CHAPTER FIVE

SIMPLE AND COMPOUND INTEREST

Introduction:

*Money deposited or borrowed from a financial institution, such as a bank is referred to as the principal.

*When one borrows from a financial institution and is returning the borrowed amount, he is required to add a certain amount, determined by certain factors such as time and the rate of borrowing to the institution.

*This added amount is known as the interest.

*Also when one makes a deposit at a financial institution, such institutions normally from time to time add certain small amounts to the deposited amount.

*This added amount is also known as interest

Simple interest:

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

Where P **=** The principal.

R **=** The rate.

T **=** Time in years.

N/B: P. a **=** Per annum.

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

Soln:

P = ¢ 700, R = 3% and T = 5 years.

S.I = P **X** R **X** T= 700 **X** 3 **X** 5 = ¢105.

100 100

(Q2) A man borrowed ¢2000 from a bank for 10 years, at a rate of 5% per annum. Calculate

(i) the simple interest.

(ii) the amount returned to the bank by the man.

Soln:

(i) P = ¢2000, T = 10 years and R = 5%.
S.I = P **X** R **X** T= 2000**X** 5 **X** 10 = ¢1000.
100 100

(ii) The amount returned to the bank = The principal + the interest = ¢2000 + ¢1000 = ¢3,000.

(Q3) Mr. John took a loan of ¢400 from a bank, for 8 years at a rate of 2% p.a. Determine the amount of money he returned to the bank.

Soln:

S.I = P **X** R **X** T= 400 **X** 2 **X** 8 = ¢64.

100 100

=>Amount returned to the bank = 400 + 64 = ¢464.

(Q4) Determine the simple interest on ¢9000 for 5 years at 3⅓ % per annum.

Soln:

P = ¢9000, T = ¢5years and R = 3⅓% = 10/3% = 3.3%.

S.I = $\frac{P \textbf{ X } R \textbf{ X } T}{100} = \frac{9000 \textbf{ X } 3.3 \textbf{ X } 5}{100}$ **=** ¢1485.

N/B: If the time is given in months, it must be changed into years by dividing by 12.

(Q5) Find the simple interest on ¢400 for 6 months at a rate of 10% p.a.

Soln:

P = ¢400, T= 6months = 6/12 = 0.5 years and R = 10%.

S.I = $\frac{P \textbf{ X } R \textbf{ X } T}{100} = \frac{400 \textbf{ X } 10 \textbf{ X } 0.5}{100}$ **=** ¢20.

(Q6) A man deposited an amount of ¢800 at a bank for 4 months at a rate of 3¼% per annum. Find the interest he earned.

Soln:

P = ¢800, T = 4months = 4/12= 0.33 years, R = 3¼= 13/4 = 3.25%.

S.I = $\frac{P \textbf{ X } R \textbf{ X } T}{100} = \frac{800 \textbf{ X } 3.25 \textbf{ X } 0.33}{100}$ **=** ¢858.

(Q7) Kofi earned ¢200 as interest at a bank for depositing a certain amount at the bank for 3months, at a rate of 20% p.a. Determine his deposit.

Soln:

P = deposit**= ?,** T = 3months = 3/12 = 0.25 years, R = 20%.

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S.I = $\frac{P \textbf{ X } R \textbf{ X } T}{100} = \frac{P \textbf{ X } 0.25 \textbf{ X } 20}{100}$

=>S.I = $\frac{5P}{}$

100

Since the interest earned = ¢2000 =>2000 = 5P/100

=>2000 **X** 100 = 5P

=>200000 = 5P

P = 200000 = 40,000.

5

Deposit= ¢40,000.

(Q8) A man gained an interest of ¢20, for depositing a certain amount at a bank for 8 months, at an interest rate of 5½% p.a. Find the amount deposited.

Soln:

S.I = ¢20, P = ?, T= 8months = 8/12 = 0.67 years and R= 5½= 11/2% = 5.5%.

Since S.I = P **X** R **X** T

100

=>20 = P **X** 5.5 **X** 0.67,

100

∴ 20 **X** 100 = 3.7p,

=>2000 = 3.7p => P = $\frac{2000}{3.7}$ = ¢541.

(Q9) Kofi borrowed an amount of ¢4000, at a rate of 10% per annum from a bank. At the end of this time period, he had to pay an amount of ¢6000 to the bank. Find this time.

Soln:

P = ¢4000, R= 10% and T =?.

Amount returned to the bank = **¢**6000.

Interest = Amount returned — the principal = ¢6000 —¢4000 = ¢2000.

Since S.I = P **X** R **X** T

100

=> 2000 = 4000 **X** 10 **X** T

100

=>2000 = 400T => T = $\frac{2000}{400}$, => T = 5 years.

(Q10) An amount of ¢400 deposited at a bank became ¢480, during a time period of 6 months. Determine the rate.

Soln:

S.I = 480 — 400 = ¢80.

P = ¢400, T = 6 months = 6/12 = 0.5 years and S.I = ¢80.

Since S.I = P **X** R **X** T

100

=>80 = 400 **X** R **X** 0.5

100

= >80 = 2R => R = 80/2 = 40,=> R = 40%.

(Q12) An amount of ¢6000 deposited at a financial institution became ¢7000. If the rate was 5⅓% per annum, find the time.

Soln:

Interest = 7000 — 6000 = ¢1000.

R = 5⅓% = 19/3% = 6.3%, T = ?, P = ¢6000 and S.I = ¢1000.

S.I = P **X** R **X** T

100

=> 1000 = 6000 **X** 6.3 **X** T

100

=>1000 **X** 100 = 37800T,

=> 100000 = 37800T,

=> T = 100000 = 2.6,

37800

=> T = 2.6 years.

(Q13) Mr. Addo deposited ¢9000 at a bank, at $3\frac{2}{5}$% p.a for 8 months. At the end of the 8 months, he withdrew the whole amount together with the interest and gave it as a loan to Mr. Badu, who in turn deposited it at a bank for 2 years at an interest rate of 7% per annum.

(i) Calculate the amount given to Mr. Badu by the bank at the end of the 2 year time period.

(ii) If Mr. Badu returned Mr. Addo's money together with half of the interest he gained, how much did he give to Mr. Addo?

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Soln:

P = ¢9000, R = $3\frac{2}{5}$%, = $\frac{17}{5}$% = 3.4%, T = 8 months = $\frac{8}{12}$ = 0.67 years and S.I =?.

Interest gained = P **X** R **X** T

100

= 9000 **X** 3.4 **X** 0.67 = **¢**214.

100

=>The interest earned on the ¢9000 by Mr.Addo = ¢214.

Amount given to Mr. Badu by Mr. Addo = the principal + the interest = 9000 + 214 = ¢9214.

Mr. Badu deposited this amount at a bank for 2 years at 7% per annum simple interest. The interest gained by Mr. Badu = $\frac{\mathbf{P \times R \times T}}{\mathbf{100}} = \frac{\mathbf{9214 \times 2 \times 7}}{\mathbf{100}}$ = ¢1288.

Amount given to Mr. Badu by the bank at the end of the 2 years period = 9214 + 1288 = ¢10502.

(ii)Amount given by Mr. Badu to Mr.Addo = amount given to him by Mr. Badu + half the interest gained = 9214 + $\frac{1288}{2}$ = 9214 + 644 = ¢9858.

(Q14) Kofi bought a car for ¢2500. Since he did not have the whole amount he first paid ¢1500. For the rest, he took a loan at 20% p.a.

- **(i)** If he was able to repay the loan after 5 years, how much interest did he pay?
- **(ii)** Calculate the percentage increase in the cost of the car as a result of the loan.

Soln:

Cost of car = ¢2500.

Amount paid by Kofi = ¢1500.

=>Loan taken by Kofi = 2500 — 1500 = ¢1000.

To get this ¢1000, he took a loan at 20% per annum and repaid it in 5 years.

P = 1000, T = 5 years, R = 20%.

Interest paid on loan = $\frac{\mathbf{P \times R \times T}}{100} = \frac{\mathbf{1000 \times 5 \times 20}}{100}$ = ¢1000.

(ii)Actual cost = cost of the car + interest paid due to the loan = ¢2500 + ¢1000 = ¢3500.

(ii)Increase in cost = 3500 — 2500 = ¢1000.

% increase = $\frac{\text{increase in cost}}{\text{Original cost}}$ X 100

= $\frac{1000}{2500}$ X 100 = 40%.