Name: …………………………………..…....... Index No: ………………..........

Date: .... Signature…………............

121/1

MATHEMATICS
Paper 1

MAYS 2015

2½ Hours

TIGANIA SOUTH PRE-MOCKS 2015

Kenya Certificate of Secondary Education

INSTRUCTIONS TO CANDIDATES

1. *Write your name, index number, signature and date in the spaces provided at the top of this page.*
2. *The paper contains two sections: Section I and Section II. Answer* ***ALL*** *the questions in Section I and* ***ANY FIVE*** *from Section II.*
3. *Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.*
4. *Marks may be given for correct working even if the answer is wrong.*
5. *Silent non - programmable electronic calculators and KNEC Mathematical tables may be used unless otherwise stated.*

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

This paper consists of fifteen (17) printed pages.
Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.

Paper1 **section 1**(50marks)

1. Points S(-2,2) and T(-3,7) are mapped onto S^1(4,-10) and T^1(0,10) by an enlargement . Calculate the enlargement scale factor. (3marks)

2. Given that $\frac{1}{2x} = (0.732)^3 + \sqrt[3]{85.3}$, use mathematical tables to find the value of x in standard form correct to 3 significant figures (3marks)

3. Simplify $\frac{12x^2+ax-6a^2}{9x^2-4a^2}$ (3 marks)

4. All prime numbers less than ten are arranged in ascending order to form a number.

(a) Write down the number formed (1 mark)

(b) Express the number in (a) above in expanded form (2 marks)

5. A two digit number is such that the one's digit is four more than the tens digit, and the sum of the digits is 14. Find the number (3 marks)

6 Paul bought a refrigerator on hire purchase by paying monthly instalments of Ksh. 2000 per month for 40 months and a deposit of Ksh. 12,000. If this amounted to an increase of 25% of the original cost of the refrigerator, what was the cash price of the refrigerator? (3 marks)

7. Find all the integral values of x which satisfy the inequality (3 marks)

$$3\,(1 + x) < 5x - 11 < x + 45$$

8. Without using calculator, evaluate

$$\left(\frac{7}{3}\left[\frac{2}{5}\, of\, 1\frac{2}{3} - \frac{1}{2}\left(\frac{1\frac{2}{3} - 2\frac{1}{2}}{\frac{1}{3} - \frac{19}{27}}\right)^{\frac{1}{2}} + \frac{2}{3}\right]\right)^{\frac{1}{2}}$$

leaving the answer as a mixed fraction. (4 marks)

9. During a certain month, the exchange rates in a bank were as follows;

	Buying (Ksh.)	Selling (Ksh.)
1 US $	91.65	91.80
1 Euro	103.75	103.93

A tourist left Kenya to the United States with Ksh.1 000,000.On the air port he exchanged all the money to dollars and spent 190 dollars on air ticket. While in US he spent 4500 dollars for upkeep and proceeded to Europe. While in Europe he spent a total of 2000 Euros. How many Euros did he remain with? (3marks)

10. A school decided to make a beautiful picnic site to be used by students and teachers as a resting point. The site was designed to be triangular in shape measuring 40 metres, 60 metres and 80 metres. Calculate the area of the picnic site. (Answer correct to 1 d.p) (3 marks)

11 A regular *n*-sided polygon has its interior angle equal to 4 times its exterior. Find *n.* (3 marks)

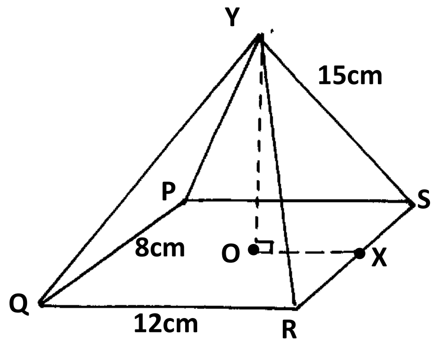
12. The ratio of the lengths of the corresponding sides of two similar rectangular petrol tanks is 3:5.The volume of the smaller tank is 8:1m^3.Calculate the volume of the larger tank. (3 marks)

13. ABCD is a rhombus. A is the point (2, 1) and C is the point (4, 7). Find the equation of the diagonal BD in the form ax + by = c. (3marks)

14. A man walks directly from point A towards the foot of a tall building 240m away. After covering 180m, he observes that the angle of elevation of the top of the building is 45^0.Determine the angle of elevation of the top of the building from A. (3 marks)

15. The G.C.D. and L.C.M. of three numbers are 3 and 1008 respectively. If two of the numbers are 48 and 72, find the least possible value of the third number. (3 marks)

16. An ant moved from `' ' X the midpoint of RS through P in the right pyramid below



Draw the net of the pyramid showing the path of the ant hence find the distance it moved. (4marks)

SECTION II (50 marks)

ANSWER ANY FIVE

17. Three warships A,B and C are at sea such that ship B is 500km on a bearing N30E from ship A. Ship C is 700km from ship B on a bearing of 120^{o}.An enemy ship D is sighted 800km due south of ship B.

a)Taking a scale of 1cm to represent 100km, locate the positions of ships A, B ,C and D. (4 marks)

b) Find the bearing of:

i) Ship A from D (1 mark)

ii)Ship D from C (1 mark)

c) Use scale drawing to determine the distance between

i) D and A (1 mark)

ii) C and D. (1 mark)

d) Measure angle DAC and angle BCD (2 marks)

18. a) A rectangular tank of base 2.4m by 2.8m and a height of 3m contains 3600litres of water initially. Water flows into the tank at the rate of 0.5litres per second. Calculate:

i) The amount needed to fill the tank (2marks)

ii) The time in hours and minutes required to fill (3marks)

b). Pipe A can fill an empty tank in 3hours while pipe B can fill the same tank in 6hours .When the tank is full, it can be emptied by pipe C in 8hours .Pipes A and B are opened at the same time when the tank is empty .If one hour later pipe C is also opened, find the total time taken to fill the tank. (5marks)

19. A solid is made up of a conical frustum and a hemispherical top. The slant height of the frustum is 8cm and its base radius is 4.2cm.If the radius of the hemispherical top is 3.5cm

a) Find the area of:

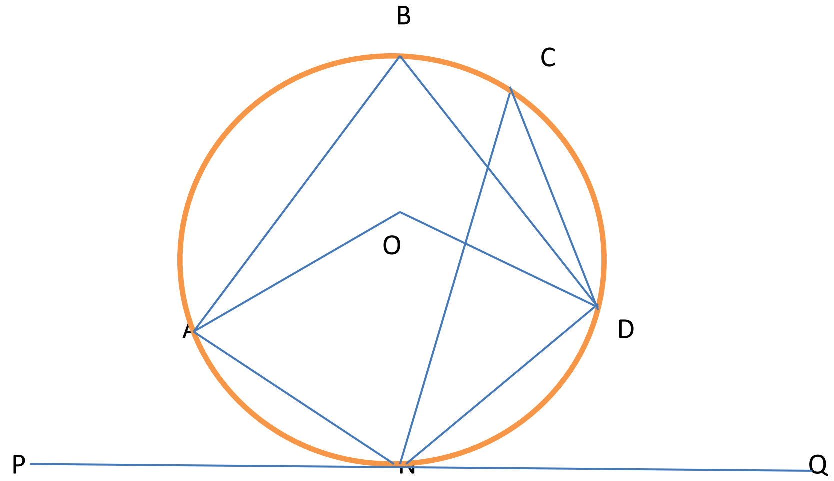
i) the circular base. (2 marks)

ii) the curved surface of the frustum (3 marks)

iii) the hemispherical surface (3marks)

b) A similar solid has a total surface area of 81.51cm^2.Determine the radius of its base. (2marks)

19. In the figure below, O is the center of the circle. PQ is a tangent to the circle at N. Angle NCD is 10° and angle ANP is 30°



Giving reasons find;

a) Angle DON (2marks)

b) Angle DNQ (2marks)

c) Angle DBA (2marks)

d) Angle ONA (2marks)

e) Angle ODN. (2marks)

20. Two quantities P and Q are connected by the equation **$P= KQ^n$**. The table below gives the values of P and Q

P	1.2	1.5	2.0	205	3.5	4.5
Q	1.58	2.25	3.39	4.74	7.86	11.5

a) State the linear equation connecting P and Q (1 mark)

b) Using a scale of 1cm to represent0.1 units in both axes, draw a suitable straight line graph on the grid provided (5 marks)

c) Use your graph in b) above to determine the approximate values of **K** and **n.** (2 marks)

d) From the graph, find the value of Q when P=3 (2 marks)

22. The displacement h metres of a particle moving along a straight line after t seconds is given by

$$h=-2t^3+\frac{3}{2}t^2 + 3t.$$

a) Find its initial acceleration (3 marks)

b) Calculate;

i) The time when the object was momentarily at rest (3 marks)

ii) Its displacement by the time it comes to rest (2 marks)

c) Calculate the maximum speed attained (2 marks)

23.a) Complete the table below for graphs of y=sinx and y=2sin(x+30)

(2 marks)

x	o	30	60	90	120	150	180	210	240	270	300	330	360
sin x	0		0.87			0.5			-0.87			-0.5	
2sin (x +30)	1	0.5		1.74		0	-1				-1		

e) Using a suitable scale on the grid below draw the graphs of y = sin x and y = 2sin (x +30) for $0 \leq x \geq 360^0$

(4 marks)

c) State the transformations that would map y= sinx onto y=2sin(x+30). (2 mark)

d) Find the values of x which satisfy the equation sin x – 2sin (x +30) =0. (2 marks)

24. A trailer moving at a speed of 80km/h is being overtaken by a car moving at 100km/h in a clear section of a road. Given that the bus is 21m long and the car is 4m long.

    a) How much time (in seconds) will elapse before the car can completely overtake the bus? (3 marks)

    b) How much distance (in metres) will the car travel before it can completely overtake the bus? (2 marks)

    c) Given that as soon as the car completed overtaking the trailer, a bus heading towards the trailer and the car and moving at a speed of 90km/h became visible to the car driver. It took exactly 18 seconds for the car and the bus to completely by pass each other from the moment they first saw each other.

i. How far was the tail of the bus from the tail of the car at the instance they first saw each other given that the bus is 12 metres long? (3 marks)

ii. How far a part was the trailer and the bus just immediately after the car and the bus had passed each other? (2 marks)

Name……………………………………………………… Adm No……………Class………

121/2
Mathematics
Paper 2
2 ½ Hours
MAY 2015

TIGANIA SOUTH PRE-MOCKS 2015

Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES

- Write your name and Admission number in the spaces provided at the top of this page.
- This paper consists of two sections: Section I and Section II.
- Answer ALL questions in section 1 and ONLY FIVE questions from section II
- All answers and workings must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculation, giving your answer at each stage in the spaces below each question.
- Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

FOR EXAMINERS 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

SECTION I (50 MARKS)

1. Use logarithm tables to solve; (4mks)

$$\sqrt[3]{\frac{45.23 \times 0.1122}{6394}}$$

2. Solve for θ in the equation $\sin(4\theta + 10^o) - \cos(\theta + 70^o) = 0$ (3mks)

3. A quantity K is partly constant and partly varies as M. When K = 45, M = 20, and when K = 87, M = 48

a) Find the formulae connecting K and M (1mk)

b) Find K when M = 36 (2mk)

4. (i) Expand $(2x-1)^5$ in ascending powers of x (1mk)

(ii) Hence use your expansion up to the third term to evaluate $(-0.98)^5$ (2mks)

5. Find the equation of the normal to the curve y = $x^2 + 4x - 3$ at point (1, 2). (3mks)

6. Using a ruler and a pair of compass only, construct triangle ABC in which BC is 6.6cm, AC=3.8cm and AB= 5.6cm. Locate point E inside triangle ABC which is equidistant frompонts A, and C such thatangle AEC=90^0. (3mks)

7. Solve the following trigonometric equation $2\cos 2(x+30) = 1$for $0 \le x \le 360^0$ (3 mks)

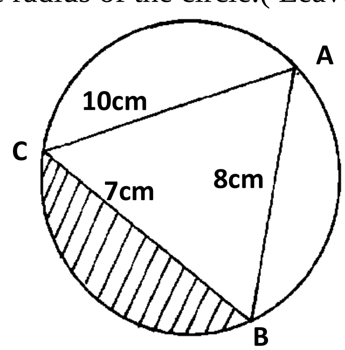
8. The position vectors of A and B are given as **a**= 2**i**-3**j**+4**k** and **b**= -2**i**-**j**+2**k** respectively. Find to 2decimal places, the length of the vector $\overrightarrow{AB}$. (3mks)

9. A T.V set was bought on hire purchase. A down payment (deposit) of Ksh 5000 was paid and a 15 monthly installment of Kshs 1500 was required.

a) Calculate the total amount paid on hire purchase (1mks)

b) If the hire purchase payment is 20% than cash payment, find the cash price (2mks)

10. The figure below shows a triangle ABC inscribed in a circle. AC = 10cm, BC = 7cm and AB = 10cm. Find the radius of the circle.(Leave your answer to the nearest 1 decimal place) (3mks)



11. The floor of a rectangular room measures 4.8m by 3.2m. Estimate the percentage error in the area.

(3mks)

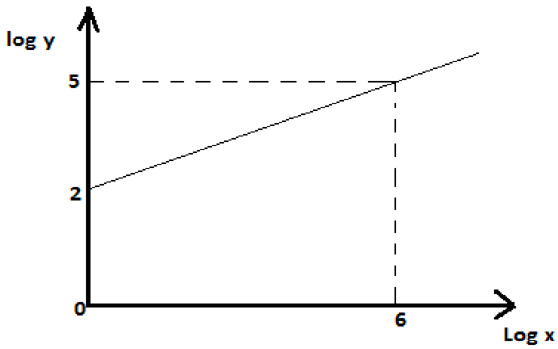
12. Simplify without using mathematical tables or a calculator (3mks)

$$\frac{\log 16 + \log 81}{\log 8 + \log 27}$$

13. Rationalize the denominator fully and simplify, leaving your answer in surd form. (3mks)

$$\frac{2}{\sqrt{5}+\sqrt{3}} - \frac{5}{\sqrt{7}-\sqrt{6}}$$

14. The figure below shows the graph of logy against logX



If the law connecting x and y is of the form $y = ax^b$, where a and b are constants. **Find** the values of a and b. (3mks)

15. Solve the equation by completing square method $2x^2 + 3x - 5 = 0$ (3mks)

16. Find the area bounded by the curve $y = x(x-1)(x+2)$ and the x-axis . (4mks)

SECTION II (50 MARKS)

Answer any five questions from this section

17. Mr. Ouma is a civil servant on a basic salary of Kshs.18,000. On top of his salary, he gets a monthly house allowance of Kshs.14,000, medical allowance of Kshs. 3080 and a commuter allowance of Kshs. 4640. He has a life insurance policy for which he pays a premium of kshs.800 p.m and claims an insurance relief of shs 3 for every 20/= on the monthly premiums. He is entitled to a personal relief of kshs.1056 p.m

a) Using the tax table below calculate his PAYE

Income in K£ p.m	Rate %
1 – 484	10
485 – 940	15
941 – 1396	20
1397 – 1852	25
over 1852	30

b) In addition to PAYE the following deductions are made on his pay every month.
- Wcps at 2% of his basic salary
- NHIF of kshs. 400
- Loan repayment of kshs. 4000
- Co-op shares of kshs. 800

(i) Calculate his total monthly deductions in Kshs. (7mks)

(ii) Calculate his net monthly pay in Kshs. (3mks)

18. The points $A^1B^1C^1$ are images of ABC A (1, 4), B (-2, 0), C (4, -2) respectively under a transformation N presented by the matrix N = $\begin{pmatrix} 3 & 1 \\ 4 & 0 \end{pmatrix}$.

a) Write down the co-ordinates of $A^1B^1C^1$ (3mks)

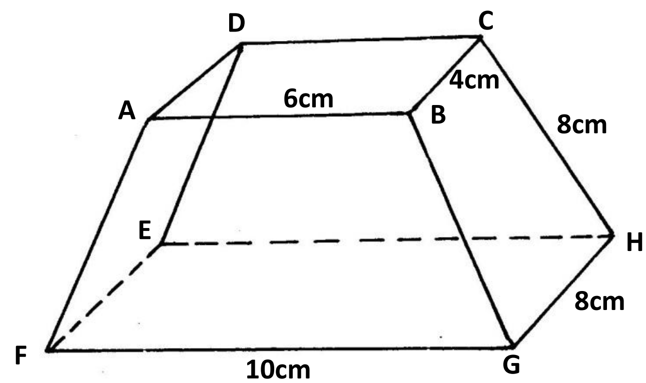
b)$A^{11}B^{11}C^{11}$ are the images of $A^1B^1C^1$ under a transformation represented by matrix

M = $\begin{pmatrix} 2 & -2 \\ 1 & 0 \end{pmatrix}$. Write down the co-ordinates of $A^{11}B^{11}C^{11}$. (3mks)

c) A transformation N followed by M can be represented by a single transformation K.

Determine the matrix K (4mks)

19. The figure below shows a solid frustum of a pyramid with a rectangular top of side 6cm by 4 cm and a rectangular base of side 10cm by 8 cm. The slant edge of the frustum is 8cm.



a) Calculate the height of the frustrum (3mks)

b) Calculate the volume of the solid frustum. (3mks)

c) Calculate the angle between the line FC and the plane FGHE (2mks)

d) Calculate the angle between the planes **BCHG** and the base **EFGH**. (2mks)

20. The 2^{nd} and 5^{th} terms of an arithmetic progression are 8 and 17 respectively. The 2^{nd}, 10^{th} and 42^{nd} terms of the A.P. form the first three terms of a geometric progression. Find

(a) the 1^{st} term and the common difference. (3mks)

(b) the first three terms of the G.P and the 10^{th} term of the G.P. (4mks)

(c) The sum of the first 10 terms of the G.P. (3mks)

21. Hospital records indicating the maternity patients that stayed in a hospital for a number of days are as shown in the table below.

No of days stayed	Frequency (No of patients)
3	15
4	32
5	56
6	19
7	5

Find the probability that

a) A patient stayed exactly 5 days (2mks)

b) A patient stayed less than 6 days (2mks)

c) A patient stayed at most 4 days (2mks)

d) A patient stayed at least 5 days (2mks)

e) A patient stayed less than 7 days but more than 4days (2mks)

22. The position of two towns **X** and **Y** are given to the nearest degree as **X** (45^0 N, 110^0 W) and **Y** (45^0 N, 70^0 E). Take π = 3.142, **R** = 6370km.Find:

(a) The distance between the two towns along the parallel of latitude in km. (3mks)

(b) The distance between the towns along a parallel of latitude in nautical miles. (3mks)

(c) A plane flew from **X** to **Y** taking the shortest distance possible. It took the plane 15hrs to move from **X** and **Y**. Calculate its speed in Knots. (4mks)

23. A transporter has a van and a pick-up available for trips to the nearest town. He can allow atmost 120 litres of petrol and 4 litres of oil to be used each day. Each trip,the van uses 10litres of petrol and 0.2 litres of oil. Each trip the pick-up uses 6 litres of petrol and 0.8 litres of oil. The profit made on each trip by the van is shs. 60 and on each trip by the pick-up is shs. 80. If he makes x trips in the van and y trips in the pick-up;

a) Write down four inequalities which must be satisfied by x and y (4marks)

b) Represent the inequalities above graphically using a scale of 1cm to represent 2 units in both axes, and then determine the number of trips made by each vehicle to give maximum profit by use of a search line. Then give the maximum profit. (6marks)

24. A stone is thrown straight up from the edge of a roof, 80m above the ground, at a speed of 10m/s. Given that the acceleration due to gravity is $10m/s^2$

a) How far is the stone 3 seconds later? (5mks)

b) What time does it hit the ground? (3mks)

c) What is the velocity of the stone when it hits the ground? (2mks)