Chapter Nine

Simple Interest

Introduction:

- Money borrowed from or deposited at institutions such as a bank, is referred to as the principal.
- When we are returning this borrowed amount, we have to pay a price and this price paid a known as the interest or simple interest.
- Apart from that when we deposit an amount at a bank; the bank adds interest to it from time to time.
- It is also a common practice that when we take a loan from an individual or a group, we return it with an interest.

S.I = $\frac{P\times R\times T}{100}$, $where\ S.I = simple\ interest.$

$P = the\ Principal.$

$T = the\ time\ in\ years.$

$R = the\ rate.$

Q1. Find the simple interest on ¢700 for 5 years, at a rate of 3% per annum.

Soln.

P = ¢700, R = 3%, T = 5years.

S.I = $\frac{P\times R\times T}{100} = \frac{700\times 3\times 5}{100} = 105.\ The\ simple\ interest = ¢105.$

Q2. Find the simple interest on ¢500 at 10% per annum for 2 years.

Soln.

P = ¢500, R = 10%, T = 2 years.

S.I = $\frac{P\times R\times T}{100} = \frac{500\times 10\times 2}{100} = ¢100.$

Q3. A man borrowed ¢2000 from a bank for 10 years, at an interest rate of 5% per annum. Calculate

i. the interest he paid on this loan.
ii. the amount he returned to the bank.

Soln.

i. $P = ¢2000,\ T = 10years, R = 5\%.$

$$S.I = \frac{P \times R \times T}{100} = \frac{2000 \times 5 \times 10}{100} = ¢1000$$

ii. The amount he paid to the bank = the principal + the interest = ¢2000 + ¢1000 = ¢3,000

Q4. Mr. John wishes to take a loan of ¢400 from a bank for 8 years, at an interest rate of 2% p.a. Determine the amount of money which he will be required to pay back to the bank.

N/B: P.a = per annum.

Soln.

P = ¢400. T = 8yrs R = 2%.

S.I = $\frac{P \times R \times T}{100} = \frac{400 \times 2 \times 8}{100} = 64, => the\ interest = ¢64.$

Amount needed to be paid to the bank = 400 + 64 = ¢464.

Q5. Determine the interest on ¢600 for 4 years at a rate of 2½% per annum.

Soln.

P = ¢600, T = 4 years, R = 2½% = $\frac{5}{2}$%.

S.I = $\frac{P \times R \times T}{100} = \frac{600 \times \frac{5}{2} \times 4}{100} = \frac{600 \times 5 \times 4}{2 \times 100} = \frac{600 \times 5 \times 4}{200} = ¢60.$

Q6. Find the simple interest on a loan of ¢9000, taken from a financial institution by Mr. Kwame at an interest rate of $3\frac{1}{3}\%$ per annum, if he was able to repay the loan in five years time.

Soln

P = ¢9000, T = 5years, R = $3\frac{1}{3}\% = \frac{10}{3}\%$.

S.I = $\frac{P \times R \times T}{100} = \frac{9000 \times \frac{10}{3} \times 5}{100} = \frac{9000 \times 10 \times 5}{3 \times 100} = \frac{9000 \times 10 \times 5}{300} = ¢1500.$

Q7. Find the simple interest on ¢400 for 6 months at a rate of 10% per annum.

N/B: The time given in months must be changed into years by dividing by 12.

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Soln.

P = ¢400, R = 10%, T = 6 months = $\frac{6}{12} = \frac{1}{2} year.$

$$S.I = \frac{P \times R \times T}{100} = \frac{400 \times 10 \times \frac{1}{2}}{100} = \frac{400 \times 10 \times 1}{2 \times 100} = \frac{400 \times 10}{200} = ¢20.$$

Q8. A man deposited ¢4,500 at a bank for 3 months at a rate of 60% per annum. Calculate the interest earned at the end of the 3 months period.

Soln.

P = ¢4500, R = 60%, T = 3 months = $\frac{3}{12} = \frac{1}{4} year$.

$$S.I = \frac{P \times R \times T}{100} = \frac{4500 \times 60 \times \frac{1}{4}}{100} = \frac{4500 \times 60 \times 1}{4 \times 100} = \frac{4500 \times 60}{400} = ¢675.$$

Q9. ¢800 was deposited at a bank for 4 months, at a rate of 3¼% per annum. Determine the interest earned

Soln.

P = ¢800, $Rate = 3\frac{1}{4}\% = \frac{13}{4}\%$, T $= 4$ months $= \frac{4}{12} = \frac{1}{3} year$

$$S.I = \frac{P \times R \times T}{100} = \frac{800 \times \frac{13}{4} \times \frac{1}{3}}{100} = \frac{800 \times 13 \times 1}{4 \times 3 \times 100} = ¢78.$$

Q10. Find the principal which generated an interest of ¢18, for 3 years at a rate 6% per annum.

Soln.

P = ?, T = 3yrs, R = 6%, S.I = ¢18.

Since S.I = $\frac{P \times R \times T}{100} => 18 = \frac{P \times 6 \times 3}{100}, => 18 = \frac{18P}{100} => 18 \times 100 = 18P, =>$

$1800 = 18P, => P = \frac{1800}{18} = ¢100.$

Q11. A certain amount was deposited at a bank for 10 years, at a rate of 4% per annum. If the interest earned was ¢500, determine this amount.

Soln.

P = ?, S.I = ¢500, R = 4% and T = 10 yrs.

S.I = $\frac{P \times R \times T}{100} \Longrightarrow 500 = \frac{P \times 4 \times 10}{100}, \Longrightarrow 500 = \frac{40P}{100} => 500 \times 100 = 40P, \Longrightarrow$

$50000 = 40P \Longrightarrow P = \frac{50000}{40},$

$\Longrightarrow P = 1250$. The amount = ¢1,250.

Q12. Kofi earned an interest of ¢2000 at a bank, for depositing an amount of money at this bank for 3 months, at a rate of 20% per annum. Calculate his deposit.

Soln.

S.I = ¢2000, P =? , T = 3 months = $\frac{3}{12} = \frac{1}{4} yr, R = 20\%.$

$$S.I = \frac{P \times R \times T}{100} => 2000 = \frac{P \times 20 \times \frac{1}{4}}{100}, => 2000 = \frac{P \times 20}{4 \times 100} \Longrightarrow 2000$$
$$= \frac{20P}{400}, \Longrightarrow 2000 \times 400 = 20P, => 800000 = 20P \Longrightarrow P$$
$$= \frac{800000}{20} = 40000.$$

The $amount\ deposited = ¢40{,}000.$

Q13. An amount of ¢550 deposited at a bank earned an interest of ¢55. If the rate was 10% p.a, determine the time.

Soln.

S.I = ¢55, P = ¢550, R = 10%, T =?

Since S.I = $\frac{P \times R \times T}{100} => 55 = \frac{550 \times 10 \times T}{100}, \Longrightarrow 55 = 55T \Longrightarrow T = \frac{55}{55} = 1yr.$

Q14. An amount of ¢250 was borrowed from a bank at an interest rate of 20% per annum, for a certain length of time. Given that the interest paid at the end of this time period was ¢50, find the time.

Soln.

P = ¢250, R = 20%, S.I = ¢50, T = ?

S.I = $\frac{P \times R \times T}{100} => 50 = \frac{250 \times 20 \times T}{100}, \Longrightarrow 50 = 50T => T = 1yr.$

Q15. An amount of ¢2000 was deposited at a bank at a rate of 40% per .annum, for a certain length of time. If at the end of this time period it has increased to ¢4800, calculate this time.

Soln.

Initial amount deposited = the principal = ¢2000. The value of this amount at the end this time period = ¢4800 $=> interest = 4800 - 2000 = ¢2800. Rate =$ 40%. $S.I = \frac{P \times R \times T}{100} \Longrightarrow 2800 = \frac{2000 \times 40 \times T}{100}, \Longrightarrow 2800 = 800T \Longrightarrow T = \frac{2800}{800} =$ $3\frac{1}{2} yrs.$

Q16. John borrowed an amount of ¢600 at an interest rate of 12½ % per annum. If at the end of a certain length of time he had to pay ¢630 to the one from whom he borrowed this amount, determined the time.

Soln.

Amount borrowed = the principal = ¢600.

Since the amount paid back = ¢630, $=> interest\ paid$

$= ¢630 - ¢600 = ¢30.$

$$R = 12\frac{1}{2}\% = \frac{25}{2}\%\,.Since\ \ S.I = \frac{P \times R \times T}{100} => 30 = \frac{600 \times \frac{25}{2} \times T}{100}, \Longrightarrow 30$$
$$= \frac{600 \times 25 \times T}{2 \times 100}, \Longrightarrow 30 = 75T \Longrightarrow T = \frac{30}{75} = \frac{2}{5} year.$$