

121/1
MATHEMATICS
PAPER 1
2½ HRS

**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

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*The paper consists of 7 printed pages.
Candidates should check to see that no page is missing.*

SECTION I (50 MKS)

Answer ALL the questions in this section.

1. Without using a calculator, evaluate: (3 marks)

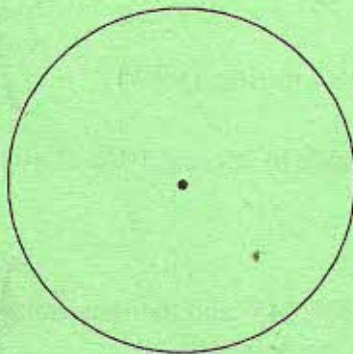
$$\sqrt{\frac{306 \times 0.36}{1.36 \times 0.64}}$$

2. Simplify the expression: (3 marks)

$$\frac{24ab^2 - 18a^2b}{34ab - 12a^2 - 24b^2}$$

3. The number of people who attended a graduation ceremony at K.S.T.C were 170 men, 360 women and some children. When the information was represented on a pie chart, the combined angle for the men and children was 216° .

- a) Find the angle representing the children. (2 marks)
- b) Using the circle provided below represent the information as it would appear on the pie chart. (2 marks)

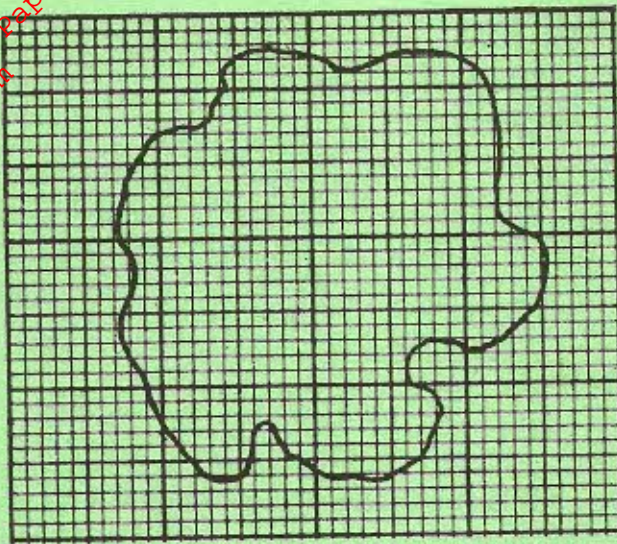


4. The sum of two numbers is 58, the difference between them is 4 greater than the smaller number. Find the numbers. (3 marks)
5. Solve the equation for x, given: (3 marks)

$$5^{x+1} + 6(5^x) - 70 = 205$$

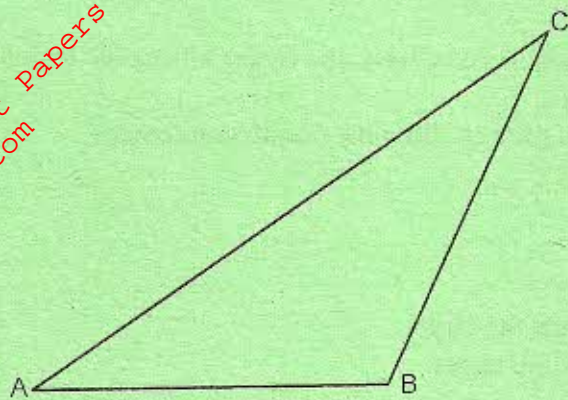
6. An athlete walks a distance of 1km at an average speed of 6km/hr and then without stopping, runs a further distance of 800m in 2 minutes. Calculate the average speed of the whole journey in km/hr. (2 marks)

7. The figure below is a map of an island drawn on a grid of 1 cm squares
Scale 1:400,000



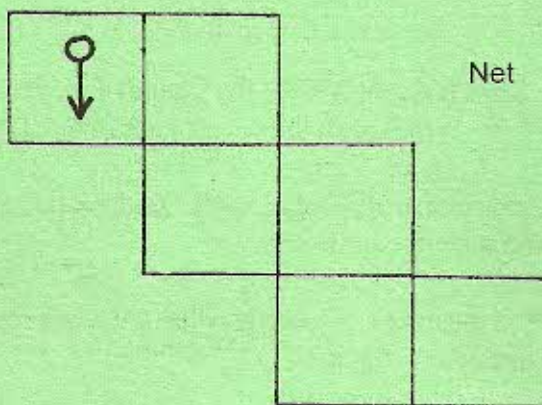
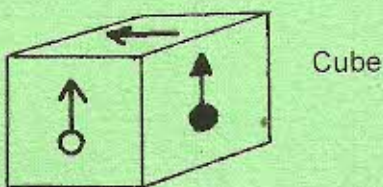
- a) Estimate the area of the map in cm^2 . (2 marks)
- b) Using the scale provided, estimate the area of the island in hectares. (2 marks)
8. Solve for y in the equation: (3 marks)
- $$\log_2 y^2 = 4 + \log_2 (y + 5)$$
9. What is the density of an alloy made by mixing 102g of metal A density 17g/cm^3 with 45g of metal B density 3g/cm^3 ? (3 marks)
10. Three angles of a polygon are 130° , 145° and the remaining angles are 145° each. Calculate the sum of the interior angles of the polygon. (3 marks)
11. A tourist takes 280 Euros to a bank and is given Ksh. 29050. The tourist also buys \$300 (U.S. dollars) for Ksh. 21 975. At the same exchange rate, how many dollars can be bought for 650 Euros (€)? (4 marks)
12. The lines $x=1$ and $y=3$ are tangents to a circle whose centre is in the third quadrant. If the diameter of the circle is 14 units, determine the equation of the circle in the expanded form. (3 marks)
13. The cash price of a T.V is sh. 17 600. Tom buys it on hire purchase terms paying a deposit that is 25% of the cash price, followed by monthly installments of sh.2200. If the hire purchase price is 50% more than the cash price, find the number of months he will take to complete the payment. (3 marks)

14. The locus of a point P is such that $\angle APB \leq \angle ACB$. Locate and shade the region represented by point P. (3 marks)



15. The point P (-5, -2) is the image of Q (3, 4) under a given reflection. Find the equation of the mirror line. (3 marks)
16. The diagram represents a cube with faces marked as shown. Each opposite face that is shown in the diagram is marked with the same sign but on the reverse direction to that shown on the diagram of the cube.

On the net of the diagram only one of the face has been identified with the sign. Identify each of the remaining five faces with the correct sign. (3 marks)



SECTION II (50 MARKS)

Answer any **FIVE** questions in this section

17. The probabilities of three soldiers Tom, Jerry and Spike hitting the target are 0.2, 0.3 and 0.15 respectively.

a) Draw a probability tree diagram to show the possible outcomes. (3 marks)

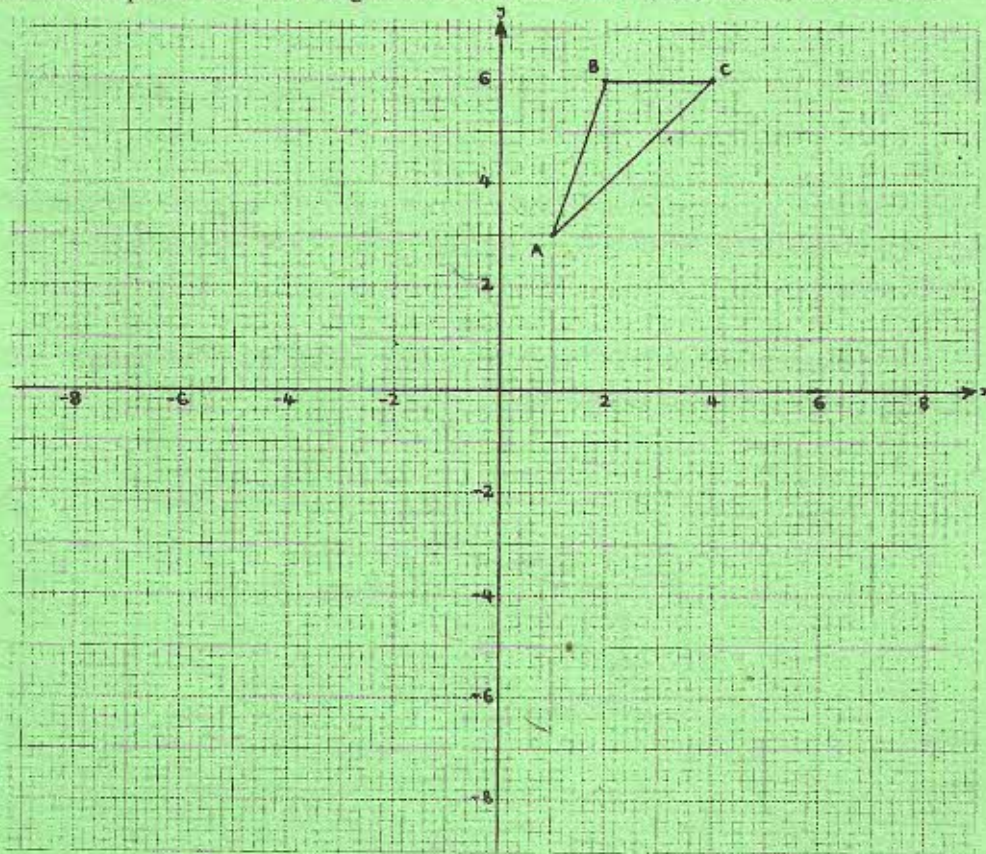
b) Find the probability that:

(i) all hit the target. (2 marks)

(ii) only one of them hits the target. (3 marks)

(iii) at most one misses the target. (2 marks)

18. On the Cartesian plane below triangle ABC has vertices A(1,3) B(2,6) and C(4,6).



a) On the same plane draw triangle A'B'C' the image of ΔABC when rotated by a positive quarter turn about (0,0). Write down the coordinates of $\Delta A'B'C'$. (3 marks)

b) Triangle A''B''C'' is the image of triangle A'B'C' under reflection in the line y=0. Draw triangle A''B''C'' and state its coordinates. (2 marks)

c) Triangle A'''B'''C''' is the image of triangle A''B''C'' when rotated by a positive quarter turn about (0,0). Draw triangle A'''B'''C''' (2 marks)

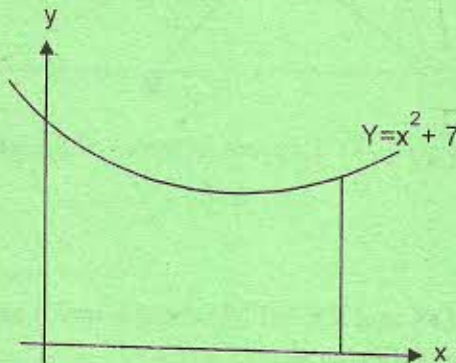
d) Describe fully a single transformation that:
 (i) Maps triangle A''B''C'' to triangle ABC
 (ii) Maps triangle A'''B'''C''' to triangle ABC.

19. a) During a survey the cross sectional areas in m^2 along a stretch of 36m on a river are:

Area m^2	5.0	5.4	7.0	8.0	5.5	5.8	6.0
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The cross-sectional areas are equally spaced. The first and last areas represent the boundaries of where the survey was carried out. Estimate the volume of the river using the trapezoidal rule. (4 marks)

- b) The diagram below is a sketch of the curve $y = x^2 + 7$.



Use the mid-ordinate rule with 8 strips to estimate the area enclosed by the curve, the x-axis, the y-axis and line $x = 4$. (6 marks)

20. Given the quadratic function $y = 3x^2 + 4x - 1$.

- a) Complete the table below for values of x Ranging $-4 \leq x \leq 3$.

x	-4	-3	-2	-1	0	1	2	3
y								

- b) Using the grid provided draw the graph of $y = 3x^2 + 4x - 2$ for $-4 \leq x \leq 3$. (4 marks)

- c) Using the graph, find the solution to the equation.

(i) $3x^2 + 4x - 2 = 0$ (1 mark)

(ii) $3x^2 + 7x + 2 = 0$ (1 mark)

21. A port **B** is on a bearing 080° from a port **A** and a distance of 95km. A submarine is stationed at a port **D**, which is on a bearing of 200° from **A** and a distance of 124km from **B**. A ship leaves **B** and moves directly southwards to an island **P**, which is on a bearing of 140° from **A**. The submarine at **D** on realizing that the ship was heading for the island **P** decides to head straight for the island to intercept the ship.

- a) Using a scale of 1cm represent 10km, make a scale drawing showing the relative positions of **A**, **B**, **D** and **P**. (4 marks)

- b) Hence find;

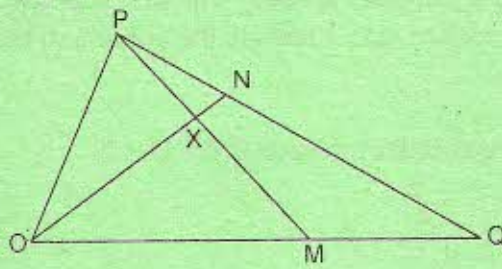
(i) The distance from **A** to **D**. (2 marks)

(ii) The bearing of the submarine from the ship when the ship was setting off from **B**. (1 mark)

(iii) The bearing of the island **P** and **D**. (1 mark)

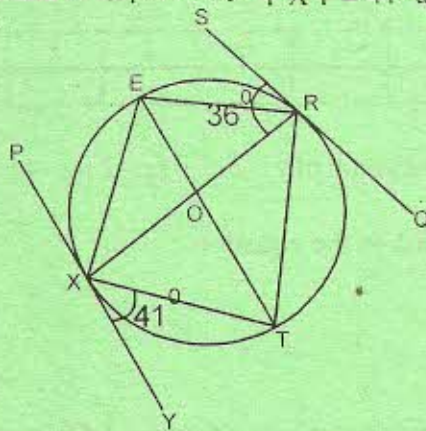
(iv) The distance the submarine had to cover to reach the island **P**. (2 marks)

22. The diagram below shows triangle OPQ in which M and N are points on OQ and PQ respectively, such that $\vec{OM} = \frac{2}{3}\vec{OQ}$ and $\vec{PN} = \frac{1}{4}\vec{PQ}$. Lines PM and ON meet at X.



- a) Given that $\vec{OP} = p$ and $\vec{OQ} = q$. Express in terms of p and q the vectors.
- (i) \vec{PQ} (1 mark)
 - (ii) \vec{PM} (1 mark)
 - (iii) \vec{ON} (1 mark)
- b) Given further that $\vec{OX} = k\vec{ON}$ and $\vec{PX} = h\vec{PM}$ where k and h are constants.
- (i) Express \vec{OX} in two different ways. (2 marks)
 - (ii) Hence determine the values of the constant h and k. (3 marks)
 - (iii) Find the ratio $PX:XM$ (1 mark)

23. In the diagram below XTRE is a cyclic quadrilateral. EOT is the diameter. SRQ and PXY are tangents to the circle at R and X respectively. $\angle YXT = 41^\circ$ and $\angle SRE = 36^\circ$.



Find the following angles giving reasons in each case.

- (a) $\angle XRE$ (3 marks)
 - (b) $\angle XTR$ (3 marks)
 - (c) $\angle TXR$ (2 marks)
 - (d) $\angle XOT$ (2 marks)
24. The displacement s metres of a particle after t seconds is given by $S = t^3 - 2t^2 + 6$ and $t > 0$.
- a) Calculate the velocity of the particle in m/s when $t = 2$. (2 marks)
 - b) Calculate:
 - (i) The time when the particle is momentarily at rest. (3 marks)
 - (ii) Its displacement when the particle is momentarily at rest. (2 marks)
 - (iii) The displacement of the particle during the 4th second. (2 marks)
 - (iv) The time when the particle is moving with maximum velocity. (1 mark)