NAME ....ADM.NO ..... CLASS .....

121/2

MATHEMATICS ALT. A
Paper 2
24th March 2017

Candidate's signature .....

Date .....

TIME: 2 ½ HRS

ALLIANCE GIRLS' HIGH SCHOOL

KCSE 2017 PRE-MOCK EXAMINATION

Instructions to candidates

(a) *Write your name and admission number in the spaces provided above.*
(b) *Sign and write the date of the examination in the spaces provided above.*
(c) *The paper contains **TWO** Sections: **Section I** and **Section II.***
(d) *Answer **ALL** the questions in Section I and **only five** questions from **Section II.***
(e) *All answers and working must be written on the question paper in the spaces provided below each question.*
(f) ***Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
(g) *Marks may be given for correct working even if the answer is wrong.*
(h) ***Non-programmable** silent electronic calculators and KNEC Mathematical tables may be used except where stated otherwise.*
(i) *This paper consists of 14 printed pages.*
(j) ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***

FOR EXAMINER'S USE 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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Section 1 (50 marks)

*Answer **all** the questions from this section*

1 Given that $\log 4 = 0.6021$ and $\log 3 = 0.4771$ without using mathematical tables or a calculator, evaluate $\log 0.012$ (2 marks)

2 Given that $\mathbf{OA} = 2\underset{\sim}{i} + 3\underset{\sim}{j} - 4\underset{\sim}{k}$ and $\mathbf{OB} = 4\underset{\sim}{i} - 6\underset{\sim}{j} - 3\underset{\sim}{k}$, find the magnitude of **AB** correct to four significant figures. (3 marks)

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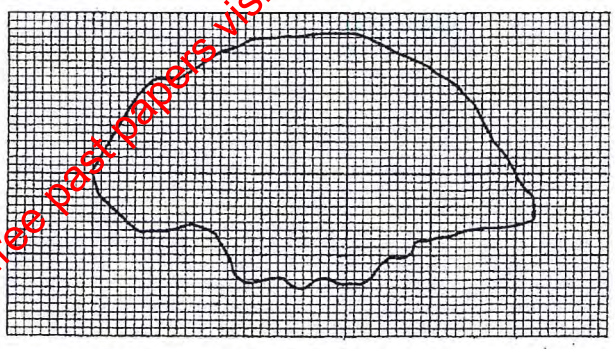
3 The enclosed region shown in the figure below represents a ranch drawn to scale. The actual area of the ranch is 7187.5 hectares.



(a) Estimate the area of the enclosed region in square centimeters. (1 mark)

(b) Calculate the linear scale used to represent the region above. (2 marks)

4 Three grades of rice A,B and C were mixed in the ratio 5: 7: 3. The cost per kg of grades A, B and C were shs.60, shs.53 and shs.95 respectively. Calculate the selling price of the mixture to the nearest shilling if it was sold at a profit of 25%. (3 marks)

5 Expand $(1-2x)^8$ in ascending powers of x upto and including the term in x^3. (2 marks)

(b) Use the expansion above to evaluate $(1.02)^8$ (2 marks)

6 Find the equation of the normal to the curve $y = x^3 + 2x + 1$ at the point $(1,4)$ (3 marks)

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7 Given that $\frac{3}{2+\sqrt{5}} + \frac{4\sqrt{5}}{2-\sqrt{5}} = a + b\sqrt{5}$. Find the values of a *and* b (3 marks)

8 . The volume of two similar solids are $1856cm^3$ and $783cm^3$. The surface area of the smaller solid is $315cm^2$. Calculate the surface area of the larger solid. (4 marks)

9 Make q the subject of the formula (3 marks)

$$r = \sqrt{\frac{p-q}{p+pq}}$$

10 Line PQ is the diameter of a circle with centre (a,b). Find the equation of the circle in the form $x^2 + y^2 + 2ax + 2by = r^2 - (a^2 + b^2)$ given the coordinates of $P(-2,0)$ *and* $Q(6,6)$

(3 marks)

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11 Solve the equation $2Cos^2 x - Sinx = 1$ for the range $0^0 \leq x \leq 360^0$ (4 marks)

12 By correcting each number to two significant figures approximate the value of 632×0.0145. Hence, calculate the percentage error arising from this approximation correct to 2 decimal places. (3marks)

13 The position of two towns **X** and **Y** are given to the nearest degree as $\mathbf{X}(35^0 N, 115^0 W)$ and $\mathbf{Y}(\theta, 65^0 E)$. Given that the distance between **X** and **Y** through the North Pole is $5700nm$, find the latitude of town **Y** (3marks)

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14 The 6^{th} *and* 17^{th} terms of an arithmetic sequence are 25 and 69 respectively. Find the first term and the common difference and hence the 20^{th} term of the sequence (3 marks)

15 Using a pair of compass and ruler only, find the locus of P such that $2.5cm \leq OP < 3.5cm$ where O is a fixed point. (3 marks)

.O

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16 Form a quadratic equation given the roots $0.5 - \sqrt{3}$ and $0.5 + \sqrt{3}$ in the form $ax^2 + bx + c = 0$ where a, b and c are integers. (3 ma

SECTION II (50 marks)

*Answer **only five** questions from this section*

17 The cash price of a car is Ksh. 825,000. Mapesa paid Ksh.1 076 600 on hire purchase terms with an initial deposit of Ksh.155 000 followed by Ksh.76 800 monthly installments.
Calculate;

(a) (i) How many months Mapesa took to pay for the car. (3 marks)

(ii) Express the percentage increase of the hire purchase price to the cash price. (3 marks)

(b) Three years ago, the land under tea cultivation in Litein sub-county was 199 982 ha. Due to soil erosion over the years, the area under cultivation has reduced to 150 700 ha. Calculate the rate of soil erosion (4 marks)

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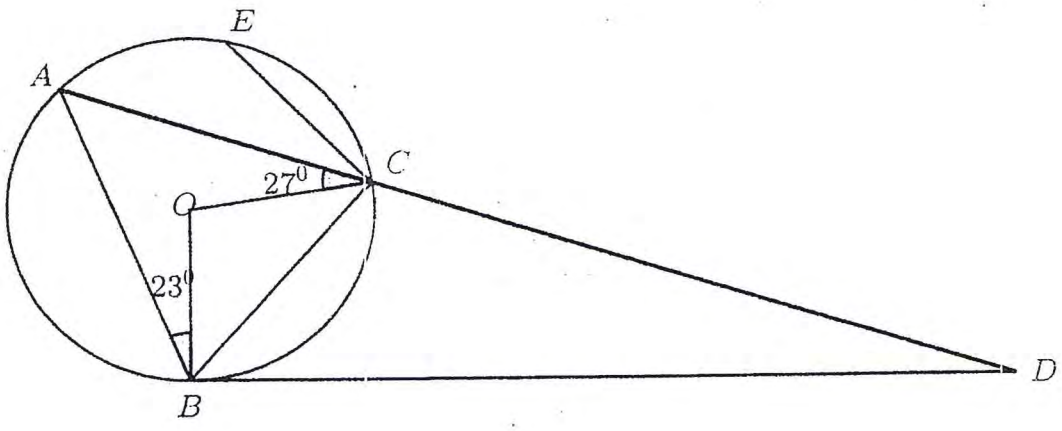
18 In the figure below, O is the centre of the circle. ACD is a straight line, angle ABO= 23^0 and angle ACO= 27^0.



Determine the size of the following angles, giving the reason in each case.

(a) ∠BAC (2 marks)

(b) ∠CBD (2 marks)

(c) ∠ADB (2 marks)

(d) ∠AEC (2 marks)

(e) Reflex ∠BOC (2 marks)

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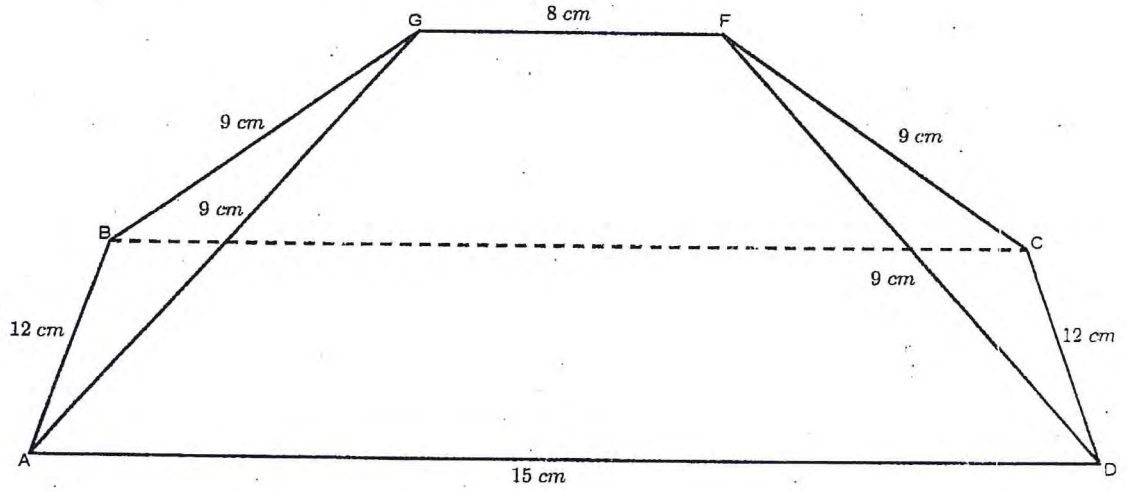
19 The figure ABCDFG below represents the roof of a house. AD = BC = 15 cm, AB = DC = 12 cm, GB = GA = FC = FD = 9 cm and GF = 8 cm.



Calculate the

(i) Perpendicular distance of GF from the plane ABCD (3 marks)

(ii) Angle between the planes GAB and ABCD (2 marks)

(iii) Angle between the line AG and the plane ABCD (2 marks)

(iv) Angle between the planes ADFG and BCFG (3 marks)

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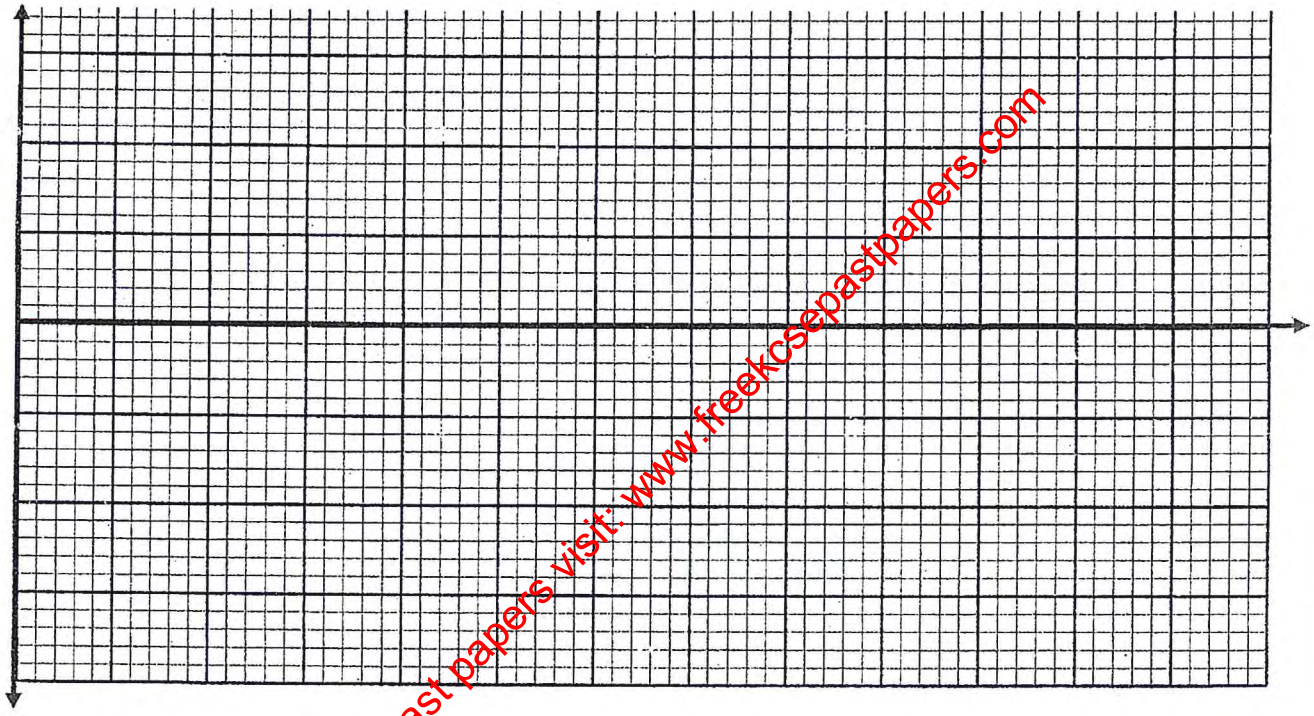
20 (a) Copy and complete the table below correct to 2 decimal. (2 marks)

x	0^0	20^0	40^0	60^0	80^0	100^0	120^0	140^0	160^0	180^0
$y=2\sin x$	0		1.97		0.68		-1.73		-1.28	0.00
$y=3\cos(x+45^0)$	2.12	1.27		-0.78		-2.46			-2.72	-2.12

b) Use the table above to draw the graphs of $y=2\sin x$ and $y=3\cos(x+45^0)$ for $0^0 \le x \le 180^0$ on the same axes (4 marks)



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c) State the amplitude and period of each curve (2 marks)

d) Use your graph to solve the equation $2\sin x - 3\cos(x+45^0) = 0$ for $0^0 \le x \le 180^0$ (2 marks)

21 (a)Two variables P and L are such that P varies partly as L and partly varies inversely as the square root of L. Determine the relationship between P and L given that L = 16 when P = 165 and L = 25 when P = 254. (4 marks)

(b)Three variables P, Q and R are such that P varies directly as Q and inversely as the square of R. When P = 18, Q = 24 and R = 4. Find the equation connecting P, Q and R. (3 marks)

(c)If Q is increased by 20% and R is decreased by 10%. Find the percentage change in P. (3 marks)

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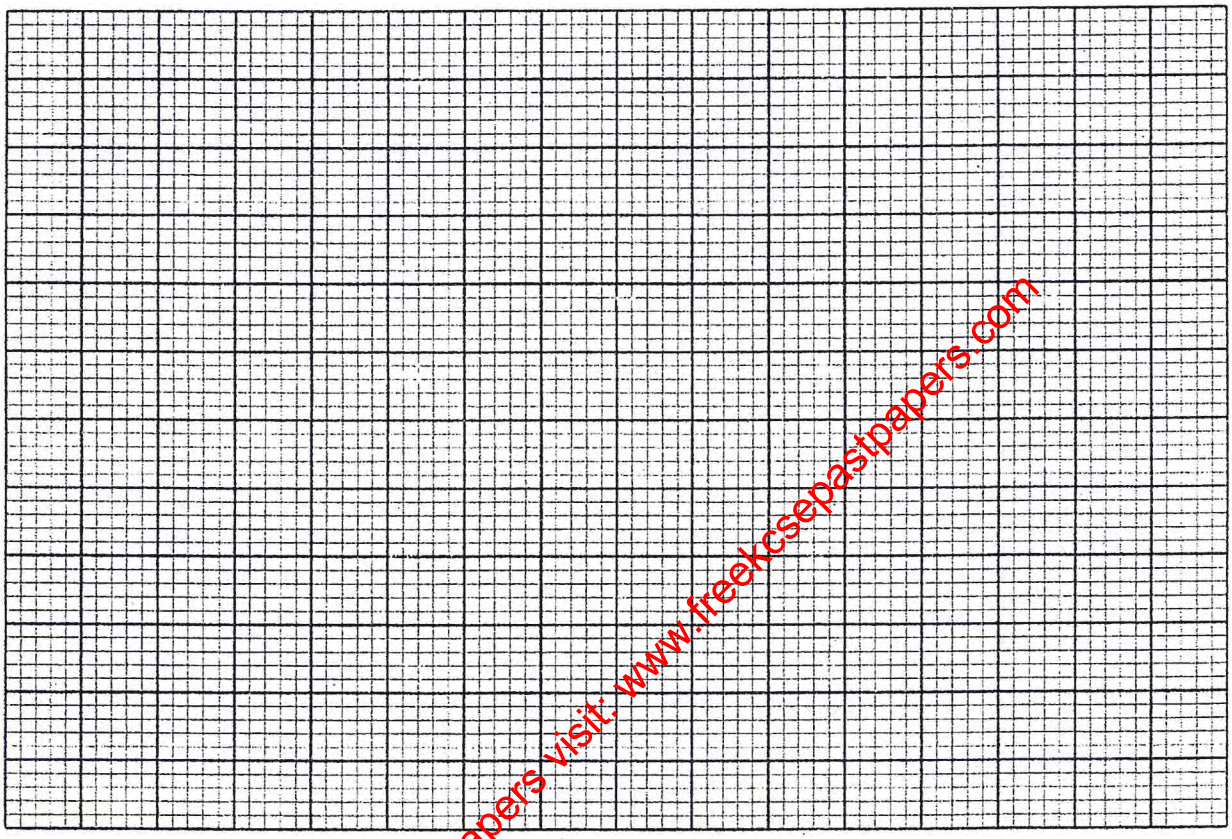
22 The table below shows the temperatures in degrees Fahrenheits' recorded at Moscow International Airport in a period of 100 days.

Temperature ^0F	0-19	20-39	40-59	60-79	80-99	100-119	120-139	140-159
Frequency (days)	9	19	22	18	13	11	5	3

(a) On the grid provided draw an Ogive representing the data (5 marks)



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(b) Use the graph to estimate

(i) The quartile deviation (3 marks)

(ii) The number of days when the temperature exceeded $125^0 F$ (2 marks)

23 Two bags A and B contain identical balls except for the colour. Bag A contains 3 green balls and 4 white balls, while bag B contains 4 green balls and 2 white balls.

(a) If a ball is drawn at random from each bag, find the probability that both balls are of the same colour. (4 marks)

b. If two balls are drawn at random from each bag, one ball at a time without replacement, find the probability that;

(i) The two balls drawn from bag A or bag B are green. (3 marks)

(ii) All the four balls drawn are green. (3 marks)

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(ii) All the four balls drawn are green. (3 marks)

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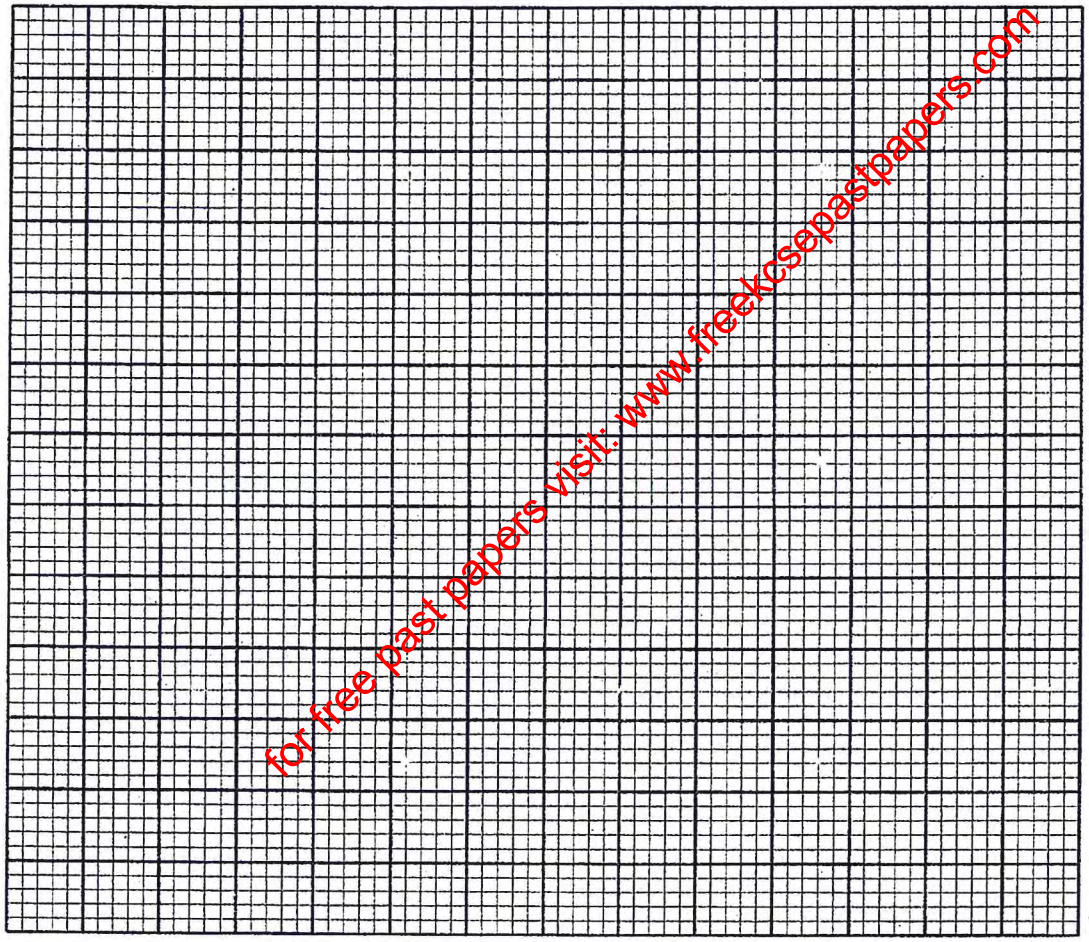
24 A bus company runs a fleet of two types of buses operating between Nairobi and Nyeri. Type A bus has a capacity to take 70 passengers and 2000 kg of luggage. Type B can carry 50 passengers and 3000kg of luggage. On a certain day, there were 500 passengers with 35000kg of luggage to be transported. The company could only use a maximum of 15 buses altogether.

(a) If the company uses x buses of type A and y buses of type B write down all the inequalities satisfying the given conditions. (4 mark)

(b) Represents the inequalities graphically and use your graph to determine the least number of buses that could be used. (4 marks)



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(c) If the cost of running one bus of type A is Kshs. 7200 and that of running one bus of type B Kshs.6000. Find the minimum cost of running the buses. (2 marks)