. = P and T = 16 yrs.

$$\therefore \text{Rate} = (100 \times P)/(P \times 16)\% = 6 \frac{1}{4} \% \text{ p.a.}$$

Ex. 8. The simple interest on a sum of money is $\frac{4}{9}$ of the principal .Find the rate percent and time, if both are numerically equal.

Sol. Let sum = Rs. x. Then, S.I. = Rs. $\frac{4x}{9}$

Let rate = R% and time = R years.

$$\text{Then, } (x \times R \times R)/100 = 4x/9 \text{ or } R^2 = 400/9 \text{ or } R = 20/3 = 6 \frac{2}{3}.$$

$$\therefore \text{Rate} = 6 \frac{2}{3} \% \text{ and Time} = 6 \frac{2}{3} \text{ years} = 6 \text{ years } 8 \text{ months.}$$

Ex. 9. The simple interest on a certain sum of money for $2 \frac{1}{2}$ years at 12% per annum is Rs. 40 less than the simple interest on the same sum for $3 \frac{1}{2}$ years at 10% per annum. Find the sum.

$$\text{Sol. Let the sum be Rs. } x \text{ Then, } \left(\frac{x \times 10 \times 7}{100 \times 2} \right) - \left(\frac{x \times 12 \times 5}{100 \times 2} \right) = 40$$

$$\Leftrightarrow (7x/20) - (3x/10) = 40$$

$$\Leftrightarrow x = (40 \times 20) = 800.$$

Hence, the sum is Rs. 800.

Ex. 10. A sum was put at simple interest at a certain rate for 3 years. Had it been put at 2% higher rate, it would have fetched Rs. 360 more. Find the sum.

Sol. Let sum = P and original rate = R.

$$\text{Then, } \left[\frac{P \times (R+2) \times 3}{100} \right] - \left[\frac{P \times R \times 3}{100} \right] = 360.$$

$$\Leftrightarrow 3PR + 6P - 3PR = 36000 \Leftrightarrow 6P = 36000 \Leftrightarrow P = 6000$$

Hence, sum = Rs. 6000.

Ex. 11. What annual instalment will discharge a debt of Rs. 1092 due in 3 years at 12% simple interest?

Sol. Let each Instalment be Rs. x

$$\text{Then, } \left(x + \frac{(x \times 12 \times 1)}{100} \right) + \left(x + \frac{(x \times 12 \times 2)}{100} \right) + x = 1092$$

$$\Leftrightarrow ((28x/25) + (31x/25) + x) = 1092 \Leftrightarrow (28x+31x+25x)=(1092*25)$$

$$\Leftrightarrow x = (1092*25)/84 = \text{Rs.}325.$$

\therefore Each instalment = Rs. 325.

Ex. 12. A sum of Rs. 1550 is lent out into two parts, one at 8% and another one at 6%. If the total annual income is Rs. 106, find the money lent at each rate.

Sol. Let the sum lent at 8% be Rs. x and that at 6% be Rs. $(1550 - x)$.

$$\therefore ((x*8*1)/100) + ((1550-x)*6*1)/100=106$$

$$\Leftrightarrow 8x + 9300 - 6x = 10600 \Leftrightarrow 2x = 1300 \Leftrightarrow x = 650.$$

\therefore Money lent at 8% = Rs. 650. Money lent at 6% = Rs. $(1550 - 650) = \text{Rs.} 900$.