



SIRONGA GIRLS' HIGH SCHOOL

FORM 3- CAT 1/15-TERM 2-2024



FILL IN YOUR PERSONAL DETAILS HERE

Student Name: Stream:

Admission Number: Target:

Instructions to Candidates:

- Write your name, admission number and stream in the spaces provided above.
- Answer **ALL** the questions in **Section I**
- Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.**

QUESTIONS ARE AS BELOW;

- The cash price of a T.V set is Ksh. 26,000. Linda bought the set on hire purchase terms by paying a deposit of Ksh. 6,000 and the balance by 24 equal monthly installments of Ksh. 1,045.30. Find the compound rate of interest per year. {3 marks}

$$A = 24 \times 1045 \cdot 3$$
$$= 25087 \cdot 2$$

$$P = 26000 - 6000 = 20000$$

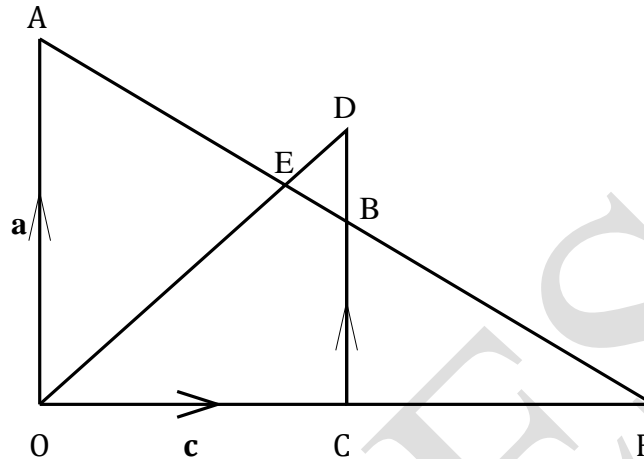
$$25,087.2 = 20,000\left(1 + \frac{r}{100}\right)^2$$

$$1.25436 = \left(1 + \frac{r}{100}\right)^2$$

$$11.998\% = r$$



2. In the figure below, $\mathbf{OA} = \mathbf{a}$ and $\mathbf{OC} = \mathbf{c}$. $CB = \frac{2}{3}\mathbf{OA}$ and B divides CD in the ratio 3 : 1



- (a) Express the following vectors in terms of \mathbf{a} and \mathbf{c} only:

I. \mathbf{AB} ;

{1 mark}

$$\begin{aligned}\overline{AB} &= \overline{AO} + \overline{OC} + \overline{CB} \\ &= -\tilde{a} + \tilde{c} + \frac{2}{3}\tilde{a} \\ \mathbf{AB} &= \tilde{c} - \frac{1}{3}\tilde{a}\end{aligned}$$

II. \mathbf{OD}

{2 marks}

$$\begin{aligned}\overline{OD} &= \overline{OC} + \overline{CD} \\ \overline{OD} &= \tilde{c} + \frac{8}{9}\tilde{a}\end{aligned}$$

- b) Given that $\mathbf{OE} = h\mathbf{OD}$ and $\mathbf{AE} = k\mathbf{AB}$ where h and k are scalars express \mathbf{OE} in two different ways hence find the scalars h and k . {5 marks}

$$\begin{aligned}\mathbf{OE}_1 &= h\overline{OD} \\ &= h\left(\tilde{c} + \frac{8}{9}\tilde{a}\right) \\ \mathbf{OE}_1 &= h\tilde{c} + \frac{8}{9}h\tilde{a} \dots (1) \\ \mathbf{OE}_2 &= \tilde{a} + k\left(\tilde{c} - \frac{1}{3}\tilde{a}\right) \\ &= \tilde{a} - \frac{1}{3}k\tilde{a} + k\tilde{c} \\ \mathbf{OE}_2 &= \left(1 - \frac{1}{3}k\right)\tilde{a} + k\tilde{c} \dots (2)\end{aligned}$$

$$\begin{aligned}h &= k \text{ and,} \\ 1 - \frac{1}{3}k &= \frac{8}{9}h \\ 1 - \frac{1}{3}h &= \frac{8}{9}h \\ h &= \frac{9}{11} \\ k &= \frac{9}{11}\end{aligned}$$



c) If OC produced meets AB produced at F and that $AF = 3AB$, find the modulus of OF .
 {3 marks}

$$\vec{OF} = \vec{OA} + \vec{AF}$$

$$\vec{a} + 3\left(\vec{c} - \frac{1}{3}\vec{a}\right) = 3\vec{c}$$

$$|OF| = \sqrt{(3^2) + (0)^2 + (0)^2}$$

$$|OF| = 3 \text{ Units}$$

3. The table below shows the Kenyan tax rate in a certain year.

Income (Ksh per annum)	Tax rates (%)
On the first Ksh 116,160	10%
On the next Ksh 109,440	15%
On the next Ksh 109,440	20%
On the next Ksh 109,440	25%
All the income over 444,480	30%

A company employee is Housed by the company, and as a result, he pays Kes 900 per month as nominal rent. He is entitled to a Basic salary of Ksh. 30, 000 per month, Commuter allowance of Kes 5,000, and Risk allowance of Kes 3,000 per month. He contributes 10% of his Basic salary per month to a pension scheme and this contribution is tax free. Besides he claims additional relief of Kes 2,000 from life assurance cover which is equivalent to 20% of the premiums paid per month.

a) Calculate his taxable income per annum. {2 marks}

$$T.I = \left(\frac{115}{100} \times 30,000 - 900\right) + 5000 + 3000 - \left(\frac{10}{100} \times 30,000\right)$$

$$T.I = (34,500 + 8000 - 3,900) \times 12$$

$$T.I = 463,200 P.a$$

b) Calculate his payable tax per month if he gets a personal relief of Ksh. 1056 {4 marks}

$$116,160 \times \frac{10}{100} = 11,616$$

$$109,440 \times \frac{15}{100} = 16,416$$

$$109,440 \times \frac{20}{100} = 21,888$$

$$109,440 \times \frac{25}{100} = 27,360$$

$$18,720 \times \frac{30}{100} = 5,616$$

$$G.Tax (p.m) = (82,896 \div 12) = 6908$$

$$Less; Relief (1056 + 2000) = 3056$$

$$NET TAX = 3,852$$

- c) He pays NHIF and NSSF Ksh. 3000 and Ksh. 1000 per month respectively. Given further that Kes 11, 248 of his income is auto deducted towards other monthly expenses. Determine his net monthly pay. {3 marks}

$$T. Deductions = [3852 + 1,000 + 3,000 + 10,000 + 900 + 3,000 + 11,248]$$

$$T. Deductions = 33,000$$

$$Net Pay = Gross Pay - Total deductions$$

$$Net. pay = 38,000 - 33,000$$

$$Net Pay = 5,000$$

4. Determine the amount of interest when Ksh. 320,000 is invested in a bank that pays compound interest quarterly at the rate of 12% p.a for 3 years. {2 marks}

$$A = 320,000 \left(1 + \frac{12}{400}\right)^{12}$$

$$A = 456,243.48$$

$$I = 456,243.48 - 320,000$$

$$I = 136,243.48$$

5. A man invested Ksh 240,000 in bank A at a simple interest rate of 12% p.a for 3 years and Ksh 200,000 in bank B at a simple interest rate of 14% p.a for the same duration. by what percentage is the return of bank B greater than that of Bank A? {3 marks}

$$Bank A \rightarrow I = 240,000 \times \frac{12}{100} \times 3 = 86,400$$

$$Return_A \rightarrow \frac{86,400}{240,000} \times 100 = 36\%$$

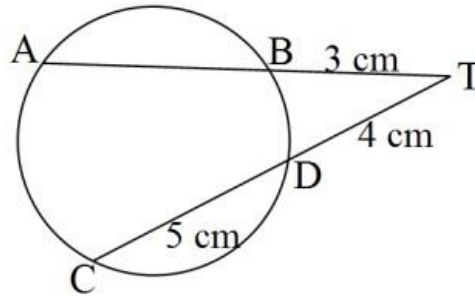
$$Bank B \rightarrow 200,000 \times \frac{14}{100} \times 3 = 84,000$$

$$Return_B \rightarrow \frac{84,000}{240,000} \times 100 = 42\%$$

$$42\% - 36\% = 6\%$$



6. In the figure below, the chords CD and AB intersect externally at T. DT = 4 cm, BT = 3 cm and CD = 5 cm, calculate the length AB. {2 marks}



$$\begin{aligned} 36 &= (3 + AB) \times 3 \\ 36 - 9 &= 3AB \\ AB &= 8 \text{ cm} \end{aligned}$$

OJ-FILES