MATHEMATICS

Date:12/June/2025
Period: 8:30 AM-11:30 AM

END OF TERM III EXAMINATIONS

GRADE: **SENIOR TWO**
OPTION: **ORDINARY LEVEL**

DURATION: **3 HOURS**

MARKS: **/100**

INSTRUCTIONS

1) This paper contains **two** sections:

Section A: Answer **all** questions. **(55 marks)**

Section B: Attempt **three** questions only. **(45 marks)**

2) You may use mathematical instruments and a calculator **where necessary.**

3) Use a **blue or black ink pen only** to write your answers and a **pencil** to draw diagrams.

4) Show clearly all the working steps where it is necessary.

SECTION A: ANSWER ALL QUESTIONS. (55 marks)

1) Answer by true or false to the following statements. **(4 marks)**
   a) In the parallel projection on one line, all images are formed on that line: ……
   b) In the parallel projection, the ratio of image to corresponding object lengths is variable: ……
   c) Orthogonal projection preserves ratios of corresponding line segments and ratios of corresponding projections: ……
   d) In the orthogonal projection, the projection meets the line of projection at right angle (90°): ……

2) State true or false the following: **(4 marks)**
   a) A projection on a Cartesian plane is a type of isometry: ……
   b) A translation is a type of isometry but does not preserve size of objects: ……
   c) An isometry preserves distance and shapes: ……
   d) In mathematics, a reflection as well as a rotation are types of isometries: ……

3) Answer true or false on the statements below which are related to the grouped data. **(3 marks)**
   a) A modal class of a grouped data with equal intervals is the class that contains the highest frequency: ……
   b) Grouped data is data that has been sorted into classes: ……
   c) $\text{Number of classes} = \frac{\text{class size}}{\text{range}}$: ……
   d) Measures of central tendency include the mean and the median only:……
   e) The best representative of a class interval is the class centre: ……
   f) $\text{Number of classes} = \frac{\text{range}}{\text{class width}}$: ……

4) Answer by true or false. **(5 marks)**
Marks obtained by competitors in individual sports competition are recorded in a grouped frequency table below.

Marks	Frequency (f_i)
30 - 39	2
40 - 49	9
50 - 59	14
60 - 69	7
70 - 79	8

a) The range of the data is 10: .....
b) The width of classes is 49: .....
c) The number of competitors is 40: .....
d) The modal class is $50 - 59$: .....
e) The mean marks of competitors is 57: .....

5) For a) and b) below circle the correct answer.
Consider the polynomial expression $16x^2y^3+8xy^2-2x^3y^3$.

a) Its degree is: **(2 marks)**
(i) 2
(ii) 3
(iii) 5
(iv) 6

b) Its numerical value for x=-1 and y=1 is: **(2 marks)**
(i) 22
(ii) 10
(iii) 6
(iv) –22

6) The remainder of the division of the polynomial $P(x)=6x^3+2x^2+ax-8$ by $x+2$ is 48.
Find the value of the coefficient a and circle the correct answer. **(4 marks)**

a) $a=48$
b) $a=2$
c) $a=0$
d) $a=-48$

7) Simplify and circle the correct answer : $\dfrac{\sqrt{162}+\sqrt{18}}{\sqrt{32}}$ **(4 marks)**

a) -3
b) $-\dfrac{21}{8}$
c) $\dfrac{21}{8}$
d) 3

8) Given that $16^{(3+n)}\times 2^{(1-n)}=\left(\dfrac{1}{2}\right)^{(1-n)}$, find the value of n. **(4 marks)**

Circle the correct answer.

a) $n=-7$
b) $n=-3$
c) $n=\dfrac{7}{3}$
d) $n=7$

9) Which of the following pairs of numbers satisfy the equation $3x+2y=-3$?
Circle the right pair of numbers. **(2 marks)**

a) $(-1,0)$

b) $(0,-1)$

c) $(3,-3)$

d) $(-3,3)$

10) Solve the simultaneous equations: $\begin{cases} 2x+5y=21 \\ 3x-7y=17 \end{cases}$ **(4 marks)**

Circle the correct solution set $(\mathbf{S})$.

a) $S=\{(1,8)\}$

b) $S=\{(8,1)\}$

c) $S=\{(-2,5)\}$

d) $S=\{(1,-2)\}$

11) What is the multiplier for 20% increase? **(2 marks)**
Circle the best answer.

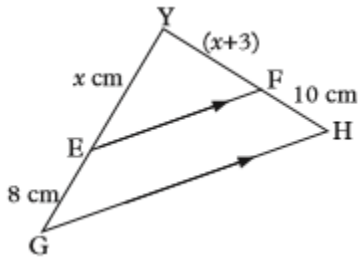
a) The multiplier is 2

b) The multiplier is 0.2

c) The multiplier is 0.8

d) The multiplier is 1.2

12) In the figure below EF is parallel to GH. Find the value of x. **(3 marks)**



Circle the correct answer.

a) $x = \frac{4}{3}$ cm

b) $x = 12$ cm

c) $x = 12$ m

d) $x = 15$ cm

13) A ladder reaches the top of a wall of height $6\,m$ when the end on the ground is $2.5\,m$ from the wall. What is the length (L) of the ladder?
Circle the correct answer. **(3 marks)**

a) $L = 5.5$ m

b) $L = 5.5$ cm

c) $L = 6.5$ m

d) $L = 6.5\ m^2$

14) Given that $\vec{u} = \begin{pmatrix} -2x \\ -4 \end{pmatrix}$ and $\vec{v} = \begin{pmatrix} 10 \\ 5-y \end{pmatrix}$, find the values of x and y if $\vec{u} = \vec{v}$.

Circle the right answer. **(4 marks)**

a) $x = -5$ and $y = 9$

b) $x = 9$ and $y = -5$

c) $x = -5$ and $y = -9$

d) $x = 5$ and $y = -9$

15) A football team played 35 games last season. The team receives 3 points for a win, 1 point for a draw and no points for a loss. The team lost 9 games and ended the season with 58 points. Find how many wins and draws the team had the last season. **(5 marks)**

SECTION B: ATTEMPT ANY THREE QUESTIONS ONLY. (45 marks)

16) Given that $f(x) = ax^3 + ax^2 + bx + 12$ and that $f(-2) = f(3) = 0$;

a) Find the values of the coefficients a *and* b. **(8 marks)**

b) Write down the degree of $f(x)$. **(2 marks)**

c) Solve $f(x) = 0$. **(5 marks)**

17) Given that the following vectors: $\vec{a} = (k, -3)$, $\vec{b} = (k-1, 2)$, $\vec{u} = (1, y-1)$, $\vec{v} = (x+3, 2y+2)$;

a) Find the values of k if $\|\vec{a}\| = \|\vec{b}\|$. **(6 marks)**

b) Find the values of x and y if $\vec{u} = \vec{v}$. **(3 marks)**

c) Using the values of x and y obtained in b) above, find the magnitude of $(\vec{u} - \vec{v})$. **(6 marks)**

18) A $(2,4)$, B$(6,4)$ and C$(7,2)$ are the vertices of a triangle in a Cartesian plane.

Find the images of the triangle under reflection in the line:

a) x-axis, labelling the image as $A'B'C'$. **(9 marks)**

b) y-axis, labelling the image as $A''B''C''$. **(6 marks)**

19) Below are the weights of 30 pupils in kg.

45	62	35	54	48	35	48	59	52	40
54	46	59	51	32	37	49	42	53	38
37	35	53	46	48	44	33	52	54	44

Make a grouped frequency table using interval of 5kg starting with 30 – 34. **(7 marks)**

b) Calculate:

(i) mean weight of the pupils. **(3 marks)**

(ii) Class size. **(1 mark)**

(iii) Modal class weight of pupils. **(1 mark)**

(iv) Median of weight of pupils. **(3 marks)**

20) A survey involving 120 people about their preferred breakfast showed that:

- 55 eat bread for breakfast;
- 40 take sorghum porridge for breakfast;
- 25 eat bread and sorghum porridge.

a) Represent the information on a Venn diagram. **(9 marks)**

b) Calculate the following probabilities:

(i) A person selected at random takes only one type for breakfast. **(2 marks)**

(ii) A person selected at random takes neither bread nor porridge. **(2 marks)**

(iii) A person selected at random takes both bread and porridge. **(2 marks)**