

**ALLIANCE GIRL'S HIGH SCHOOL
MOCK EXAM**

INSTRUCTIONS TO CANDIDATES

1. Write your name, index number, admission number and class in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. The paper consists of **TWO** sections Section I and Section II
4. Answer ALL the questions in Section I and any five questions from Section II.
5. All answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
7. Non-Programmable silent electronic calculators and KNEC Mathematics tables may be used, except where stated otherwise.

FOR EXAMINER'S ONLY

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

Section II

17	18	19	20	21	22	23	24	Total

Grand Total

*The paper consists of 6 printed pages.
Candidates should check to see that no page is missing.*

©Alliance Girls' High School

SECTION I (50 MKS)

Answer ALL the questions in this section.

1. Use logarithms to evaluate (3 marks)

$$\frac{\sqrt{0.00262} \times 44.79}{3.965}$$

2. Given that $2 \leq a \leq 5$ and $-7 \leq b \leq -3$. Find
a) the greatest possible value of $a - b$. (1 mark)

- b) the least possible value of $a^2 - b^2$. (2 marks)

3. Make x the subject of the formula (3 marks)

$$\frac{y}{x} = \frac{e}{\sqrt{a^2 + x^2}}$$

4. P is directly proportional to the square of x and inversely proportional to the square root of y .
Find the percentage change in P if x is increased by 25% and y decreased by 36%. (3 marks)

5. Write down the expansion of $\left(2x - \frac{y}{2}\right)^5$ upto the fourth term.

Hence evaluate $(19.95)^5$ correct to 4 significant figures. (1 mark)

6. Express $\frac{1 + \sqrt{2}}{\sqrt{5} + \sqrt{3}} + \frac{1 - \sqrt{2}}{\sqrt{5} - \sqrt{3}}$ in the form $a\sqrt{5} + b\sqrt{b}$. (3 marks)

7. A, B and C are points with position vectors $\begin{pmatrix} 3 \\ 6 \\ 4 \end{pmatrix}$, $\begin{pmatrix} -1 \\ 4 \\ 2 \end{pmatrix}$ and $\begin{pmatrix} 6 \\ -7 \\ 0 \end{pmatrix}$ respectively relative to an origin O. Given that D is the midpoint of AB, Find vector **CD**. (3 marks)

8. The distance S metres, moved by a particle along a straight line after t seconds in motion is given by $S = 7 + 8t^2 - 2t^3$. Find the velocity attained after 3 seconds. (2 marks)

9. The sixth term of an arithmetic progression is $5\frac{1}{2}$ and the twelfth term is $8\frac{1}{2}$. Find the sum of the first 40 terms. (3 marks)

10. Ann sold a plot of land at Shs 450,000 and invested the money in a financial institution which pays compound interest at 15% p.a compounded semi-annually. If she withdrew the amount after 2 years, how much did she receive? (3 marks)

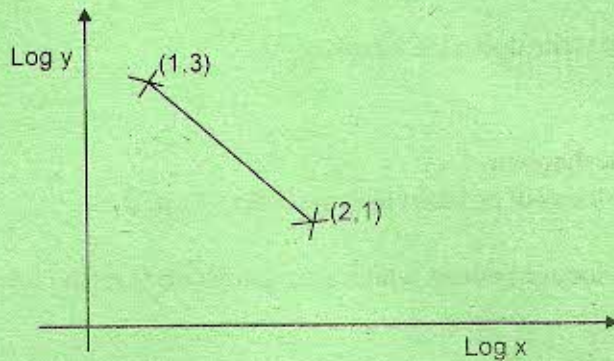
11. There are two baskets with snacks labeled A and B. Basket A contains 5 samosas, 4 eggs and 3 sausages. Basket B contains 3 samosas, 2 eggs and 4 sausages. A child selects a basket at random and picks a snack from it. Determine the probability that he picks a sausage. (3 marks)

12. Find the shortest distance between A (48°N , 35°E) and B (63°N , 145°W) in nautical miles. (2 marks)

13. An alcoholic solution which is 40% ethanol and 60% water is packed in 1 litre container. A dealer decided to dilute the alcohol in order to make it mid by removing 200ml of the alcohol solution and replacing it with water. Determine the percentage of ethanol in the alcohol solution. (3 marks)

14. Given that $A = \begin{pmatrix} 2 & 1 \\ -3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -2 \\ 3 & 1 \end{pmatrix}$ and $C = \begin{pmatrix} 2 & 0 \\ -1 & 1 \end{pmatrix}$.
Find the matrix M such that $M = 2AB - 3C^{-1}$. (4 marks)

15. The diagram below shows part of a straight line graph drawn to represent the equation $y = Ax^n$. Find the values of A and n. (4 marks)



16. Find all the angles between 0° and 360° that satisfy the equation:-
 $2 - \sin x = \cos^2 x + 7 \sin^2 x$. (4 marks)

SECTION II
ANSWER ANY FIVE QUESTIONS

17. 100 Agriculture students in a school sowed one maize seed each. The heights of the plant shoots were measured after a period of 40 days to the nearest centimeter.

Length	7-9	10-12	13-15	16-18	19-21	22-24	25-27
Frequency	5	9	18	28	20	14	6

- a) Construct a cumulative frequency graph for the data. (3 marks)
- b) Use your graph to estimate;
- The median height in cm correct to 1 decimal place. (1 mark)
 - The semi-interquartile range. (3 marks)
 - The percentage of maize seedlings whose height was between 18.5 and 23.5. (3 marks)

18. An aircraft flies from airstrip A to B, 600km away on a bearing of 125° . From airstrip B, the pilot flies on a bearing of 240° to airstrip C, 400km away. If the pilot flies back to A directly, calculate;

- a) The distance from C to A. (4 marks)
- b) The direction of A from C. (3 marks)
- c) The shortest distance from B to the path AC. (3 marks)

19. Construct the triangle ABC in which $AB=8.5\text{cm}$, $\angle ABC=112\frac{1}{2}^\circ$ and $BC=7.2\text{cm}$. (3 marks)

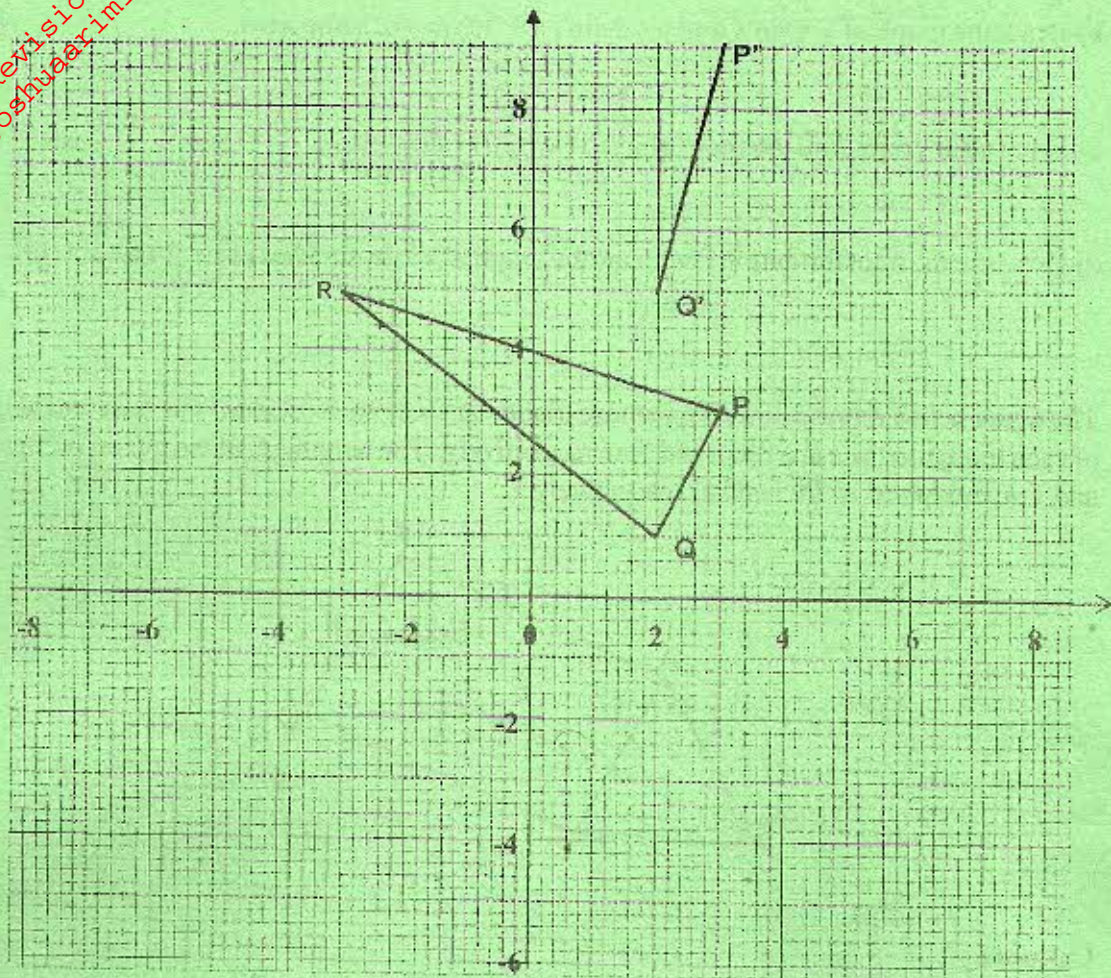


- Measure and write down the length of AC. (1 mark)
 - On the same diagram
 - Draw the locus of points which are 3.5cm from B. (1 mark)
 - Draw the locus of points which are equidistant from the lines CA and CB. (1 mark)
 - Mark with letter P the point inside triangle ABC which is 3.5cm from B and equidistant from CA and CB. (1 mark)
- Measure and write down the length of AP. (1 mark)

(iv) Indicate clearly by shading the region inside the triangle ABC which contains the points which are more than 3.5cm from B and which are nearer to CA than to CB. (2 marks)

20. a) Given that point $P(0,3)$ is mapped to $P'(3,9)$ $Q(2,1)$ is mapped unto $Q'(2,5)$ by a shear with y-axis invariant.

(i) Draw the triangle $P'Q'R'$ the image of ΔPQR under the shear. (1 mark)



(ii) Determine the shear representing the matrix. (2 marks)

b) Triangle $P'Q'R'$ is mapped unto $P''Q''R''$ by transformation defined by the matrix $\begin{pmatrix} 1 & 0 \\ 2 & -1 \end{pmatrix}$

(i) Draw triangle $P''Q''R''$. (3 marks)
 (ii) Determine the shear representing the matrix. (2 marks)

21. a) Complete the table below.

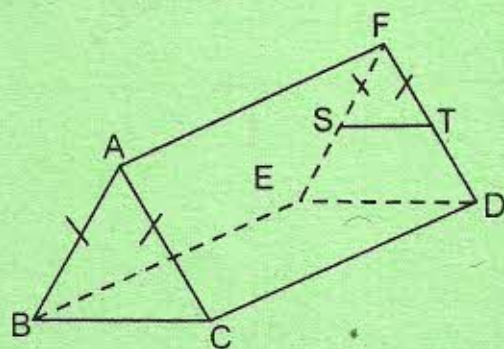
X	0	30	60	90	120	150	180	210	240	270	300	330	360°
Sin x	0		0.87		0.87		0		-0.87	-1		-0.5	0
2sin (x+30)	1	1	2		1	0		-1.73	-2		-1		1

b) Draw the graph of $y = \sin x$ and $y = 2 \sin (x + 30)$ on the same axes. (4 marks)

c) From your graph find the roots of $2 \sin (x + 30) - \sin x = 0$. (2 marks)

d) Describe the transformation that maps the graph of $y = \sin x$ to that of $y = 2 \sin (x + 30)$. (2 marks)

22. The figure below represents a prism whose triangular faces are isosceles. The base and height of each triangular face are 12cm and 8cm respectively. The length AE of the prism is 20cm, S and T are midpoint of EF and ED respectively.



Calculate

a) The length of CF. (3 marks)

b) The angle between line CF and plane BCDE. (3 marks)

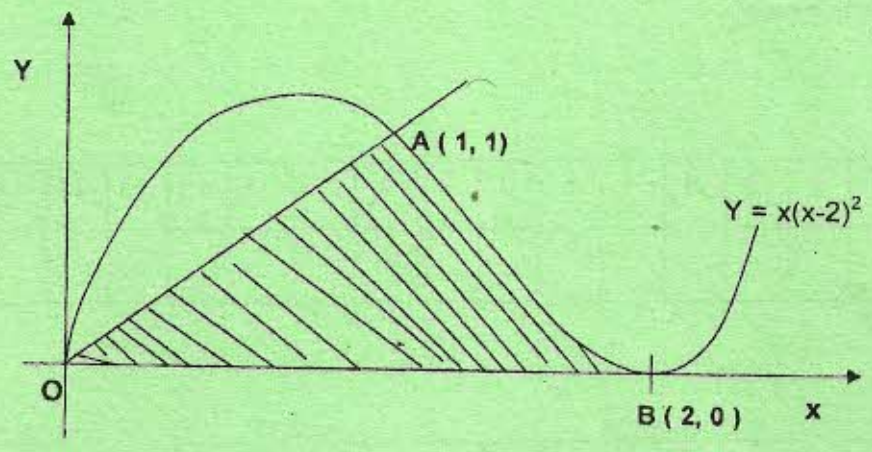
c) The angle between planes BCTS and BCDE. (4 marks)

23. A carpenter makes two types of chairs. To make type A chair it requires 9 man-hours whereas a type B requires 6 man-hours. The cost of material for type A is sh.150 and that for type B is sh.300. The profit on type A is sh. 80 and profit on type B is sh. 60. The carpenter has to abide by the following conditions.
- (i) A contract to supply 15 of type A and 10 of type B per week has to be fulfilled.
 - (ii) Only 300 man-hours are available in each week.
 - (iii) Total weekly cost of material for all chairs should not exceed sh. 9,000

If type A and B chairs made were x and y per week respectively.

- a) Write down the inequalities satisfying these conditions. (3 marks)
- b) Represent this information on a grid and show the region by shading out the unwanted. (4marks)
- c) what value of x and y satisfy the condition that he will get maximum profit? (3 marks)

24. The diagram below shows part of the curve $y = x(x - 2)^2$ which passes through point A(1,1) and touches the y axis at B(2,0).



- a) Find the equation of the tangent to the curve $y=x(x - 2)^2$ at A. (4 marks)
- b) Find the area bounded by line OA the x-axis and the curve $Y= x (x - 2)^2$. (6 marks)