

## GAYAZA HIGH SCHOOL

## S.2 MATH WORKSHEET SEVEN

Percentages, Discounts, Commissions,  
Interest, Profit and Loss

## PART III

**INTEREST****Simple interest**

If you borrow money from a bank or other financial institution, then you will have to pay interest (the charge paid for borrowing) in addition to your repayments.

The money borrowed or lent is called **the principal** (P). When interest is paid at fixed intervals, yearly, half-yearly, quarterly or monthly, the principal is said to be lent (or borrowed) at **simple interest** (I).

The interest is calculated on the original principal only. The investor receives interest at regular periods, the principal remains the same. Simple interest is calculated using the following formula

$$\text{Interest, } I = \frac{PTR}{100}$$

Where, P = principal, R = rate of interest per annum (%); T = time (in years).

Note that the units for R and T must be consistent, i.e. **If R is per annum, T must be in years, If R is per month, T must be in months**, e.t.c.

When the simple interest for any given time is added to the principal, the sum is called the amount at simple interest for that time. **Amount = Principal + Interest, i.e. A = P + I.**

**Example 1**

Find the simple interest on sh. 25 000 for 3.5 years at 18% per annum. Solution

$$\begin{aligned} I &= \frac{PTR}{100} \\ I &= \frac{25000 \times 3.5 \times 18}{100} \\ &= \text{sh. } 15\,750. \end{aligned}$$

**Example 2**

Find the simple interest on sh. 20 000 for  $1\frac{3}{4}$  years at  $1\frac{1}{2}\%$  per month. Find also, the amount after  $1\frac{3}{4}$  years.

Time =  $1\frac{3}{4}$  years  $\times$  12 = 21 months; P = sh. 20 000; R =  $1\frac{1}{2}\%$  per month

Therefore,

$$\begin{aligned} I &= \frac{PTR}{100} \\ I &= \frac{20000 \times 21 \times 1\frac{1}{2}}{100} \\ &= \text{shs. } 6,300. \\ \text{Amount} &= \text{Principal} + \text{Interest} \\ &= 20\,000 + 6\,300 \\ &= \text{sh. } 26\,300. \end{aligned}$$

## COMPOUND INTEREST

In most financial institutions, **interest is added to the money borrowed or lent** and then **the interest is calculated on this total amount for the next period**. Adding the interest is known as compounding the interest, or just compound interest.

**Compound interest = Final amount – original principal.**

**Note:** Simple interest is the same for each period, compound interest becomes greater for successive periods.

### Example 1

Calculate the compound interest on sh. 2 000 for 2 years at 8% per annum.

#### Solution

$$\text{First year: Principal} = 2\,000$$

$$\text{Interest is calculated as } I = \frac{\text{PTR}}{100}$$

$$I_1 = \frac{\text{PTR}}{100}$$

$$I_1 = \frac{2000 \times 8 \times 1}{100}$$

$$I_1 = \text{shs. } 160$$

$$\text{Amount by end of year 1} = 2000 + 160 = \text{shs. } 2\,160$$

$$\text{Second year: Principal} = 2\,160$$

$$\text{Interest is calculated as } I = \frac{\text{PTR}}{100}$$

$$I_2 = \frac{\text{PTR}}{100}$$

$$I_2 = \frac{2160 \times 8 \times 1}{100}$$

$$I_2 = 172.8$$

$$\text{Amount} = 2\,160 + 172.80 = 2\,332.80$$

$$\text{Compound interest} = \text{Amount} - \text{Principal} = 2\,332.80 - 2\,000 = \text{sh. } 332.80.$$

Alternatively, the compound interest can be calculated using the following formula:  $A = P \left(1 + \frac{R}{100}\right)^n$  where, A is the amount after n years; **P = principal**; **R is the rate % p.a.** and **n is the number of years**.

### Example 1

Calculate the compound interest on sh. 2 000 for 2 years at 8% per annum

$$A = P \left(1 + \frac{R}{100}\right)^n$$

$$A = 2000 \left(1 + \frac{8}{100}\right)^2$$

$$A = 2000(1 + 0.08)^2$$

$$A = 2000(1.08)^2$$

$$A = 2000 \times 1.1664$$

$$A = \text{shs. } 2,332.8$$

$$\text{Compound interest} = \text{Amount} - \text{Principal}$$

$$\text{Compound interest} = 2,332.8 - 2000$$

$$\text{Compound interest} = \text{Shs. } 332.8$$

## EXERCISE

1. Peter deposited shs. 2,500,000 in a bank which offers a compound interest of 15% per annum. How much money did he have in the bank at the end of two years?

2. Paul and Mary invested Shs. 600,000 each in a savings society for 2 years. Paul opted for simple interest while Mary opted for compound interest. Both interest rates were 12% per annum.

(a) Find the interest earned by each of them.

(b) Who earned more interest and by how much?

3. Mukasa wants to buy a house which is priced at shs. 56,000,000. A deposit of 25% of the value of the house is required. A bank will lend him the rest of the money at a compound interest of 15% per annum and payable after two years. Calculate the:

(i) deposit Mukasa must make

(ii) amount of the money Mukasa will have to pay the bank after two years.

(iii) total money which Mukasa will spend to buy the house.

**END.**