Name ____ Admission No. ____________Class____

Candidate's signature ___________

Date _________________________

121/1
MATHEMATICS
PAPER 2
JULY/AUGUST 2014
2 ½ HOURS

MAKINDU DISTRICT INTER – SECONDARY SCHOOLS EXAMINATIONS

PRE-KENYA CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS
PAPER 2
JULY/AUGUST 2014
2 ½ HOURS

INSTRUCTIONS TO DANDIDATES

1. Write your name, index number and class in the spaces provided.
2. Sign and write date of the of the examination in the spaces provided.
3. The paper contains two sections: Section I and II
4. Answer ALL questions in section I and **STRICTLY FIVE** questions from section II.
5. All working and answers must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculations, giving you're your answers at each stage in the spaces below each question.
7. Marks may be awarded for correct working even if the answer is wrong.
8. Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINER'S USE ONLY

SECTION 1

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	25	TOTAL

GRAND TOTAL

121/2
Mathematics
Paper 2

This paper consists of 16 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing.

SECTION 1 (50 MARKS): ANSWER ALL QUESTIONS IN THE SECTION.

1. Use logarithms to evaluate (4 Marks)

$$\sqrt[3]{\frac{45.3 \, x \, 0.00697}{0.534}}$$

2. Form the quadratic equation whose roots are $x = -\frac{5}{3}$ and $x = 1$ (2 Marks)

3. W varies directly as the cube of x and inversely as y. Find W in terms of x and y given that W = 80 when x = 2 and y = 5. (2 Marks)

4. A cold water tap can fill a bath in 10 minutes while a hot water tap can fill it in 8 minutes. The drainage pipe can empty it in 5 minutes. The cold water and hot water taps are opened for 4 minutes. After four minutes all the three taps are opened. Find how long it takes to fill the bath. (3 Marks)

5. Object A of area $10cm^2$ is mapped onto its image B of area $60cm^2$ by a transformation. Whose matrix is given by p = $\begin{pmatrix} x & 4 \\ 3 & x+3 \end{pmatrix}$. Find the positive values of x (3 Marks)

6. Make P the subject of the formula in L = $\frac{2}{3}\sqrt{\frac{x^2 - PT}{y}}$ (3 Marks)

7. (a) Expand the expression $\left(1 + \frac{1}{2}x\right)^5$ in ascending order powers of x, leaving the coefficients as fractions in their simplest form. (2 Marks)

(b) Use the first three terms of the expansion in (a) above to estimate the value of $(1.05)^5$ (2 Marks)

8. By rounding each number to the nearest tens, approximate the value of $\frac{2454 \times 396}{66}$
Hence, calculate the percentage error arising from this approximation to 4 significant figures. (3 Marks)

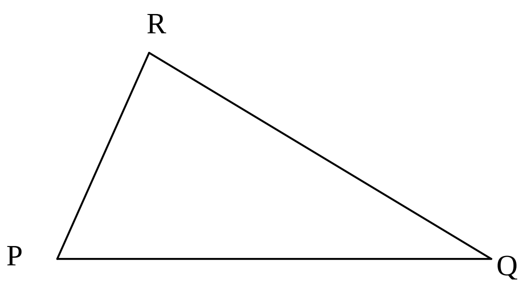
9. Without using a calculator or mathematical tables, express $\frac{\sqrt{3}}{1-Cos\ 30^0}$ in surd form and simplify (3 Marks)

10. Kasyoka and Kyalo working together can do a piece of work in 6 days. Kasyoka, working alone takes 5 days longer than Kyalo. How many days does it take Kyalo to do the work alone? (3 Marks)

11. The second and fifth terms of a geometric progression are 16 and 2 respectively. Determine the common ratio and the first term. (3 Marks)

12. A particle moves along a straight line AB. Its velocity V metres per second after t seconds is given by $v = t^2 - 3t + 5$
    Its distance from A at the time t = 1 is 6 metres.
    Determine its distance from A when t = 3 (3 marks)

13. On the triangle PQR, draw a circle touching PR, QP produced and QR produced. (3 Marks)



14. Two containers have base area of $750cm^2$ and $120cm^2$ respectively. Calculate the volume of the larger container in litres given that the volume of the smaller container is $400cm^3$. (3 Marks)

15. Solve for x in the equation

$2\ \text{Sin}^2 x - 1 = \text{Cos}^2 x + \text{Sin}\ x$, where $0^0 \leq x \leq 360^0$. (4 Marks)

16. Find the radius and the coordinate of the centre of the circle whose equation is

$2x^2 + 2y^2 - 3x + 2y + \frac{1}{2} = 0$ (4 marks)

SECTION II (50 MARKS): ANSWER FIVE QUESTIONS IN THIS SECTION.

17. A bag contains 5 red, 4 white and 3 blue beads. Two beads are selected at random.

(a) Draw a tree diagram and list the probability space. (3 Marks)

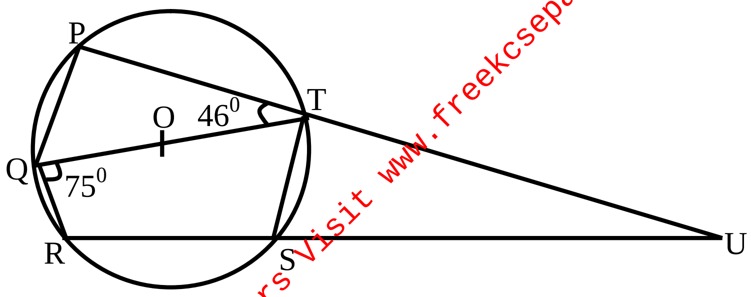
(b) Find the probability that

(i) The last bead selected is red. (2 Marks)

(ii) The beads selected were of the same colour (2 Marks)

(iii) At least one of the selected beads is blue (3 Marks)

18. The figure below shows a circle centre O in which line QOT is a diameter. Angle QTP = 46^0, angle TQR = 75^0 and angle SRT = 38^0, PTU and RSU are straight lines.



Determine the following, giving reasons in each case:

(a) angle RST (2 Marks)

(b) angle SUT (2 Marks)

(c) angle PST (2 Marks)

(d) obtuse angle ROT (2 Marks)

(e) angle SQT (2 Marks)

19. P, Q and R are three villages such that PQ = 10km, QR = 8km and PR = 4km where PQ, QR and PR are connecting roads.

(a) Using a scale of 1cm rep 1 km, locate the relative positions of the three villages (2 Marks)

(b) A water tank T is to be located at a point equidistant from the three villages. By construction locate the water tank T and measure its distance from R. (3 Marks)

(c) Determine the shortest distance from T to the road PQ by construction (2 Marks)

(d) Determine the area enclosed by the roads PQ, QR and PR by calculation (3 Marks)

20. For a sample of 100 bulbs, the time taken for each bulb to burn was recorded. The table below shows the result of the measurements.

Time (in hours)	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74
Number of bulbs	6	10	9	5	7	11	15	13	8	7	5	4

(a) Using an assumed mean of 42, calculate

(i) the actual mean of distribution (4 Marks)

(ii) the standard deviation of the distribution (3 Marks)

(b) Calculate the quartile deviation (3 Marks)

21. A plane leaves an airport P (10^0S, 62^0E) and flies due north at 800km/h.

(a) Find its position after 2 hours (3 Marks)

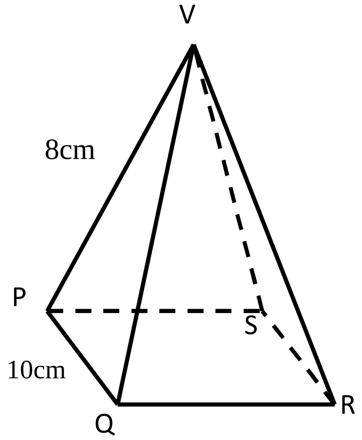
(b) The plane turns and flies at the same speed due west. It reaches longitude Q, 12^0W.

(i) Find the distance it has traveled in nautical miles. (3 Marks)

(ii) Find the time it has taken (Take $\pi = \frac{22}{7}$, the radius of the earth to be 6370km and 1 nautical mile to be 1.853km) (2 Marks)

(c) If the local time at P was 1300 hours when it reached Q, find the local time at Q when it landed at Q (2 Marks)

22. PQRSV is a right pyramid on a horizontal square base of side 10cm. The slant edges are all 8cm long. Calculate



(a) The height of the pyramid (2 Marks)

(b) The angle between

(i) Line VP and the base PQRS (2 Marks)

(ii) Line VP and line RS (2 Marks)

(iii) Planes VPQ and the base PQRS (2 Marks)

(c) Volume of the pyramid (2 Marks)

23. Complete the table below for the functions y = sin 3 θ and y = 2 Cos (θ + 40^0) (2 Marks)

θ^0	0^0	10^0	20^0	30^0	40^0	50^0	60^0	70^0	80^0	90^0
3 Sin 3θ	0	1.50		3.00			0.00			-3.0
2 Cos (θ + 40^0)	1.53	1.29			0.35			-0.69		-1.29

(a) On the grid provided, draw the graphs of Y = 3 Sin 3 θ and y = 2 Cos (θ + 40^0) on the same axis. Take 1 cm to represent 10^0 on the x-axis and 4 cm to represent 2 unit on the y – axis. (5 marks)

(b) From the graph find the roots of the equation.

(i) $\frac{3}{4}$ Sin 3θ = $\frac{1}{2}$ Cos (θ + 40^0) (2 Marks)

(ii) $2 \cos (0 + 40^0) = 0$ in the range $0 \leq \theta \leq 90^0$ (1 Mark)

24. The gradient function of a curve is given by the expression $2x + 1$. If the curve passes through the point $(-4, 6)$

(a) Find:

(i) The equation of the curve (3 Marks)

(ii) The values of x, at which the curve cuts the x-axis (3 Marks)

(b) Determine the area enclosed by the curve and the x –axis (4 Marks)