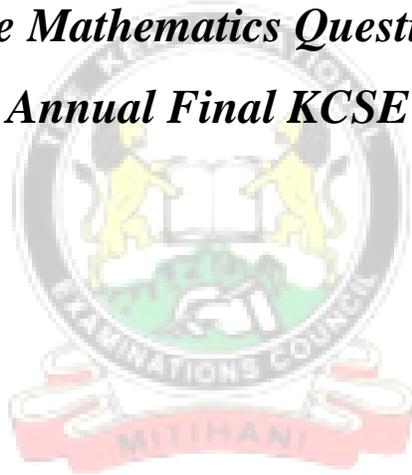


TOP KCSE PREDICTIONS

MATHEMATICS

KCSE PREDICTION TRIALS (1-10)

2nd Series of Sampled Top National Schools Prediction Trials of Anticipated Possible Mathematics Questions we Expect in the Forthcoming Annual Final KCSE Examinations.



SERIES 2

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TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 1 PAPER 1

Time: 2 ½ Hours

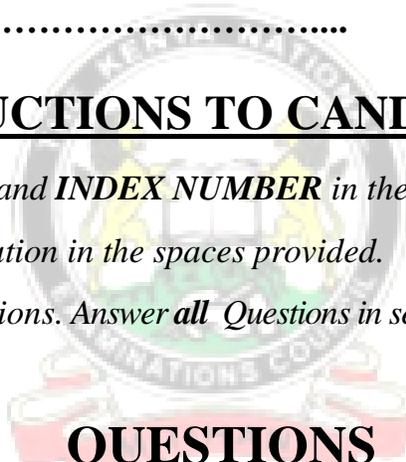
NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your **NAME, SCHOOL and INDEX NUMBER** in the spaces provided above.
- b) **Sign** and write **date** of examination in the spaces provided.
- c) This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any **five** in section **B**



QUESTIONS

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1. Evaluate:

$$\sqrt{\frac{1}{4}} \text{ of } 3\frac{1}{2} + \frac{3}{2}\left(\frac{5}{2} - \frac{2}{3}\right)$$

(3mks)

$$\frac{3}{4} \text{ of } 2\frac{1}{2} \div \frac{1}{4}$$

2. The average lap time for 3 athletes in a long distance race is 36 seconds, 40 seconds and 48 seconds respectively. If they all start the race at the same time, find the number of times the slowest runner will have been overlapped by the fastest at the time they all cross the starting point together again (3mks)

3. Kamau toured Switlerland from Germany. In Switlerland he bought his wife a present worth 72 Deutsche marks. Find the value of the present in

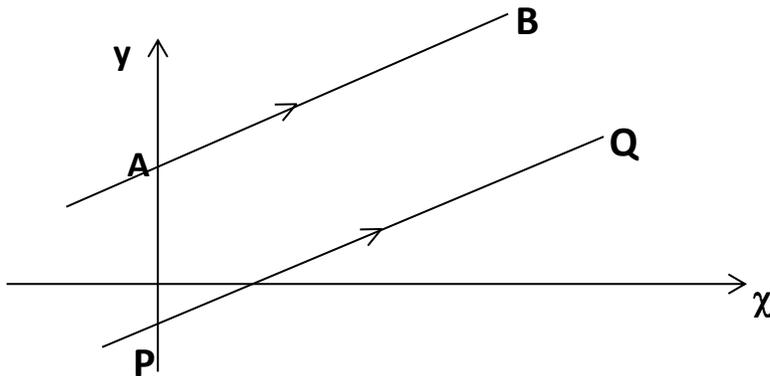
- (a) Swiss Francs.
- (b) Kenya shillings correct to the nearest sh, if
1 Swiss Franc = 1.25 Deutsche marks

1 Swiss Franc = 48.2

Kenya shillings

(3mks)

4. The equation of line AB in the figure below is $y = 3x + 5$ and A is the point (0, a). Line PQ is parallel to AB and $AP = 7$ units.



- (i) Find the value of a. (1mk)
 (ii) Write down the equation of PQ. (2mks)

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

6. Given that $\frac{3}{2 - \sqrt{18}} + \frac{5}{2 + \sqrt{18}} = a + b\sqrt{c}$. Find the values of a, b and c.

(3mks)

7. The mean of five numbers is 20. The mean of the first three numbers is 16. The fifth number is greater than the fourth by 8. Find the fifth number. (3mks)

8. Show that the points P(3, 4), Q(4, 3) and R(1, 6) are collinear. (3mks)

9. Solve the inequalities $x \leq 2x + 7 \leq -\frac{1}{3}x + 14$ hence represent the solution on a number line. (3mks)

10. Use the tables of squares, square roots and reciprocals only to find the value of

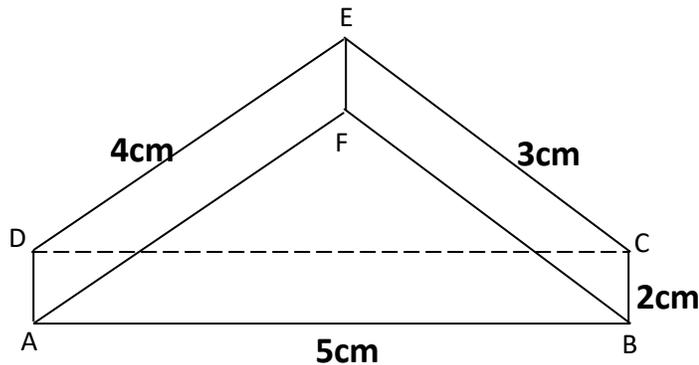
$$(0.0546)^{1/2} + \left(\frac{1}{4.327}\right)^2 \quad (3mks)$$

11. A circle of radius 7 units has its centre at the point of intersection between the lines $x + 2y + 1 = 0$ and $2x + 3y - 3 = 0$. Find the equation of the circle expressing it in the form $x^2 + y^2 + px + qy + c = 0$. (3mks)

12. The gradient of a curve at any point (x, y) is given by $3x^2 + 2x$. If the curve passes through the point (-2, 1). Find its equation. (3mks)

13. A solid metal cylinder with radius 7cm and height 5cm is melted down and recast into a spherical ball. Calculate to 1 decimal place the surface area of this ball. (4mks)

14. Sketch and label the net of the prism shown below.



15. The volume of two similar solid spheres are 4752cm^3 and 1408cm^3 . If the surface area of the small sphere is 352cm^2 , find the surface area of the larger sphere. (3mks)
16. A carpenter constructed a closed wooden box with internal measurements 1.5 metres long, 0.8 m metres wide and 0.4 metres high. The wood used in constructing the box was 1.0cm thick and has a density of 0.6g/cm^3 .
Determine the:
- (i) volume in cm^3 of the wood used in constructing the box. (3mks)
 - (ii) mass of the box in kilograms correct to 1 decimal place. (1mk)

SECTION II: (50 MARKS)

Answer any five questions from this section in the spaces provided:

17. Two aeroplanes, T and S leave an airport A at the same time. S flies on a bearing of 060° at 750km/h while T flies on a bearing of 210° at 900 km/h .
- (a) Use a suitable scale, to draw a diagram showing the relative position of the aeroplanes after two hours. (3mks)
 - (b) Use your diagram to determine:
 - (i) the distance between the two aeroplanes. (2mks)
 - (ii) the bearing of T from S. (1mk)
 - (c) Aeroplane T later flew to the East at the same speed for one hour. Show its final position on the diagram in (a) above.
Determine:
 - (i) Its final distance from A. (2mks)
 - (ii) Its final bearing from S. (1mk)

18. The table below shows the income tax rates for a certain year.

Taxable pay per month (Ksh)	Tax rates
1 – 9,680	10%
9,681 – 18,800	15%
18,801 – 27,920	20%
27,921 – 37.040	25%

37,040 and above	30%
------------------	-----

That year Kazembe paid net tax of Ksh.5,512 per month. His total monthly taxable allowances amounted to Ksh.15,220 and he was entitled to a monthly personal relief of Ksh.1,162. Every month the following deductions were made:

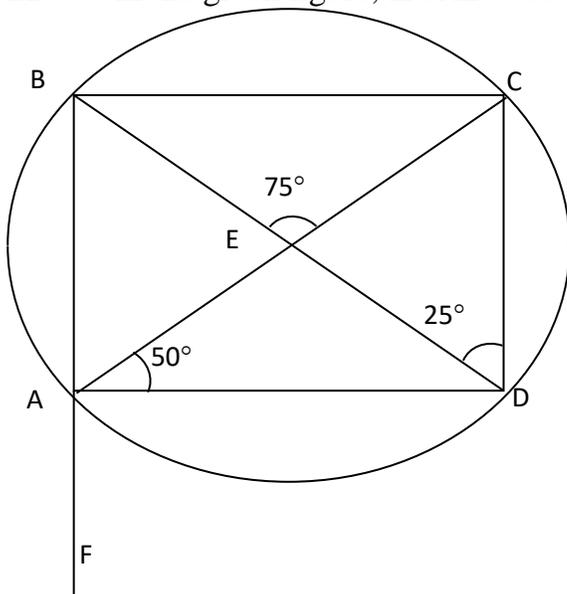
- NHIF – Ksh. 320
- Union dues – Ksh.200
- Co-operative shares – Ksh.7,500

- (a) Calculate Kazembe’s monthly basic salary in Ksh. (7mks)
 (b) Calculate his monthly net salary. (3mks)

19. (a) On the grid provided **below**, draw the graph of $y = (\chi + 4)(1 - 2\chi)$ for the range $-5 \leq \chi \leq 2$. (4mks)
 (b) On the same grid draw the line $y + 3\chi = 2$. (2mks)
 (c) Use your graph to solve the equations:
 (i) $(\chi + 4)(1 - 2\chi) = -5$ (2mks)
 (ii) $-2 - 4\chi - 2\chi^2 = 0$ (2mks)

20. A tetrahedron has equilateral triangular base ABC of side 10cm. The vertex V is such that $VA = VB = VC = 8\text{cm}$. Calculate.
 (a) The angle between the planes ABC and BCV. (5mks)
 (b) The vertical height of the vertex V above the base ABC. (2mks)
 (c) Volume of the tetrahedron. (3mks)

21. In the given figure, $\angle CAD = 50^\circ$, $\angle BEC = 75^\circ$ and $\angle BDC = 25^\circ$. BAF is a straight line.



Giving reasons where necessary, calculate the size of:-

- (i) $\angle ABC$. (2mks)

- (ii) $\angle DEC$. (2mks)
 (iii) $\angle ABD$. (3mks)
 (iv) $\angle DAF$. (3mks)
22. A bag contains 5 red, 4 white and 3 blue beads. Two beads are selected at random one after another without replacement.
- (a) Draw a tree diagram and show the probability space. (2mks)
 (b) From the tree diagram, find the probability that:
- (i) The last bead selected is red. (3mks)
 (ii) The beads selected were of the same colour. (2mks)
 (iii) At least one of selected beads is blue. (3mks)
23. A transformation represented by the matrix $\begin{pmatrix} 2 & 1 \\ 1 & -2 \end{pmatrix}$ maps the points A(0, 0), B(2, 0), C(2, 3) and D(0, 3) of the quad ABCD onto $A^1B^1C^1D^1$ respectively.
- (a) Draw the quadrilateral ABCD and its image $A^1B^1C^1D^1$. (3mks)
 (b) Hence or otherwise determine the area of $A^1B^1C^1D^1$. (2mks)
 (c) Another transformation $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ maps $A^1B^1C^1D^1$ onto $A^{11}B^{11}C^{11}D^{11}$.
 Draw the image $A^{11}B^{11}C^{11}D^{11}$. (2mks)
 (d) Determine the single matrix which maps $A^{11}B^{11}C^{11}D^{11}$ back to ABCD. (3mks)
24. The distance from town A to town B is 360km. A bus left town A and traveled towards town B at an average speed of 60km/h. After 1½ hours, a car left town A and traveled along the same road at an average speed of 100km/h.
- (a) Determine
- (i) The distance of the bus from town A when the car took off. (2mks)
 (ii) The distance the car traveled to catch up with the bus. (4mks)
 (b) The distance from P to Q is 160km. If an express train was 16km/h slower it would take 20 minutes longer on the journey. Find the average speed of the express train. (4mks)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 1 PAPER 2

Time: 2 ½ Hours

NAME..... INDEX NO.....

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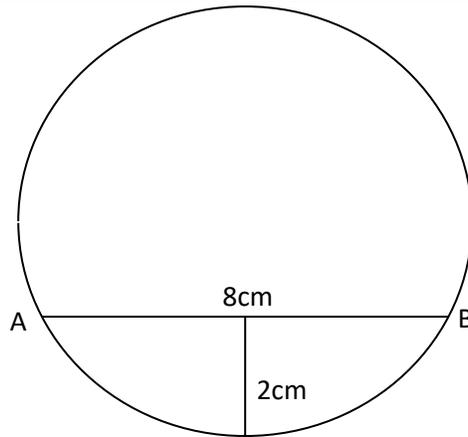
INSTRUCTIONS TO CANDIDATES.

- Write your **NAME**, **SCHOOL** and **INDEX NUMBER** in the spaces provided above.
- Sign** and write **date** of examination in the spaces provided.
- This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

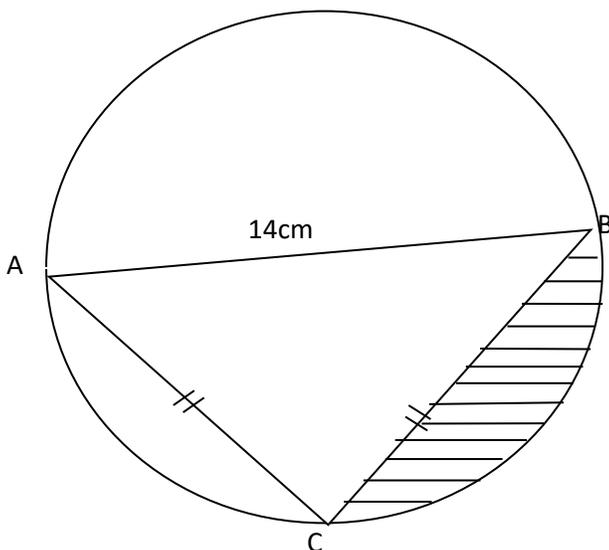
SECTION I:(50 MARKS)

Answer all the question in this section in the spaces provided:

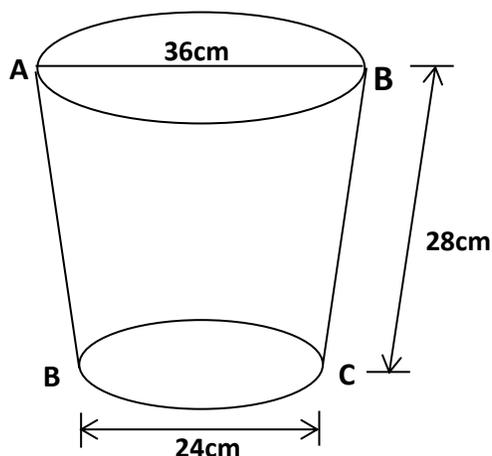
- Use a tables to find the value of χ if $2^\chi = 3$. Give your answer correct to 4sf. (3mks)
- Make χ the subject of the formula:
$$A = \sqrt{\frac{3 + 2\chi}{5 - 4\chi}}$$
 (3mks)
- It would take 18 men 12 days to dig a piece of land. If they work for 8 hours a day, how long will it take 24 men if they work 12 hours to cultivate three quarters of the same land. (3mks)
- Kinyua bought soya and millet at sh.65 per kg and sh.40 per kg respectively. He then mixed them and sold the mixture at sh.60 per kg making a profit of 20%. Determine the ratio of soya to millet in mixture. (3mks)
- Chord AB is of length 8cm and the maximum distance between chord and lower part of circle is 2cm. Determine the radius of the circle. (3mks)



6. Use the inverse matrix method rule to solve simultaneous equations.
 $2x + y = 10$ (3mks)
 $2x + 2y = 14$
7. Solve $\log_2(x+7) - \log_2(x-7) = 3$ (4mks)
8. Construct a circle centre K and radius 2.5cm. Construct a tangent from a point Q which is 6cm from K to touch the circle at M. Measure the length QM. (3mks)
9. Given $4.6 \div 2.0$ find
 (a) the absolute error in the quotient. (2mks)
 (b) the percentage error in the quotient correct to four significant figures. (1mk)
10. A variable P varies jointly with the square of R and inversely with the square root of Q. If R is increased by 10% and Q decreased by 20%, what is the percentage change in the value of P. (3mks)
11. The figure below shows a circle with segments cut off by a triangle whose longest side AB is the largest possible chord of a circle. Determine the area shaded given that $AB = 14\text{cm}$ and $AC = BC$. (3mks)



12. A bucket in the shape of a frustrum as shown in the diagram. It has diameters of 36cm and 24cm. Calculate the volume of the bucket. (4mks)



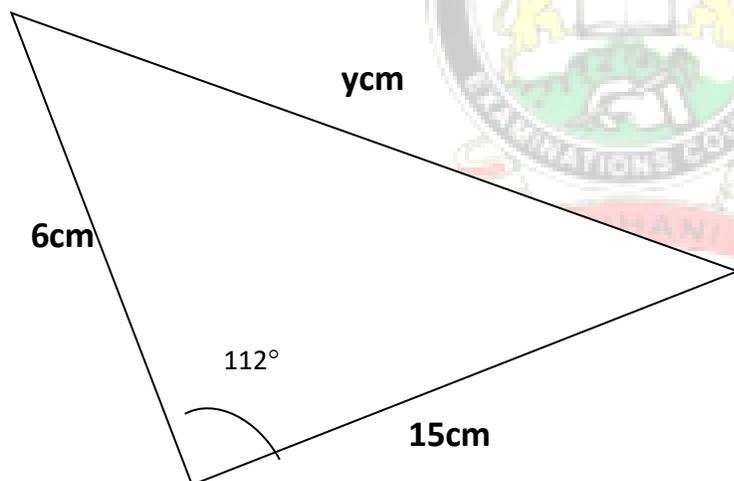
13. Without using a Mathematical tables or a calculator, evaluate.

$$\frac{2.7 \times 2.04}{300 \times 0.054}$$

(2mks)

14. Find the length represented by y in the figure below.

(3mks)



15. (a) Expand $(1 + 2\chi)^8$ in ascending powers of χ up to and including the term χ^3 . (1mk)

(b) Hence evaluate $(1.02)^8$ to 3d.p. (2mks)

16. The difference between the exterior and interior angle of a regular polygon is 100° .

Determine the number of sides of the polygon. (3mks)

SECTION II: (50 MARKS)

Answer any five questions from this section in the spaces provided:

17. (a) Fill the table below for the curves given by $y = 3 \sin (2\chi + 30^\circ)$ and $y = \cos 2\chi$ for χ values in the range $0 \leq \chi \leq 180^\circ$. (2mks)

χ	0°	15°	30°	45°	60°	75°	90°	120°	150°	180°
$y = 3 \sin (2\chi + 30^\circ)$										
$y = \cos 2\chi$										

- (b) Draw the graphs of $y = 3 \sin (2\chi + 30^\circ)$ and $y = \cos 2\chi$ on same axes. (2mks)
- (c) Use your graph to solve the equation $y = 3 \sin (2\chi + 30^\circ)$ and $y = \cos 2\chi$. (2mks)
- (d) Determine the following from your graph:
- (i) Amplitude of $y = 3 \sin (2\chi + 30^\circ)$. (1mk)
 - (ii) Period of $y = 3 \sin (2\chi + 30^\circ)$. (2mks)
 - (iii) Phase difference for $y = 3 \sin (2\chi + 30^\circ)$. (1mk)

18. OAB is a triangle in which $\vec{OA} = a$ and $\vec{OB} = b$. M is a point on OA such that $OM:MA = 2:3$ and N is another point on AB such that $AN:NB = 1:2$. Lines ON and MB intersect at X.

- (a) Express the following vectors in terms of a and b .
- (i) \vec{AB} ~ (1mk)
 - (ii) \vec{ON} ~ (1mk)
 - (iii) \vec{BM} ~ (1mk)
- (b) If $\vec{OX} = k\vec{ON}$ and $\vec{OX} = h\vec{BM}$ express OX in two different ways. Hence or otherwise find the values of h and k. (6mks)
- (c) Determine the ratio OX: XN. (1mk)

19. (a) Using only a ruler and a pair of compasses draw a line AB of length 8cm long. Hence draw the locus of all points P such that angle APB = 52.5° . (5mks)
- (b) If the region above represents a map of an estate drawn to a scale of 1cm representing 1km. Show the region to be fenced if $\angle AMB \leq 90^\circ$ by shading the unwanted region. (3mks)
- (c) Find the area of this region. (2mks)

20. The data below is a daily record of sugar sold in one of the supermarkets in Kerugoya town which sells any proportion in kg of sugar.

Kg of sugar	Number of people
-------------	------------------

0.5 – 0.9	22
1.0 – 1.4	38
1.5 – 1.9	14
2.0 – 2.4	12
2.5 – 2.9	10
3.0 – 3.4	4

- (a) How many people bought sugar from this supermarket on that day. **(1mk)**
- (b) Calculate mean of sugar bought that day. Calculate also the standard deviation from this data. **(4mks)**
- (c) Draw a cumulative frequency curve of the data above and determine the number of people who bought sugar between 1.2 and 1.9kg. **(5mks)**
21. A plane take of f from airport P at (0° , 40°W) and flies 1800 nautical rules due East to Q then 1800 nautical rules due South to R and finally 1800 nautical rules due West before landing at S.
- (a) Find to the nearest degree the latitudes and longitudes of Q, R and S. **(4mks)**
- (b) If the total flight time is 16 hours, find the average speed in knots for the whole journey. **(3mks)**
- (c) Find the time taken to fly from R to S, given that this was two hours shorter than the time taken from P to Q to R. **(2mks)**
22. The 2nd and 5th terms of an arithmetic progression are 8 and 17 respectively. The 2nd, 10th and 42nd terms of the A.P. form the first three terms of a geometric progression. Find
- (a) the 1st term and the common difference. **(3mks)**
- b) the first three terms of the G.P and the 10th term of the G.P. **(4mks)**
- (c) The sum of the first 10 terms of the G.P. **(3mks)**
23. (a) The acceleration of a particle t seconds after passing a fixed point P is given by $a = 3t - 3$. Given that the velocity of the particle when $t = 2$ is 5m/s, find
- (i) its velocity when $t = 4$ seconds. **(3mks)**
- (ii) its displacement at this time. **(3mks)**
- (b) Find the exact area bounded by the graph $\chi = 9y - y^3$ and the Y-axis. **(4mks)**
24. A girl's school has a store a far off distance for food. It has 20 sacks of rice and 35 sacks of maize. The weight, volume and number of meal rations for each sack are as follows.

Sack of	Weight in kg	Volume (m^3)	No of meals
Rice	25	0.05	800
Maize	10	0.05	160

A delivery van is to carry the largest possible total number of meals. It can carry up to 600kg in weight and 2m^3 in volume.

- (a) If a load is made up of χ sacks of rice and y sacks of maize, write four inequalities other than $\chi \geq 0$, $y \geq 0$ which satisfy these conditions. **(3mks)**
- (b) Illustrated these inequalities graphically by shading unwanted region. **(4mks)**
- (b) Write down an expression for the number of meals that can be provided from χ sacks of rice and y-sacks of maize. Use your graph to find best values to take for χ and y. **(3mks)**

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 2 PAPER 1

Time: 2 ½ Hours

NAME..... INDEX NO.....

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INSTRUCTIONS TO CANDIDATES.

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SECTION I:(50 Marks)

Answers ALL questions in this section

- Without using a calculator evaluate (3 Marks)

$$\frac{\left(3\frac{1}{3} + 1\frac{1}{9}\right) \div 1\frac{1}{3}}{\left(4\frac{2}{9} - 2\frac{5}{9}\right) \times \frac{2}{3}}$$
- The number 5.81 contains an integral part and a recurring decimal. Convert the number into an improper fraction and hence a mixed fraction. (3 Marks)
- The gradient of curve at any point is given by $2x - 1$. Given that the curve passes through point (1, 5), find the equation of the curve. (3 Marks)
- Simplify: $\frac{9x^2 - 1}{3x^2 + 2x - 1}$ (3 Marks)
- A man invests KSh. 24,000 in an account which pays 16% interest p.a. The interest is compounded quarterly. Find the amount in the account after 1 ½ years. (3 Marks)
- Given that $-\frac{3}{5}x + 3y - 6 = 0$ is an equation of a straight line, find:

(i) The gradient of the line (1 Mark)

(ii) Equation of a line passing through point (2,3) and parallel to the given line. (2marks)

7. A two digit number is formed from the first four prime numbers.

(a) Draw the table to show the possible outcomes. (1 Mark)

(b) Calculate the probability that a number chosen from the two digit numbers is an even number. (1 Mark)

8. Solve for x given that

$$\log(x - 4) + 2 = \log 5 + \log(2x + 10) \quad \text{(3 marks)}$$

9. The position vectors of A and B are given as $\mathbf{a} = 2\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}$ and $\mathbf{b} = -2\mathbf{i} - \mathbf{j} + 2\mathbf{k}$ respectively.

Find to 2 decimal places, the length of vector **AB**. (3 Marks)

10. A regular polygon has internal angle of 150° and side of length 10cm.

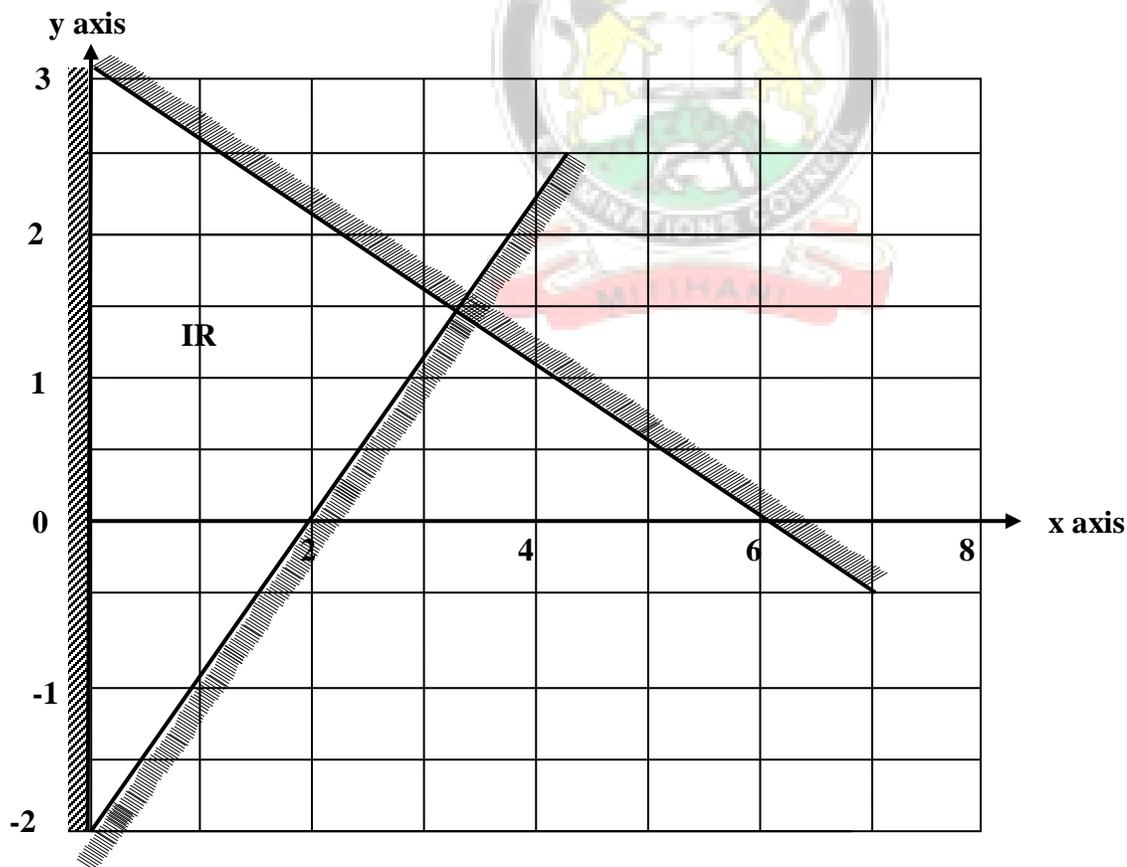
(a) Find the number of sides of the polygon. (2 Marks)

(b) Find the perimeter of the polygon. (2 Marks)

11. Solve for x in the equation. (3 Marks)

$$9^{(2x-1)} \times 3^{(2x+1)} = 243$$

12. The region R in the figure below is defined by the inequalities L1, L2 and L3.



Find the three inequalities

(3 Marks)

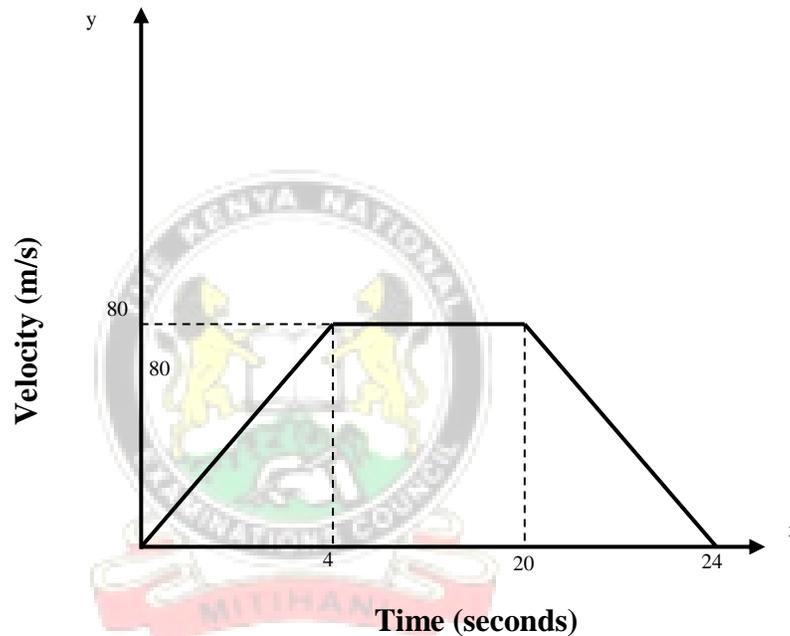
13. Two boys and a girl shared some money. The elder boy got $\frac{4}{9}$ of it, the younger boy got $\frac{2}{5}$ of the remainder and the girl got the rest. Find the percentage share of the younger boy to the girl's share. (4 Marks)

14. Use tables of reciprocals only to find the value of

$$\frac{5}{0.0829} - \frac{14}{0.581}$$

(3 marks)

15. The figure below is a velocity – time graph for a car. (not drawn to scale).



(a) Find the total distance traveled by the car? (2 Mks)

(b) Calculate the deceleration of the car. (2 Marks)

16. The table below shows marks obtained by a form four class in a certain school.

Marks (x)	$8 \leq X < 9$	$9 \leq X < 11$	$11 \leq X < 13$	$13 \leq X < 16$	$16 \leq X < 20$	$20 \leq X < 21$
No. of contents	2	6	8	3	2	1
y						

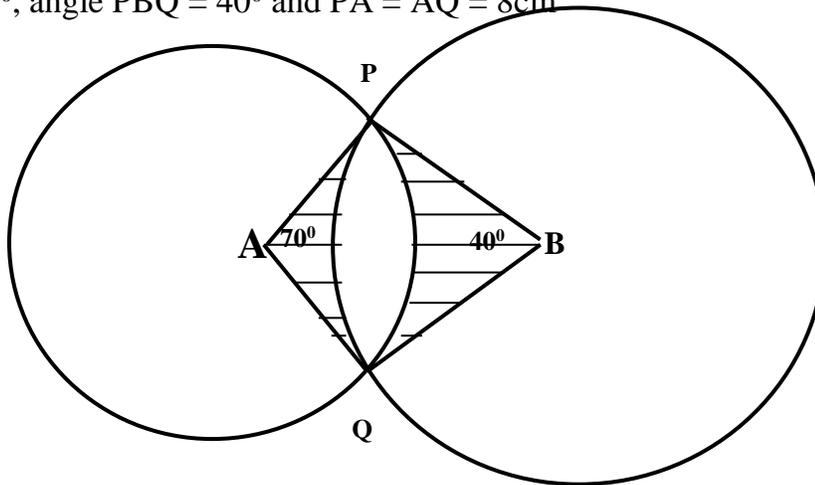
Use the table to represent the information on a histogram.

(3 Marks)

SECTION II: (50 MARKS)

Answer any five questions in this section.

17. The diagram below shows two circles, centre A and B which intersect at points P and Q. Angle PAQ = 70° , angle PBQ = 40° and PA = AQ = 8cm



Use the diagram to calculate

- (a) PQ to correct to 2 decimal places (2 Marks)
 - (b) PB to correct to 2 decimal places (2 Marks)
 - (c) Area of the minor segment of the circle whose centre is A (2 Marks)
 - (d) Area of shaded region (4 Marks)
18. Income tax rates in a certain year are as shown below.

Income (k£ – p.a)	Rate (KSh. per £)
1 – 4200	2
4201 – 8000	3
8001 – 12600	5
12601 – 16800	6
16801 and above	7

Omar pays Sh. 4000 as P.A.Y.E per month. He has a monthly house allowance of KSh.10800 and is entitled to a personal relief of KSh. 1,100 per month. Determine:

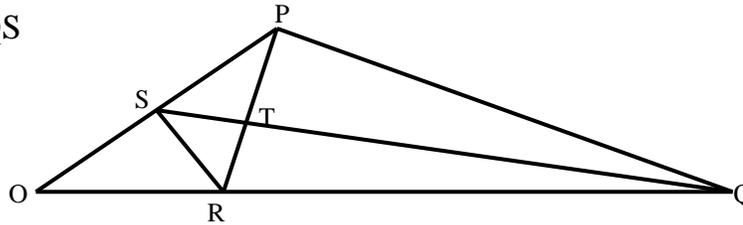
- (i) his gross tax per annum in Kshs (2 Marks)
- (ii) his taxable income in K£ per annum (2 marks)
- (iii) his basic salary in Ksh. per month (2marks)
- (iv) his net salary per month (2 marks)

19. A straight line passes through the points (8, -2) and (4,-4).
- (a) Write its equation in the form $ax + by + c = 0$, where a, b and c are integers. (3 Marks)
 - (b) If the line in (a) above cuts the x-axis at point P, determine the coordinates of P. (2 Marks)
 - (c) Another line, which is perpendicular to the line in (a) above passes through point P and cuts the y axis at the point Q. Determine the coordinates of point Q. (3 Marks)
 - (d) Find the length of QP (2 Marks)

20. A bus and a Nissan left Nairobi for Eldoret, a distance of 340 km at 7.00 a.m. The bus travelled at 100km/h while the Nissan travelled at 120km/h. After 30 minutes, the Nissan had a puncture which took 30 minutes to mend.

- (a) Find how far from Nairobi the Nissan caught up with the bus (5 Marks)
- (b) At what time of the day did the Nissan catch up with the bus? (2 Marks)
- (c) Find the time at which the bus reached Eldoret (3 Marks)

21. The figure below shows triangle OPQ in which $OS = \frac{1}{3} OP$ and $OR = \frac{1}{3} OQ$. T is a point on QS such that $QT = \frac{3}{4} QS$



- (a) Given that $OP = p$ and $OQ = q$, express the following vectors in terms of p and q .
 - (i) \vec{SR} (1 Mark)
 - (ii) \vec{QS} (2 Marks)
 - (iii) \vec{PT} (2 Marks)
 - (iv) \vec{TR} (2 Marks)

(b) Hence or otherwise show that the points P, T and R are collinear. (3 Marks)

22. On the grid provided below:

- (a) Draw triangle ABC whose coordinates are A (8,6), B(6,10) and C(10,12) and its image A'B'C' after undergoing a reflection in the line $y = x$. Write the co-ordinates of A' B' C' (4 Marks)
- (b) Triangle A'B'C' undergoes an enlargement centre (0,0) scale factor $\frac{1}{2}$ to form triangle A''B''C''. Draw triangle A''B''C'''. (3 Marks)
- (c) Triangle ABC is stretched with y-axis invariant and stretch factor of $\frac{1}{2}$ to obtain triangle A'''B'''C'''. Draw triangle A'''B'''C'''. (3 Marks)

23. Three Kenyan warships A, B and C are at sea such that ship B is 450km on a bearing of 030^0 from ship A. Ship C is 700km from ship B on a bearing of 120^0 . An enemy ship D is sighted 1000km due south of ship B.

- (a) Taking a scale of 1cm to represent 100km locate the position of the ships A, B, C and D. (4 Mks)
 - (b) Find the compass bearing of:
 - (i) Ship A from ship D (1 Mark)
 - (ii) Ship D from ship C (1 Mark)
 - (c) Use the scale drawing to determine
 - (i) The distance of D from A (1 Mark)
 - (ii) The distance of C from D (1 Mark)
 - (d) Find the bearing of:
 - (i) B from C (1 Mark)
 - (ii) A from C (1 Mark)

24. (a) Fill the table below for the function $y = 2x^2 + 6x - 5$, for $-4 \leq x \leq 3$ (2 Marks)

X	-4	-3	-2	-1	0	1	2	3
Y								

(b) (i) Draw the curve for $y = 2x^2 + 6x - 5$, for $-4 \leq x \leq 3$ on grid given (1 Mark)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 2 PAPER 2

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your **NAME, SCHOOL and INDEX NUMBER** in the spaces provided above.
- b) **Sign** and write **date** of examination in the spaces provided.
- c) This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

SECTION 1 (50 MARKS)

Answer All Questions in The Section.

1. Use logarithms to evaluate (4 Marks)

$$\sqrt[3]{\frac{45.3 \times 0.00697}{0.534}}$$
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 10cm² is mapped onto its image B of area 60cm² 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 $(1 + \frac{1}{2}x)^5$ 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)

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

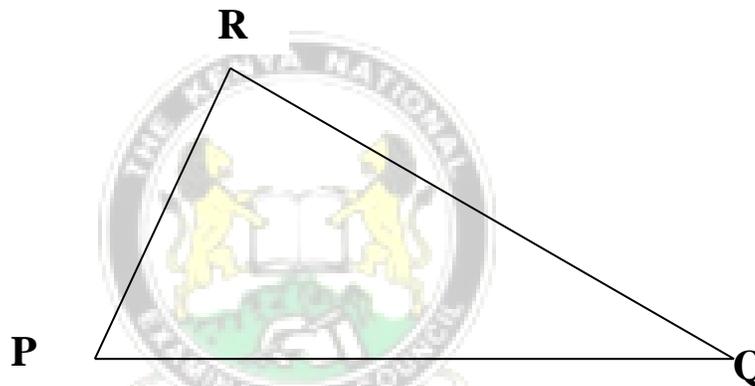
9. Kasyoka and Kyalo working together can do a piece of work in 6 days. Kasyoka, working alone takes 5 days longer than Kyalo. How many days does it take Kyalo to do the work alone? (3 Marks)

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

11. 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)

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



13. 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)

14. Solve for x in the equation
 $2 \sin^2 x - 1 = \cos^2 x + \sin x$, where $0^\circ \leq x \leq 360^\circ$. (4 Marks)

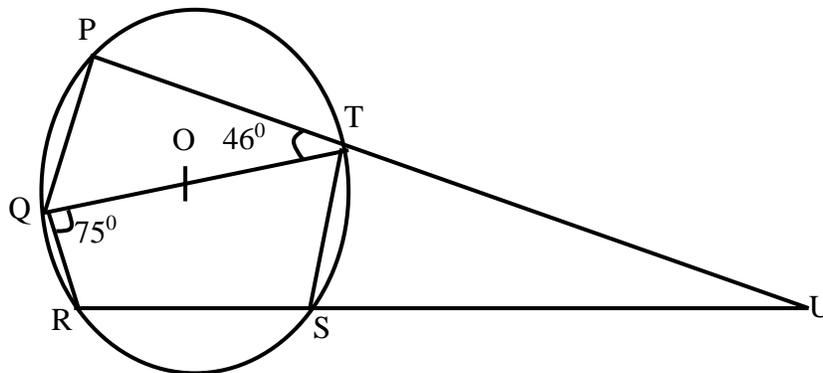
15. Find the radius and the coordinate of the centre of the circle whose equation is
 $2x^2 + 2y^2 - 3x + 2y + \frac{1}{2} = 0$ (4 marks)

SECTION II:(50 MARKS)

Answer Five Questions In This Section.

16. 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)

17. The figure below shows a circle centre O in which line QOT is a diameter. Angle QTP = 46° , angle TQR = 75° and angle SRT = 38° , 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)

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

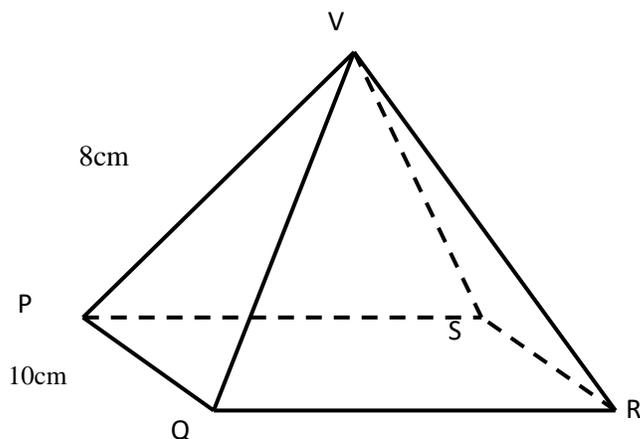
- (a) Using a scale of 1cm rep 1 km, locate the relative positions of the three villages (2 Marks)
- (b) A water tank T is to be located at a point equidistant from the three villages. By construction locate the water tank T and measure its distance from R. (3 Marks)
- (c) Determine the shortest distance 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)

19. 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)
20. A plane leaves an airport P (10°S , 62°E) 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°W .
 - (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)

21. 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)

22. Complete the table below for the functions $y = \sin 3\theta$ and $y = 2 \cos(\theta + 40^\circ)$ (2 Marks)

θ°	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
$3 \sin 3\theta$	0	1.50		3.00			0.00			-3.0
$2 \cos(\theta + 40^\circ)$	1.53	1.29			0.35			-0.69		-1.29

- (a) On the grid provided, draw the graphs of $Y = 3 \sin 3\theta$ and $y = 2 \cos(\theta + 40^\circ)$ on the same axis. Take 1 cm to represent 10° 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) $\frac{3}{4} \sin 3\theta = \frac{1}{2} \cos(\theta + 40^\circ)$ (2 Marks)
 - (ii) $2 \cos(\theta + 40^\circ) = 0$ in the range $0 \leq \theta \leq 90^\circ$ (1 Mark)
23. 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)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 3 PAPER 1

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your *NAME, SCHOOL and INDEX NUMBER* in the spaces provided above.
- b) *Sign and write date of examination* in the spaces provided.
- c) This paper consists of *two* Sections. Answer *all* Questions in sections *A* and any five in section *B*

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1. Evaluate without using a calculator (2 Marks)

$$\frac{23.4 - 2(5.2 + 5.3)}{3.2 \times 1.2}$$

2. In Blessed Church choir, the ratio of males to females is 2:3. On one Sunday service, ten male members were absent and six new female members joined the choir as guests for the day. If on this day the ratio of males to females was 1:3, how many regular members does the choir have? (3 Marks)

3. A Kenyan bank buys and sells foreign currency as shown below.

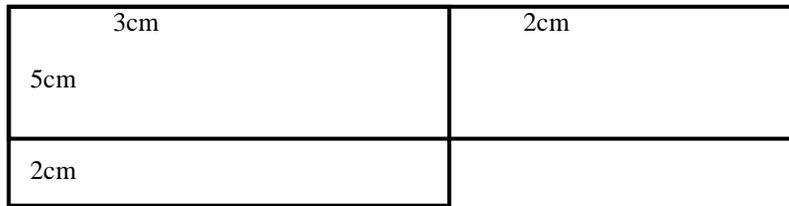
Buying	Selling	
	Kenya shillings	Kenya shillings
1 Euro	84.15	84.26
1 US Dollar	80.12	80.43

A tourist travelling from Britain arrives in Kenya with 5000 Euros. He converts all the Euros to Kenya shillings at the bank. While in Kenya he spends a total of KSh. 289,850 and then converts the remaining Kenya shillings to US dollars at the bank. Calculate (to nearest dollar) the amount he receives?(3 Marks)

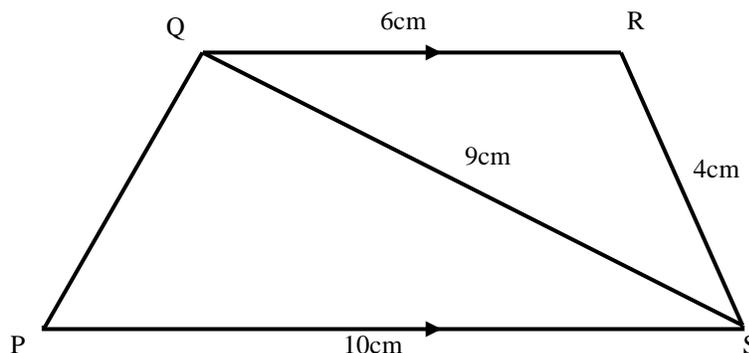
4. Simplify the expression. (3 Marks)

$$\frac{4x^2 - 16y^2}{6x^2 - 8xy - 8y^2}$$

5. Complete the figure below so as to make the net of a cuboid. Hence determine the surface area of the cuboid. (4 Marks)



6. The sum of the interior angles of a regular polygon is 1080° . Calculate
- (a) The number of sides of the polygon (2 Marks)
- (b) The sizes of the exterior and interior angles of the polygon. (2 Marks)
7. If $3^{(2x)} - 4(3^x) + 3 = 0$. Find the possible values of x (3 Marks)
8. Three similar pieces of timber of length 240cm, 320cm and 380cm are cut into equal pieces. Find the largest possible area of a square which can be made from any of the three pieces. (3 Marks)
9. The sum of digits formed in a two digit number is 16. When the number is subtracted from the number formed by reversing the digits, the difference is 18. Find the number (3 Marks)
10. Solve for x given that $\text{Log}_{10}(x - 1) + 1 = \text{Log}_{10}(x - 4)$ (3 Marks)
11. Three pens and four exercise books cost Sh. 87. Two pens and five exercise books cost Sh. 93. Find the cost of one pen and one exercise book. (4 Marks)
12. A farmer has enough feed to last 45 cows for 30 days. If he buys 5 more cows, how long will the feed last? (2 Marks)
13. Find the equation of the line perpendicular to $3x - 7y - 20 = 0$, and passes through the point (5,2) (3 Marks)
14. Wanza sold a bag of potatoes for Sh. 420 and made a profit. If she sold it at Sh. 320, she could have made a loss. Given that the profit is thrice the loss, how much did she pay for the bag of potatoes? (3 Marks)
15. In the figure below PQRS is a trapezium with QR parallel to PS. QR = 6cm, RS = 4cm, QS = 9cm and PS = 10cm.



Calculate

- (a) The size of angle SQR (2 Marks)
- (b) The area of triangle PQS (2 Marks)
16. Given that $\text{Cos}(x - 20)^{\circ} = \text{Sin}(2x + 32)^{\circ}$ and x is an acute angle, Find $\tan(x - 4)^{\circ}$ (3 Marks)

SECTION II (50 MARKS)

Answer Only Five Questions in This Section

17. An expedition has 5 sections AB, BC, CD, DE and EA. B is 200m on a bearing of 050° from A. C is 500m from B. The bearing of B from C is 300° . D is 400m on a bearing 230° from C. E is 250m on a bearing 025° from D.

- (a) Sketch the route (1 Mark)
- (b) Use the scale of 1cm to 50m to draw the accurate diagram representing the route. (5 Marks)
- (c) Use your diagram to determine
 - (i) Distance in metres of A from E (2 Marks)
 - (ii) Bearing of E from A

18. A business lady bought 100 quails and 80 rabbits for Sh. 25,600. If she had bought twice as many rabbits and half as many quails she would have paid Sh. 7,400 less. She sold each quail at a profit of 10% and each rabbit at a profit of 20%.

- (a) Form two equations to show how much she bought the quails and the rabbits (2 Marks)
- (b) Find the cost of each (3 Marks)
- (c) Calculate the profit she made from the sale of the 100 quails and 80 rabbits (3 Marks)
- (d) What percentage profit did she make from the sale of the 100 quails and 80 rabbits (2 Marks)

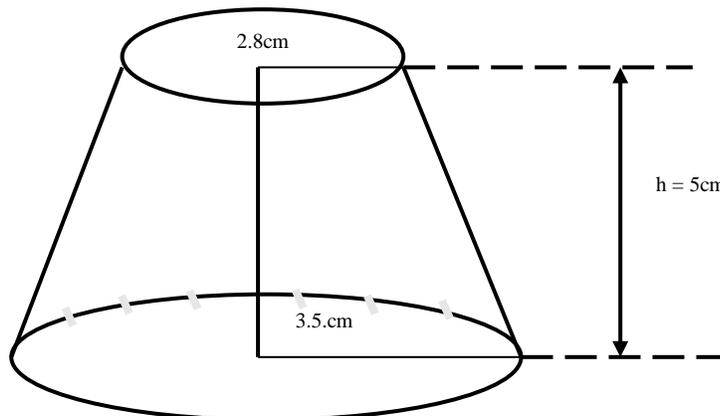
19. The table below shows the length of 40 seedlings.

Length in (mm)	Frequency
118-126	3
127 – 135	4
136 – 144	10
145 – 153	12
154 – 162	5
163 – 171	4
172-180	2

Determine

- (a) (i) The modal class (1 Mark)
- (ii) The median class (2 Marks)
- (b) (i) The mean of the seedlings (4 Marks)
- (ii) The median of the seedlings (3 Marks)

20. Find



(a) The surface area of the frustrum

(5 Marks)

(b) The volume of frustrum shown.

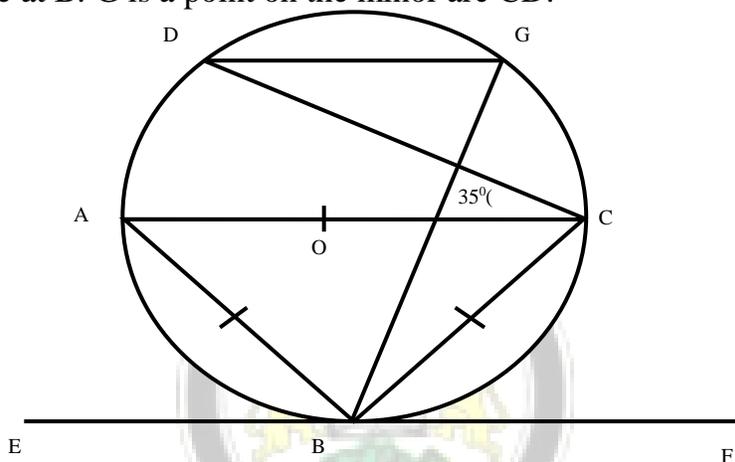
(5 Marks)

21. Triangle ABC vertices A (-2, 6), B (2, 3) and C (-2, 3) is reflected in the line $x = -3$ to give the image $A_1B_1C_1$. $A_1B_1C_1$ is translated by the vector $\begin{pmatrix} 10 \\ 2 \end{pmatrix}$ to give image $A_2B_2C_2$. $A_3B_3C_3$ with coordinates $A_3 (6,-6)$ $B_3 (2,-3)$ and $C_3 (6,-3)$ is the image of $A_2B_2C_2$ after transformation. Plot all the triangles in the grid provided and determine

(i) The transformation that maps $A_2B_2C_2$ onto $A_3B_3C_3$ (2 Marks)

(ii) The simple transformation that maps ABC onto $A_3B_3C_3$ (2 Marks)

22. In the figure below AOC is a diameter of the circle centre O; $AB = BC$ and $\angle ACD = 35^\circ$. EBF is a tangent to the circle at B. G is a point on the minor arc CD.



Giving reason

(a) Calculate the size of

(i) $\angle BAD$

(3 Marks)

(ii) The obtuse $\angle BOD$

(2 Marks)

(iii) $\angle BGD$

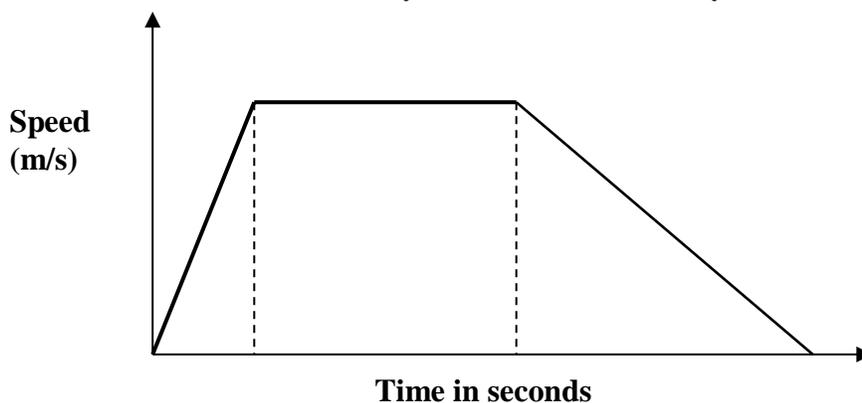
(2 Marks)

(b) Show that $\angle ABE = \angle CBF$

(3 Marks)

23. The diagram below shows the speed-time graph for a bus travelling between two stations.

The bus begins from rest and accelerates uniformly for 30 seconds. It then travels at a constant speed for 60 seconds and finally decelerates uniformly for 40 seconds.

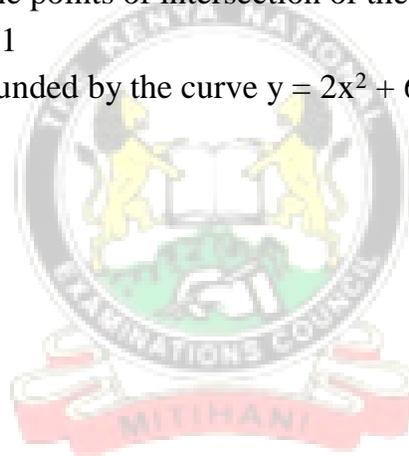


Given that the distance between the two stations is 2090m. Calculate

- (a) The maximum speed, in km/h the bus attained **(3 Marks)**
- (b) The acceleration **(2 Marks)**
- (c) The distance travelled during the last 20 seconds **(2 Marks)**
- (d) The time the bus takes to travel the first half of the journey **(3 Marks)**

24.The members of a photograph club decided to buy a camera worth Shs. 4000 by each contributing the same amount of money. Fifteen member failed to pay their contribution due to various reasons. As a result each of the remaining members had to contribute Sh. 60 more.

- (a) Find the number of members in the club **(7 Marks)**
- (b) What was the percentage increase in the contribution per month? **(3 Marks)**
 - (ii) On the same axes, draw line $y = 7x + 1$ **(1 Mark)**
- (c) Determine the values of x at the points of intersection of the curve $y = 2x^2 + 6x - 5$ and line $y = 7x + 1$ **(1 Mark)**
- (d) Find the actual of the region bounded by the curve $y = 2x^2 + 6x - 5$ and line $y = 7x + 1$ **(4 Marks)**



TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 3 PAPER 2

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- Write your **NAME**, **SCHOOL** and **INDEX NUMBER** in the spaces provided above.
- Sign** and write **date** of examination in the spaces provided.
- This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

QUESTIONS

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1. Solve (4 Marks)

$$\sqrt[3]{\left(\frac{1.23 \times 0.0468}{\text{Log}_6}\right)}$$

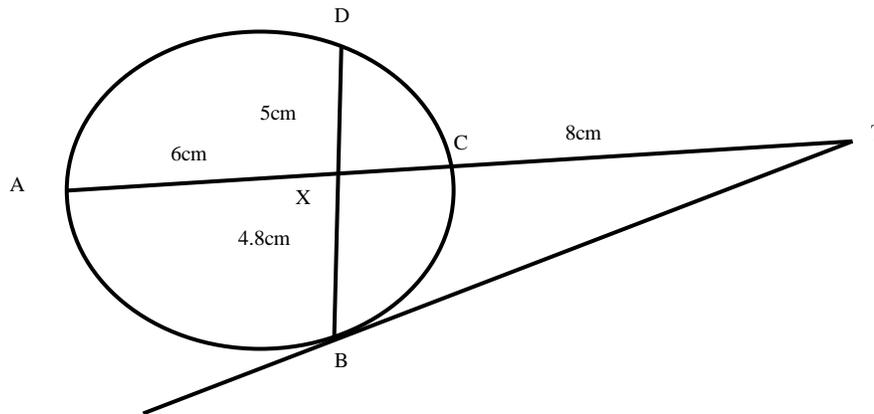
2. Express in surd form. $\frac{1}{2+\sin 45^\circ}$ (3 Marks)

hence rationalize the denominator

3. A car is driven a distance of 30 km measured to the nearest Km in 20 min measured to the nearest min. Between what limit will the average speed be? (3 Marks)
4. Make r the subject of the formula. (3 Marks)

$$S = \sqrt{\frac{r^2 + 2xb}{n}}$$

5. In the diagram below, BT is a tangent to the circle at B. AXCT and BXD are straight lines. AX = 6cm, CT = 8cm, BX = 4.8cm and XD = 5cm.



Find the length of BT.

(2 Marks)

6. Given that $X:Y = 1:2$ and $Z:Y = 2:3$, Find the value of

(3 Marks)

$$\frac{x + y}{2z + 5x}$$

7. (a) Expand $(1 - 2x)^6$ in ascending powers of x up to the term in x^3 .

(2 Marks)

- (b) Hence evaluate $(1.02)^6$ to 4 d.p.

(2 Marks)

8. Find the inverse of the matrix $\begin{pmatrix} 3 & 2 \\ 5 & 4 \end{pmatrix}$

(4 Marks)

Hence or otherwise solve the simultaneous equations

$$3x + 2y = 4$$

$$5x + 4y = 9$$

9. A merchant blends 350kg of tea costing Sh. 84 kg with 140kg of tea costing Sh. 105 per kg. At what price must he sell the mixture to gain 25%

(3 Marks)

10. The life expectancy in hours of 106 bulbs are shown in the table below.

Expectancy (hrs)	90-94	95-99	100-104	105-109	110-114	115-119	120-124	125-129	130-134	135-139
Frequency (f)	5	14	16	17	24	12	11	4	2	1

Calculate the quantile deviation of the life expectancy

(4 Marks)

11. The equation of a circle is given as $3x^2 + 3y^2 - 12x + 18y + 8 = 0$. Find the centre and radius of this circle.

(4 Marks)

12. Quantity Q partly varies as quantity R and partly varies inversely as the square of R. Given that $Q = 3$ when $R = 1$ and $Q = 5$ when $R = \frac{1}{2}$

(i) Find the equation connecting Q and R

(3 Marks)

(ii) Find the value of Q when $R = \frac{3}{2}$

(1 Mark)

13. Find the integral values of x for which; $5 \leq 3x + 2$ and $3x - 14 < -2$ (3 Marks)
14. Three soldiers Mutiso, Nzangi and Kisilu went for a shooting practice. The probability of Mutiso, Nzangi and Kisilu hitting the target are $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{2}$ respectively. The three gentlemen hit the target only once, one after the other. What is the probability that the target was hit at least once? (2 Marks)
13. Solve for x in the equation. (3 Marks)

$$\text{Log}_8 (x + 6) - \text{Log}_8 (x - 3) = \frac{2}{3}$$
14. Given that $\underline{OA} = \underline{i} + 2\underline{j} - 3\underline{k}$ and $\underline{OB} = 2\underline{i} - \underline{j} - 2\underline{k}$
 Find $|\underline{AB}|$ (2 Marks)

SECTION II – 50 MARKS

Answer only five questions from this section

15. (a) Complete the table given below by filling the blank spaces.

X	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°
$4 \text{ Cos } 2x$	4.00		2.00	0	-2.00	-3.46	-4.00	-3.46	-4.00	-3.46	-2.00		4.00
$2 \text{ Sin } (2x + 30^\circ)$	1.00	1.73	2.00	1.73		0	-1.00	-1.73	-2.00	-1.73		0	1.00

(2 Marks)

- (b) On the grid provided draw the graph of $y = 4 \text{ Cos } 2x$ and $y = 2 \text{ Sin } (2x + 30^\circ)$ for $0^\circ \leq x 180^\circ$. Take the scale 1cm for 15° on the x – axis and 2cm for 1 unit on the y -axis. (5 Marks)
- (c) (i) State the amplitude of $y = 4 \text{ Cos } 2x$ (1 Mark)
 (ii) Find the period of $y = 2 \text{ Sin } (2x + 30^\circ)$ (1 Mark)
- (d) Use your graph to solve $4 \text{ Cos } 2x - 2 \text{ Sin } (2x + 30^\circ) = 0$ (1 Mark)

18. A red and black dice are rolled and the events X, Y and Z are defined as follows.

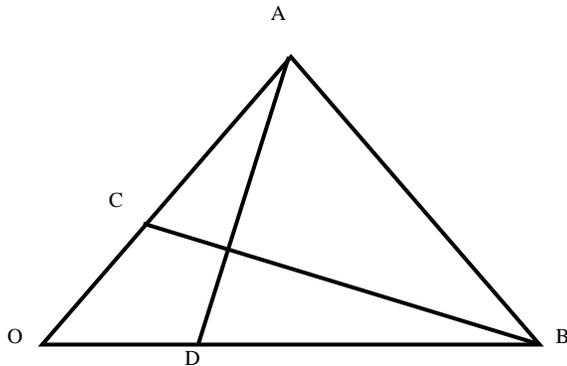
X = The red die shows a 4

Y – The sum of the scores of the two dice is 6

Z – The black die shows a 3

- (a) Find the probability of event X (2 Marks)
- (b) The probability of events X and Z (3 Marks)
- (c) Which event is mutually exclusive to X (1 Mark)
- (d) Which event is independent of X (2 Marks)
- (e) The probability of event Y (2 Marks)

19. The diagram given below show triangle OAB, $OA = a$, $OB = b$. C divides OA in the ratio 2:3 and D divides OB in the ratio 3:4 while AD and BC meet at E.



Find interm of a and b

- (a) (i) OC (2 Marks)
 (ii) CB (4 Marks)
- (b) Given that $CE = mCB$ and $DE = nDA$ where m and n are scalars
 (i) Write down two distinct expressions for OE (2 Marks)
 (ii) Hence find the values of m and n (4 Marks)
 (iii) Find OE interms of a and b only (1 Mark)
20. (a) Using a ruler and pair of compasses only, construct triangle ABC in which $AB = 9\text{cm}$, $BC = 8.5\text{cm}$ and angle $BAC = 60^\circ$ (3 Marks)
 (b) On the same side of AB as C:
 (i) Determine the locus of a point P such that $\angle APB = 60^\circ$ (3 Marks)
 (ii) Construct the locus of R such that $AR > 4\text{cm}$ (2 Marks)
 (iii) Determine the region T such that $\angle ACT \geq \angle BCT$ (2 Marks)
21. An arithmetic progression has the first term a and the common difference d.
 (a) Write down the third, ninth and twenty – fifth terms of the progression. (3 Marks)
 (b) The progression is increasing and the third, ninth and twenty-fifth terms form the first three consecutive terms of a geometric progression. If the sum of the seventh term and twice the sixth term of the arithmetic progression is 78. Calculate
 (i) The first term and the common difference (5 Marks)
 (ii) The sum of the first nine terms of the arithmetic progression (2 Marks)

- 22.** An aircraft leaves A (60°N , 13°W) at 1300 hours and arrives at B (60°N , 47°E) at 1700 hrs
- (a) Calculate the average speed of the aircraft in knots **(3 Marks)**
- (b) Town C (60°N , 133°N) has a helipad. Two helicopters S and T leaves B at the same time. S moves due West to C while T moves due North to C. If the two helicopters are moving at 600 knots. Find
- (i) The time taken by S to reach C **(2 Marks)**
- (ii) The time taken by T to reach C **(2 Marks)**
- (c) The local time at a town D (23°N , 5°W) is 1000 hours. What is the local time at B. **(3 Marks)**
-
- 23.** A firm has a fleet of vans and trucks. Each van can carry 9 crates and 3 cartons. Each truck can carry 4 crates and 10 cartons. The firm has to deliver not more than 36 crates and at least 30 cartons.
- (a) If x vans and y trucks are available to make the delivery. Write down inequalities to represent the above information. **(4 Marks)**
- (b) Use the grid provided, to represent the inequalities in (a) above **(4 Marks)**
- (c) Given that the cost of using a truck is four times that of using a van, determine the number of vehicles that may give minimum cost **(2 Marks)**
-
- 24.** (a) Sketch the graph of $y = x^2 + 5$ **(2 Marks)**
- (b) Using the mid-ordinate rule, with six strips, estimate the area enclosed by the curve, x -axis, y -axis and the line $x = 3$. **(4 Marks)**
- (c) Find the exact area by integration **(2 Marks)**
- (d) Calculate the percentage error made when the two methods above are used **(2 Marks)**

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 4 PAPER 1

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your **NAME, SCHOOL and INDEX NUMBER** in the spaces provided above.
- b) **Sign** and write **date** of examination in the spaces provided.
- c) This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

QUESTIONS

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1.(a) Find the difference between the GCD and the LCM of 36 and 54. (2mks)

(b) If three numbers 36, 54 and χ have a GCD of 6 and LCM of 216.
Find the least value of χ . (2mks)

2.Evaluate without using a calculator or Mathematical tables.

$$\frac{3}{4} + 1\frac{5}{7} \div \frac{4}{7} \text{ of } 2\frac{1}{3} \times \frac{2}{3}$$

$$\left(1\frac{3}{7} - 2\frac{5}{8}\right) \times \frac{2}{3}$$
(3mks)

3.Convert $0.\dot{6}3\dot{3}1$ into a fraction without using a calculator. (3mks)

4.Use reciprocal and square tables to calculate to 3 significant figures the value of: (3mks)

$$0.04766^2 + \frac{1}{2754}$$

5.Determine the values of χ that satisfy the following inequalities and show the solution on a

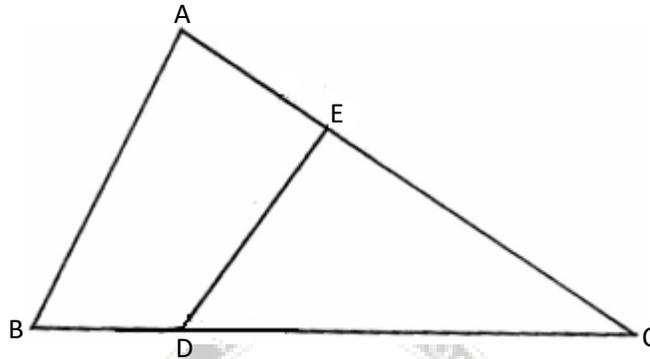
number line.

$$-3 - x \leq \frac{1}{3}x - 5 > \frac{2}{3}x - 6 \quad (4\text{mks})$$

6. The interior angle of a regular polygon is 20° more than three times the exterior angle of the same polygon. Determine the number of sides of the polygon. (3mks)

7. Solve for x in $27^{x+1} - 3^{3x+2} - 400 = 86$. (3mks)

8. In the triangle ABC below. $AC = 8\text{cm}$ and $BC = 5\text{cm}$ and angle $BCA = 30^\circ$. Point D divides BC in the ratio 1: 4 and point E divides AC in the ratio 2: 3. Find the area of the quadrilateral ABDE. (3mks)



9. Line L_1 passes through the points $(-1, 3)$ and $(3, -5)$. Line L_2 is parallel to L_1 and has a perpendicular bisector at $(-2, 4)$. Find the equation of the perpendicular bisector in the form $ax + by = C$. (3mks)

10. Simplify: $\frac{6x^3 - 8x^2y + 2xy^2}{18x^3 - 2xy^2}$ (4mks)

11. Martha has 26 coins whose total value is sh.205. There are thrice as many Sh.10 coins as there are Sh.20 coins. The rest are 50cts coins. Find the number of Sh.20 coins that Marthahas. (3mks)

12. A solid hemisphere of radius 7cm has the same volume as a cube. Find the length of the cube to 1d.p. (3mks)

13. There are two grades of tea, grade A and grade B. Grade A cost Kshs.80 per kg and grade B cost Ksh.60 per kg. In what ratio must the two grades be mixed order to produce a blend worth Ksh.75 per kg. (3mks)

14. A forex bureau buys and sells American dollars in Kenya shillings at the rate shown below.

Buying	Selling
85.40	86.00

An American tourist at the end of her tour in Kenya had Ksh.107500 which he converted to the dollar through the forex bureau. How many dollars did she get? (2mks)

15. Without using Mathematical tables or a calculator evaluate:

$$\left(\frac{0.24 \times 1.56 \times 7.2}{1.3 \times 0.16 \times 0.09} \right)^{\frac{1}{2}} \quad (3\text{mks})$$

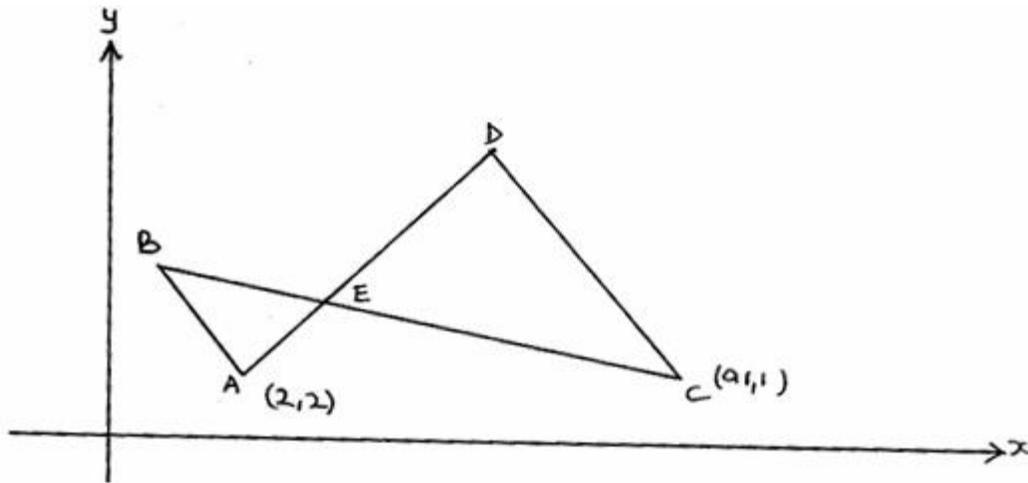
16. The image of point A $(-3, 4)$ under a translation, T is $A^1(2, -2)$. If the image of a point B under T is $(0, -1)$. Find the coordinates of B. (3mks)

SECTION II:(50 MARKS)

Answer only FIVE question from this section.

17. Milk in a cooling factory is stored in a rectangular tank whose internal dimensions are 1.7m by 1.4m by 2.2m one day the tank was 75% full of milk.
- (a) Calculate the volume of milk in the tank in litres. (3mks)
- (b) The milk is packed in small packets which are in the shape of a right pyramid on an equilateral triangle base of side 16cm. The height of each packet is 13.6cm. Each packet is sold at Sh.30. Calculate
- (i) The volume of milk in milliliters, contained in each packet to 2 significant figures. (4mks)
- (ii) The exact amount of money that was realized from the sale of all the packets of milk. (3mks)
18. (a) On the grid provided, draw a quadrilateral ABCD with vertices A (-6, -1), B (-6, -4), C (3, -7) and D (3, 2). (1mk)
- (b) On the same grid, draw the image of ABCD under enlargement centre (0, -1) scale factor $\frac{1}{3}$. Label the image $A^1B^1C^1D^1$. (3mks)
- (c) Draw $A^{11}B^{11}C^{11}D^{11}$, The image of $A^1B^1C^1D^1$ under rotation of $+90^\circ$ about (1, 0). (2mks)
- d) Draw $A^{111}B^{111}C^{111}D^{111}$, the image of $A^{11}B^{11}C^{11}D^{11}$ under reflection in the line $y - x = 0$. (2mks)
- (e) Draw $A^{IV} B^{IV} C^{IV}D^{IV}$ the image of $A^{111}B^{111}C^{111}D^{111}$ under translation $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and write the coordinates of the final image. (2mks)
19. A matatu left Kibwezi at 7.00am and travelled towards Nairobi at an average speed of 60km/hr. A car left Nairobi at 9.00am and travelled towards Kibwezi at an average speed of 80km/hr.
- The distance between the two towns is 324km. Find:
- (a) The time each vehicle arrived at their destination.
- (i) Matatu. (2mks)
- (ii) Car. (2mks)
- (b) (i) The distance the matatu covered before the car started to move from Nairobi to Kibwezi. (1mk)
- (ii) The time the two vehicles met on the way. (3mks)
- (c) How far the car was from Kibwezi when they met. (2mks)

20. (a) Determine the values of χ where the curve $y = \chi^2 - 2\chi - 3$ cuts the χ -axis. (2mks)
- (b) Using the mid-ordinate rule with four ordinates, estimate the area enclosed by the curve $y = \chi^2 - 2\chi - 3$ and the χ -axis. (3mks)
- (c) Calculate the same area using integration method. (3mks)
- (d) Taking the area obtained by integration to be the exact area of the region, calculate the percentage error made when the mid-ordinate rule is used. (2mks)



21.

In the diagram above A is the point (2, 2) and $AB = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$

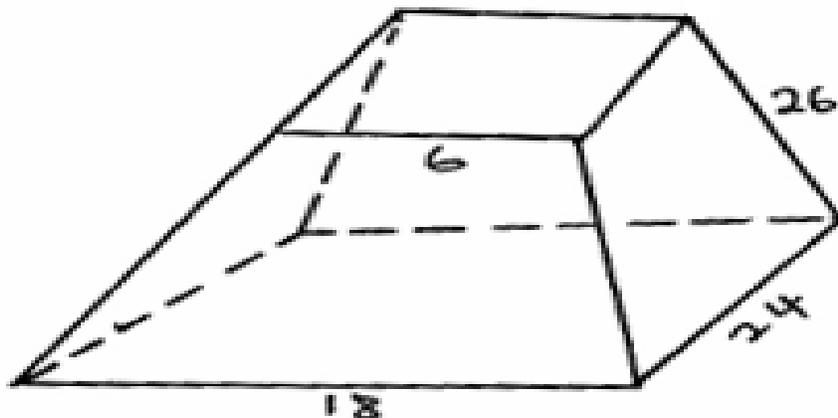
- (a) Find
- (i) $|AB|$ (2mks)
- (ii) The coordinates of B. (2mks)
- (b) The point C is (9, 1) and $CD = 3AB$. Find
- (i) the coordinates of D. (3mks)
- (c) The point E is (K, 4)
- (i) Find in terms of K, the vector AE. (1mk)
- (ii) Give that AED is a straight line, find K. (2mks)

22. Three boats X, Y and Z are approaching a harbour H. X is 50km from the harbour on a bearing of 090° . Y is 80km from the harbour on a bearing of 130° and Z is due West of Y and on a bearing of 200° from the harbour.

- (a) Using a scale of 1cm rep 10km make a scale drawing showing the positions of the three boats relative to the harbour. (3mks)
- (b) (i) Using the scale drawing find; the distance between X and Y. (2mks)
- (ii) The distance of Z from the harbour. (2mks)
- (iii) The distance between X and Z. (2mks)

(iii) The compass bearing of X from Z. (2mks)

23. The figure below shows a solid frustum with a rectangular base measuring 18cm by 24cm and a rectangular top measuring 6cm by 8cm. The slant edges are each 26cm long.



Determine:

- (a) Height of the original pyramid. (4mks)
- (b) Volume of the frustum. (3mks)
- (c) Density in g/cm³ if the solid has a mass of 7.488kg. (3mks)

24. Given that $y = 7 + 3\chi - \chi^2$ complete the below.

χ	-3	-2	-1	0	1	2	3	4	5	6
y	-11			7			7			-11

- (b) Using a suitable scale, draw the graph of $y = 7 + 3\chi - \chi^2$. (3mks)
- (c) On the same graph, draw the straight line $y = 4 - \chi$. (1mk)
- (d) Use your graph to solve the equation $\chi^2 - 4\chi - 3 = 0$ (2mks)
- (e) Determine the coordinates of the turning point. (2mks)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 4 PAPER 2

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- Write your **NAME**, **SCHOOL** and **INDEX NUMBER** in the spaces provided above.
- Sign** and write **date** of examination in the spaces provided.
- This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any **five** in section **B**

QUESTIONS

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1. In this question, show all the steps in your calculations. Use logarithms, correct to 4d.p to evaluate.

$$\left(\frac{8.429}{68.7 \times 0.9708} \right)^{\frac{2}{3}}$$

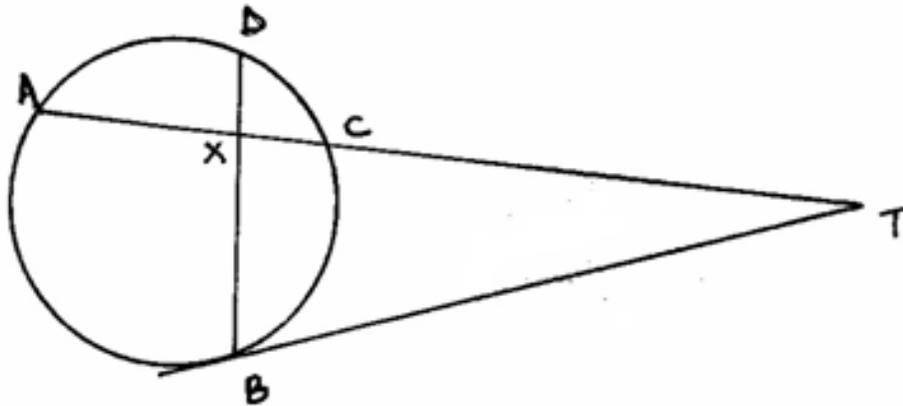
(4mks)

2. A variable chord of length 6cm is drawn in a fixed circle with centre O and radius 5cm. Show the locus of the midpoint of the chord is a circle and state its radius. (4mks)

3. Tap A can fill a tank in 10 minutes while tap B can fill the same tank in 20 minutes. Another tap C can empty the tank when full in 30 minutes. Starting with an empty tank, the three taps are left open for 5 minutes after which tap A is closed. How much longer does it take to fill the tank? (3mks)

4. In the figure below. BT is a tangent to the circle at B. AXCT and BXD are straight lines.

XC = 4cm, CT = 8cm, BX = 9.6cm and XD = 2.5cm



Find the length of

(a) **AX.** (2mks)

(b) **BT.** (2mks)

5.(a) Expand and simplify the expression $\left(1 + \frac{1}{2}x\right)^8$ up to the term in x^3 . (2mks)

(b) Hence use the results of (a) above to evaluate $(0.99)^8$ giving your answer to 4 significant figures. (2mks)

6. The cash price of a fridge is sh.41400. Jane buys the fridge on hire purchase terms by paying a deposit of sh.15960. Simple interest of 15% p.a. is charged on the balance. If Jane pays the balance in 24 equal monthly installments, calculate the amount of each installment. (3mks)

7. Make **a** the subject of the formula.

$$b = \sqrt{\frac{a^2 d}{a^2 - d^2}} \quad (3mks)$$

8. Simplify the expression below giving your answer in the form $a + b\sqrt{c}$, where a, b and c are integers. (3mks)

$$\frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$$

9. The fifth term of an arithmetic progression is 11 and the twenty fifth terms is 51. Calculate the first term and the common difference of the progression. (3mks)

10. Given the equation to a circle is $2x^2 + 2y^2 - 14x + 10y + 12.5 = 0$. Find the centre and the radius of the circle. (3mks)

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

12. Given that $A = \begin{pmatrix} 4 & 3 \\ -1 & 2 \end{pmatrix}$ and $C = \begin{pmatrix} 14 & 17 \\ -4 & 2 \end{pmatrix}$. Find B if $A^2 + B = C$.
(3mks)
13. A sum of Sh.6000 is invested at 8% p.a. compound interest. After how long will this sum amount to Sh.9250? (Give your answer to the nearest month.) (3mks)
14. Solve the simultaneous equations.
 $\chi y = 4$
 $\chi + y = 5$ (3mks)
15. Solve for Θ in $\tan (2\Theta + 45^\circ) = \sqrt{3}$ for $-90^\circ \leq \Theta \leq 90^\circ$. (2mks)
16. Find the value of χ that satisfies the equation :
 $\text{Log}_3 (\chi + 24) - 2 = \text{Log}_3 (9 - 2\chi)$. (3mks)

SECTION II: (50 MARKS)

Answer only FIVE questions from this section.

17. The volume $V\text{cm}^3$ of a solid depends partly on the square of r and partly on the cube of r , where r is one of the dimensions of the solid. When $r = 1\text{cm}$, the volume is 54.6cm^3 and when $r = 2\text{cm}$ the volume is 226.8cm^3 .
 (a) Find an expression for V in terms of r . (5mks)
 (b) Calculate the volume of the solid when $r = 4\text{cm}$. (2mks)
 (c) Find the value of r for which the two parts of the volume are equal. (3mks)
18. The table below shows the age in years of people leaving in a certain area.
- | AGE (Years) | No. of people |
|-------------|---------------|
| 10 – 13 | 20 |
| 14 – 17 | 25 |
| 18 – 21 | 32 |
| 22 – 25 | 48 |
| 26 – 29 | 35 |
| 30 – 33 | 27 |
| 34 – 37 | 23 |
- Calculate:
 (a) The median age. (3mks)
 (b) Using an assumed mean of 23.5, calculate
 (i) the mean. (3mks)
 (ii) the standard deviation. (4mks)

19. (a) Complete the table below for the trigonometric equations $y = \text{Cos } 2\chi$ and $y = -\frac{1}{2} \text{Sin } 2\chi$, giving your values to 2 decimal places. (2mks)

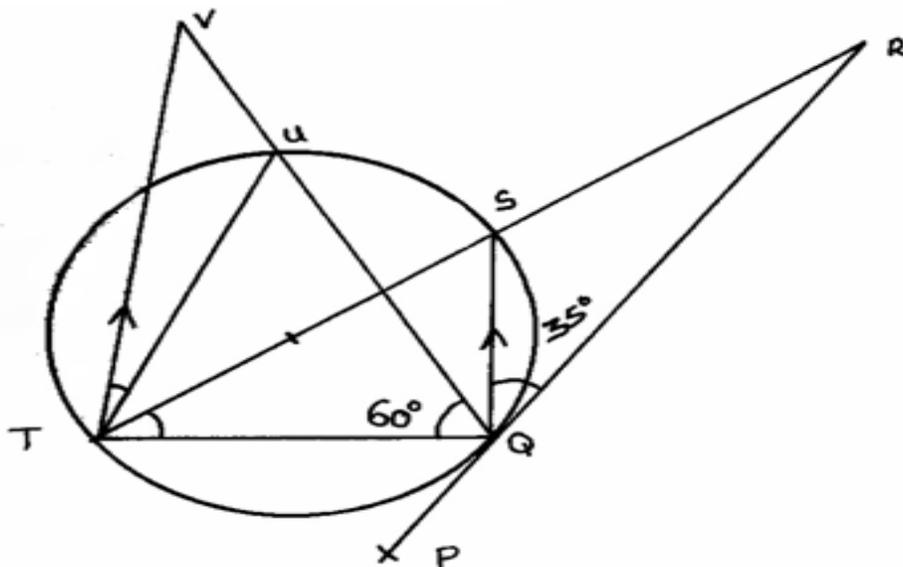
χ°	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°
$2\chi^\circ$	0	30	60	90	120	150	180	210	240	270	300	330	360
$\text{Cos } 2\chi^\circ$	1.00		0.50	0	-0.50		-1.00	-0.87		0	0.50		1.00
$-\frac{1}{2} \text{Sin } 2\chi^\circ$	0	-0.25		-0.50	-0.43		0	0.25	0.43		0.43	0.25	

- (b) On the grid provided and using the same axes, draw the graphs of $y = \text{Cos } 2\chi$ and $y = -\frac{1}{2} \text{Sin } 2\chi$ for $0^\circ \leq \chi \leq 180^\circ$. Use the scale: 1cm for 15° on the χ -axis and 2cm for 0.5 units on the y-axis. (5mks)

(c) Using the graph in (b):

- (i) Solve the equation $\text{Cos } 2\chi + \frac{1}{2} \text{Sin } 2\chi = 0$. (2mks)
 (ii) State the period of $y = -\frac{1}{2} \text{Sin } 2\chi$. (1mk)

20. In the figure below, PQR is the tangent to the circle at Q. TS is a diameter and TSR and QUV are straight lines. QS is parallel to TV. Angle $\text{SQR} = 35^\circ$ and $\text{TQV} = 60^\circ$.



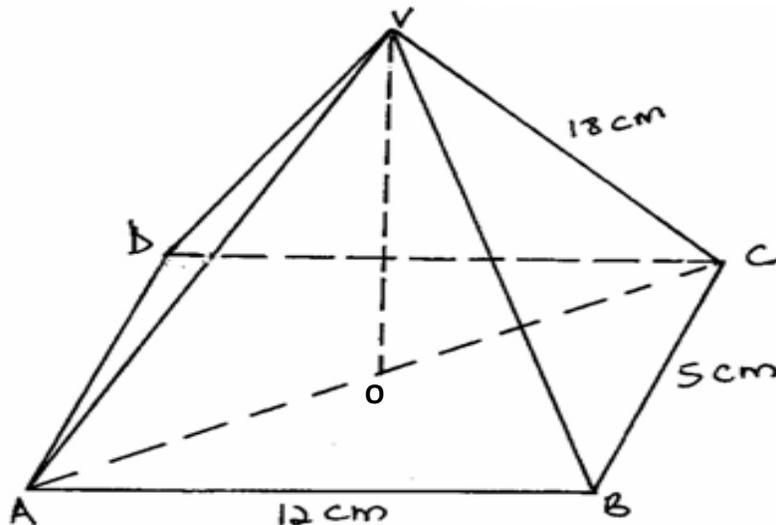
- (a) Find the following angles, giving reasons for each answer.
 (i) QTS. (3mks)
 (ii) QRS. (2mks)
 (iii) QVT. (2mks)

- (iv) UTV. (2mks)
 (v) QUT. (2mks)

21. A teacher had 5 red, 6 black and 9 blue pens in a box. The pens were all identical except for the colour.

- (a) If one pen is picked from the box, what is the probability that it is
 (i) Red. (1mk)
 (ii) Not black. (1mk)
- (b) The teacher asked a student to pick two pens from the box, one at a time, without replacement. Find the probability that
 (i) both pens are of the same colour. (3mks)
 (ii) they are of different colours. (2mks)
- (c) If the first student was allowed to take away two blue pens and another student was asked to pick two pens without replacement. What is the probability that the second student picked pens of same colour. (3mks)

22. In the figure below, VABCD is a right pyramid on a rectangular base. Point O is vertically below the vertex V. $AB = 12\text{cm}$, $BC = 5\text{cm}$ and $VA = VB = VC = VD = 18\text{cm}$.



Calculate

- (a) the height VO. (3mks)
 (b) the angle between
 (i) VC and the plane ABCD. (2mks)
 (ii) the planes VAB and ABCD. (2mks)
 (iii) the planes VAD and VBC. (3mks)

23. A uniform distributor is required to supply two sizes of skirts to a school: medium and large sizes. She was given the following conditions by the school.

- (i) The total number of skirts must not exceed 600.
 - (ii) The number of medium size skirts must be more than the number of large size skirts.
 - (iii) The number of medium size skirts must not be more than 350 and the number of large size skirts must not be less than 150. If the distributor supplied χ medium size and y large size skirts.
- (a) Write down, in terms of χ and y , all the linear inequalities representing the conditions above.

(4mks)

(b) On the grid provided, represent the inequalities in (a) above by shading the unwanted regions.

(3mks)

(c) The distributor made the following profits per skirt.

Medium size = Sh.300.

Large size = Sh.250

Draw a search line on the graph in (b) above and use it to determine the maximum profit. **(3mks)**

24. An aeroplane flies due East at an average speed of 500 knots from an airport P (5°N , 45°E) to another airport Q. The flight took $2\frac{1}{4}$ hours.

(a) Calculate:

- (i) the distance between P and Q in nautical miles, correct to one decimal place. **(2mks)**
- (ii) the position of airport Q. **(3mks)**
- (iii) the distance between P and Q in kilometers, correct to the nearest kilometer.

(Take radius of earth = 6370km). **(2mks)**

(b) The local time at P when the plane took off was 11.15am. What was the local time at Q when the plane landed? (Give your value to the nearest minute). **(3mks)**

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 5 PAPER 1

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your **NAME, SCHOOL and INDEX NUMBER** in the spaces provided above.
- b) **Sign** and write **date** of examination in the spaces provided.
- c) This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

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

$$8\frac{1}{2} - 6\frac{2}{3} \div \frac{4}{9}$$

$$\frac{2}{5} \text{ of } 6\frac{1}{4} + 1\frac{1}{4}$$

2. A tourist visited Kenya with 2500 U.S dollars and changed the U.S dollars into Kenya Shillings at a local bank in Kenya when the exchange rates at the time were as follows:

	Buying	Selling
1 U.S. Dollar	Shs. 78.45	Shs. 78.55
1 Sterling pound	Shs. 120.25	Shs. 120.45

- (a) How much did he get in Kenya shillings? (2mks)
- (b) While in Kenya, he used Shs. 80,000 and after his stay he converted the remaining amount into sterling pounds. Calculate, to 2 decimal places, the Sterling Pounds that he got (2mks)
- 3. The size of an interior angle of a regular polygon is 5 times the size of its exterior angle. Find the number of sides of this polygon. (3mks)

4. Given that in a right angled triangle, $\sin \theta = \frac{5}{12}$, find: (2mks)

$\cos (90^\circ - \theta)$

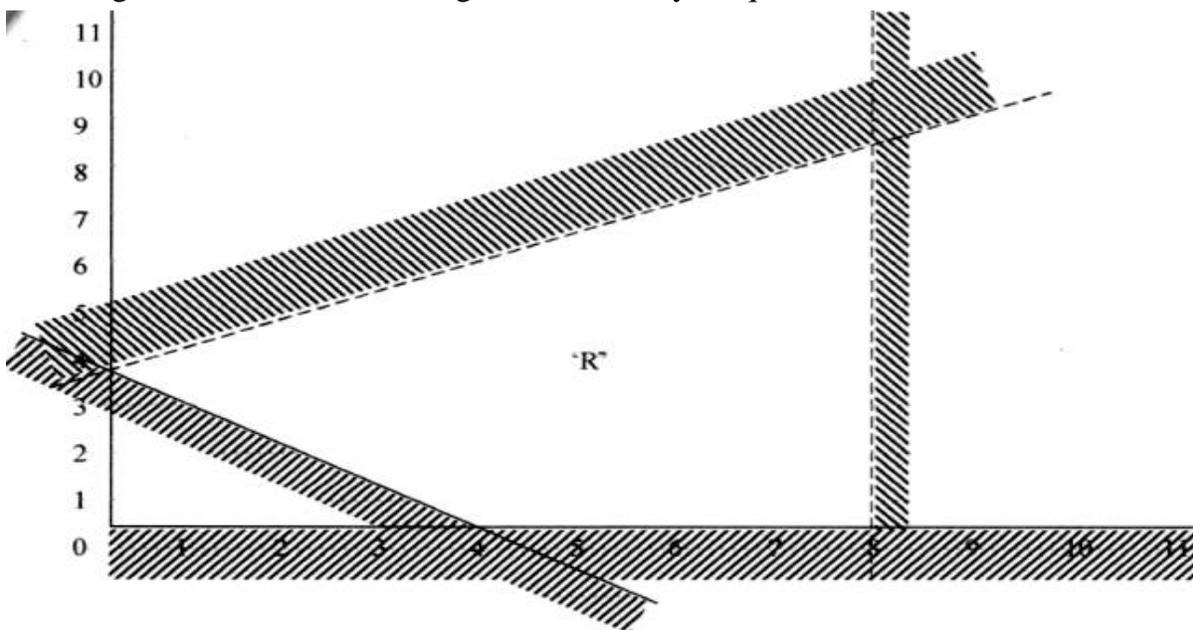
5. The column vectors of b, c and d are given as:

$$\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} \quad \begin{pmatrix} 4 \\ -2 \\ 3 \end{pmatrix} \quad \text{and} \quad \begin{pmatrix} 0 \\ 3 \\ -2 \end{pmatrix} \quad \text{respectively and}$$

that $P = b + 2c - d$

Express vector P as a column vector and hence calculate the magnitude of P. (3mks)

6. The diagram below shows the region enclosed by inequalities.



Determine the inequalities that defines the regions R. (3mks)

7. The diagonal of a rectangular flower garden is 20m. If the width of this garden is 8m, calculate its length and perimeter to 4 s.figures. (3mks)

8. Expand $(\sqrt{5} + \sqrt{3})(\sqrt{5} - \sqrt{3})$ hence or otherwise simplify by rationalising the denominator of

$$\frac{\sqrt{2}}{\sqrt{5} + \sqrt{3}} \quad \underline{\hspace{2cm}}$$

9. Given the matrix $y \begin{pmatrix} c & 0 \\ 4 & d \end{pmatrix}$

(a) Determine y^2 (1mk)

(b) If $y^2 = I$, determine the possible values of c and d. (2mks)

• •

10. Change 0.24 and 3.04 into fractions hence evaluate:

44 $\left(\frac{411}{0.24} \div 3.04 \right)$ leaving your answer as a fraction in its simplest form. (3mks)

12. Factorise $xy - zy - xw + zw$ hence simplify the expression completely. (3mks)

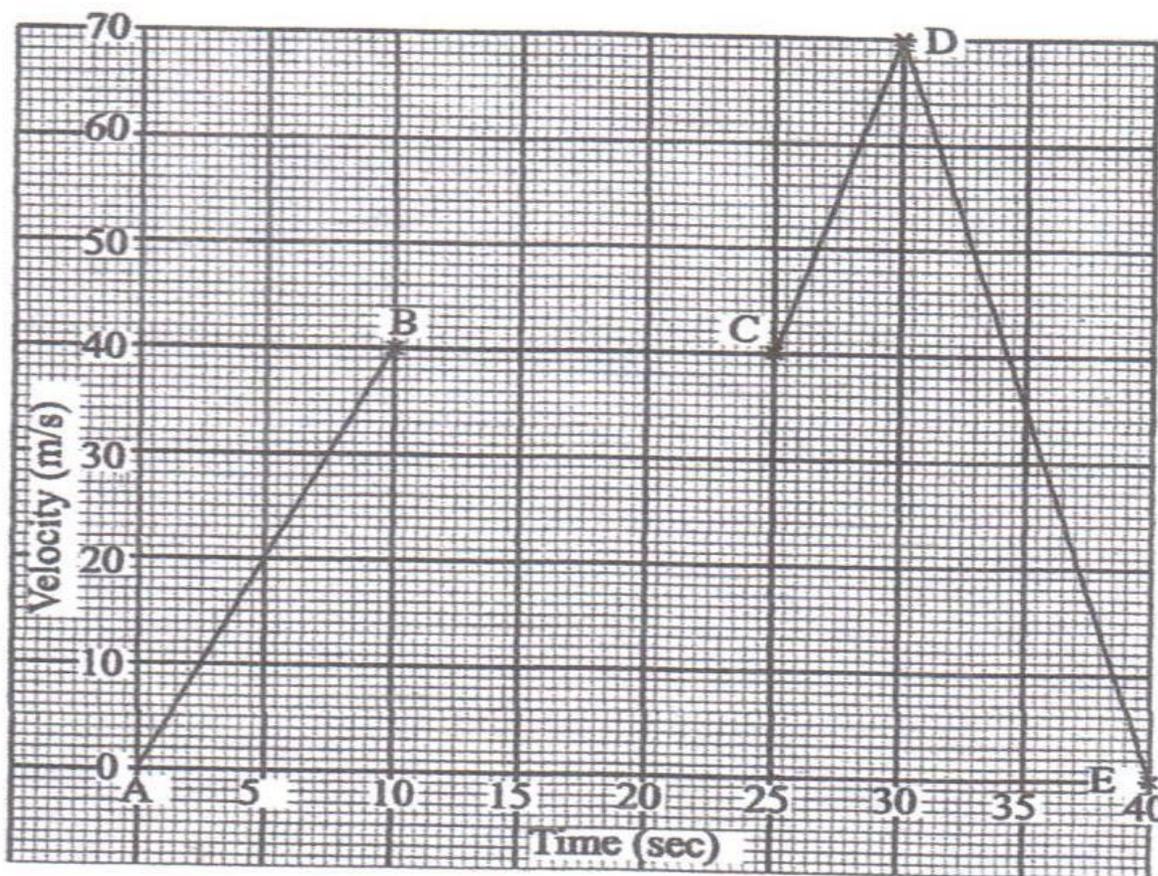
$$\frac{(xy - zy - xw + zw)(y + w)}{w^2 - y^2}$$

13. Pipe Q and R can fill a tank in 20 minutes and 30 minutes respectively. Pipe T can empty the full tank in 40 minutes. Starting with an empty tank, how long does it take to fill the tank if:

a) All the three pipes are open? (1mk)

b) Pipe R is closed after 10 minutes? (3mks)

The gradient of the curve is $ax^2 + 3x$ at $x = 2$ is 8. Find the value of a. (2mks)



14. The graph below is a velocity time graph. Determine the acceleration in the sections:

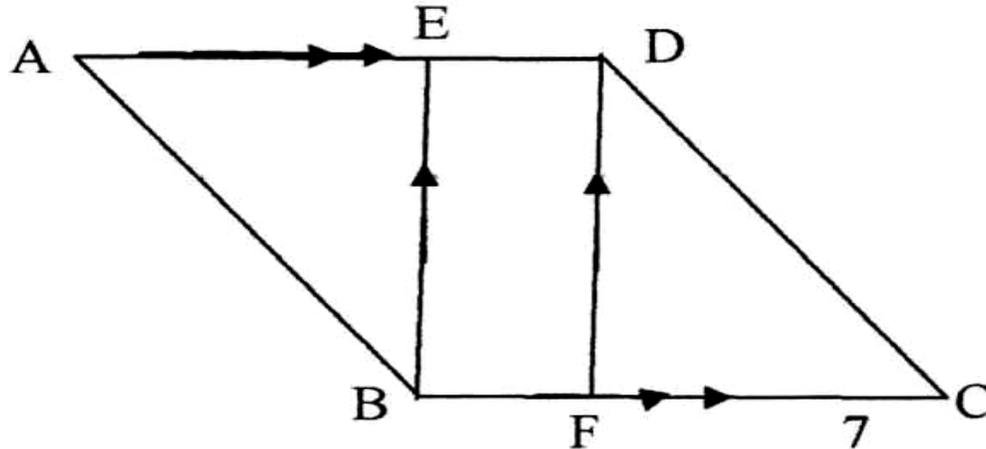
(a) (i) CD (1mk)

(ii) DE (1mk)

(b) Calculate the total distance covered. (2mks)

15. How many terms of the arithmetic series 2, 5, 8, 11 May be added to make their sum 301? (3mks)

16. The diagram ABCD is a parallelogram. Line BE is parallel to line FD.

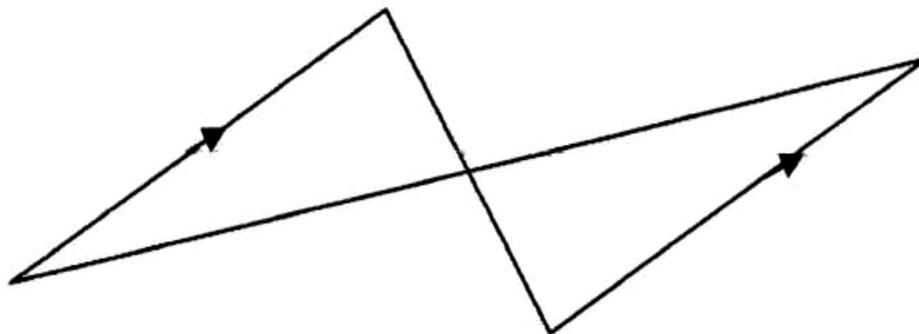


Show that triangles ABE and CDF are congruent. Show that triangles ABE and CDF are congruent. (3mks)

SECTION II (50 MARKS)

Answer ONLY five questions in this section

17. The ratio of a spherical balloon increases by 4%. Find the percentage increase in its;
- a) Surface area. (2mks)
 - b) Volume (2mks)
 - c) In the figure below, SP is parallel to QR.



- (i) Show that triangles SPX and RQX are similar. (2mks)
 - (ii) If $PS = 8\text{cm}$, $PX = 6\text{cm}$, $SX = 4\text{cm}$ and $RX = 3\text{cm}$, find the length of RQ and QX. (4mks)
18. A and B are two points 10cm apart.
- (b) Draw a circle centre A, radius 2cm and a circle centre B, radius 4cm. (2mks)
 - (c) Draw a transverse common tangent to the two circles. (5mks)
 - (d) Find by calculation the length of a direct common tangent correct to 3 significant figures. (3mks)

19. A metallic cuboid 8cm by 10cm by 14cm is melted. Half of it is used to make a cylinder of radius 4.2cm, the remaining is used to make a sphere. Determine using $\pi = \frac{22}{7}$:-
- (a) The height and surface area of the cylinder to 1 decimal place. (5mks)
 - (b) The radius and surface area of the sphere correct to 1 decimal place. (5mks)

20. (a) Complete the table below to 2 decimal places for $y = -x^3 - x^2 + 3x + 1$

x	-4	-3	-2.5	-2	-1.5	-1.0	-0.5	0	0.5	1.0	1.5	2.0
y						-2						

- (b) On the grid provided, draw the graph for $y = -x^3 - x^2 + 3x + 1$ for $-4 < x < 3$. (3mks)
 - (c) Use the graph to solve the equation $-x^3 - x^2 + 3x + 1 = 0$ (2mks)
 - (d) By drawing a suitable straight line on the graph, solve $-x^3 - x^2 + 3x + 1 = -2x$ (3mks)
21. The table below shows the masses of population randomly chosen in a certain town in kilogrammes.

Mass group	Number of people
0 – 2	3
2 – 5	6
5 – 12	12
12 – 20	24
20 – 35	30
35 – 60	20
60 – 90	5

- (i) Represent this information on a histogram. (5mks)
 - (ii) Draw a frequency polygon. (2mks)
 - (iii) Calculate the mean of the population in this town. (3mks)
22. A school has two students whose age difference is 9. Twice the sum of their ages is equal to the age of their teacher.
- a) By letting the age of the younger student be y , write an expression of the:
 - b) Age of the elder student. (1mk)
 - c) Age of their teacher. (1mk)
 - iii) If in 19 years time, the product of the ages of the two students is equal to 14 times the age of their teacher;
 - iv) Form an equation in y and hence determine the present possible age of the younger student. (4mks)
 - v) Determine the possible age of the elder student in 19 years time. (2mks)
 - vi) Find the possible age of the teacher. (2mks)

23. A quadrilateral ABCD has the coordinates A (1,1), B(4,1), C(5,3) and D(2,3).

a) On the graph provided draw the quadrilateral ABCD.

(e) $A^I B^I C^I D^I$ is the image of ABCD under a transformation matrix represented by:

R $\begin{pmatrix} = & 0 \\ 1 & 0 \end{pmatrix}^{-1}$ write down the coordinates of $A^I B^I C^I D^I$ and on the same

grid draw quadrilateral $A^I B^I C^I D^I$.

(3mks)

(f) $A^{II} B^{II} C^{II} D^{II}$ with coordinates $A^{II}(1,-2)$, $B^{II}(4,1)$, $C^{II}(5,-4)$, $D^{II}(2,-7)$ is the image of $A^I B^I C^I D^I$ under transformation whose matrix is T. Find matrix T.

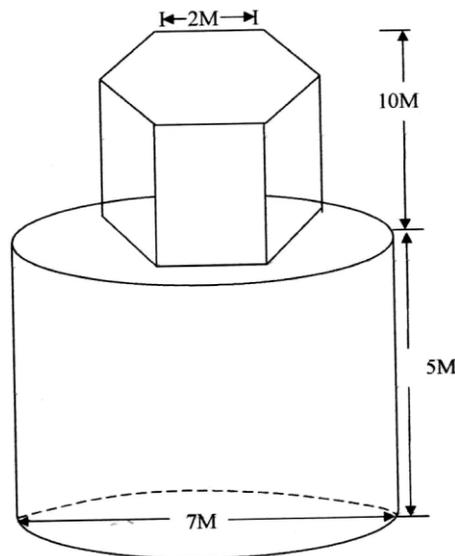
(4mks)

(g) (i) On the same grid, draw quadrilateral $A^{II} B^{II} C^{II} D^{II}$.

(1mk)

(ii) A single transformation matrix K maps ABCD onto $A^{II} B^{II} C^{II} D^{II}$. Determine the matrix K. (2mks)

24. The diagram below represents a community water tank made up of cylindrical and regular hexagonal parts. The diameter and the height of the cylindrical part are 7m and 5m respectively. The side of the regular hexagonal face is 2m and the height of the hexagonal part is 10m. (Take $\pi = \frac{22}{7}$)



(a) Determine:-

(i) Cylindrical part.

(2mks)

(ii) Hexagonal part.

(3mks)

(iii) The whole tank.

(2mks)

(b) An identical structure is to be built with a hollow cross-sectional area of $1.5m^2$ and mass of 440kgs. Calculate the density of this structure.

(3mks)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 5 PAPER 2

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your **NAME, SCHOOL and INDEX NUMBER** in the spaces provided above.
- b) **Sign** and write **date** of examination in the spaces provided.
- c) This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

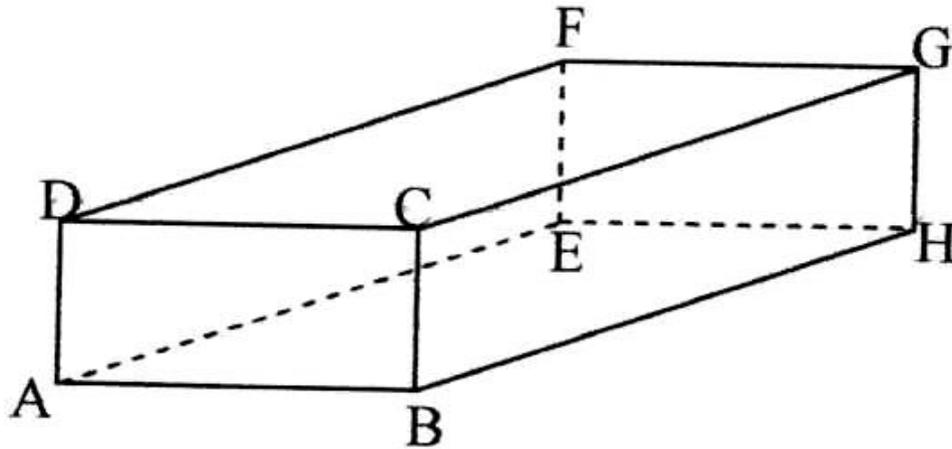
QUESTIONS

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1. Use logarithm table to evaluate: (4mks)

$$\frac{0.7493 \cos^2 16.335^\circ}{\text{Log } 559.3 + 10 \tan 3^\circ}$$
2. What must be added to $\frac{1}{4}x^2 + \frac{1}{9}$ in order to make it a perfect square? (2mks)
3. Expand $(x - a/x^2)^6$ in ascending powers of x, up to the term independent of x. If this independent term is 1215, find the value of a. (3mks)
4. An angle of 1.75 radians at the centre of a circle subtends an arc of length 24.8cm. Find the diameter of the circle. (2mks)
5. ABCDEFG is a rectangular box in which AB, AD, AE are 3cm, 4cm and 5cm long respectively. M is the midpoint of FG.



Find the length AM and determine the inclination of AM to EFGH. (3mks)

6. Use square roots, reciprocals and square tables to evaluate the expression: (3mks)

$$(0.00546667)^{1/2} + \left(\frac{3}{0.043279} \right)^2$$

7. A member of a county assembly sold his car for shs. 1,250,000 and deposited this money in a savings account in one of the banks in Kaiboi town. The banks paid 18%p.a compounded quarterly. After two years, the member of the county assembly withdrew a half of the amount from the account. He left the rest for a further two and a half years. Calculate the total interest he earned in the 4½ year period. (4mks)

8. Given that x° is an angle in the third quadrant such that $16\sin^2x^\circ + 4\cos x^\circ = 10$. Find $\tan x$. (3mks)

9. Two variables P and L are such that P varies partly as L and partly varies inversely as the square root of L.

a) Determine the relationship between P and L given that L = 16 when P = 500 and L = 25 when P = 800. (3mks)

b) Hence find P when L = 81. (1mk)

10. The angle of elevation from the base of a wall to the top of the flag post 70 metres away is 62°. The angle of depression from the top of the flag post to the wall is 25°.

Calculate:-

a) The height of the flag post. (1mk)

b) The height of the wall. (2mks)

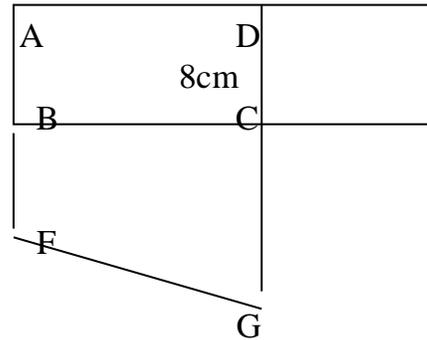
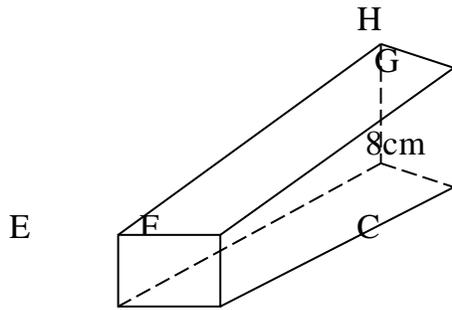
11. Given that $\log 3 = 1.583$ and $\log 5 = 2.322$, evaluate without using table or calculator:

$\log 135$ (2mks)

12. Two values of a and b are such that $7.1 \leq a \leq 7.3$ and $12.5 \leq b \leq 12.7$. Calculate the percentage error in b, giving your answer correct to 2 decimal places. (3mks)

13. The following figure is a solid and its incomplete net.

(i) Complete and label the net.



b) Hence or otherwise, find the surface area of the solid. (2mks)

Solve for x in the equation: (3mks)

$$9^{x+1} - 54 = 3^{2x+1}$$

14. The points P (-6, 5) and Q (2, -1) are the ends of a diameter of a circle centre M.

Determine:-

a) The coordinates of M. (1mk)

b) The equation of the circle in the form $x^2 + y^2 + ax + by + c = 0$. (2mks)

15. Solve the simultaneous equations: (3mks)

$$y + 2x + 1 = 0$$

$$x^2 + xy = -6$$

SECTION II (50 MARKS)

Answer ONLY FIVE questions in this section in the spaces provided

16. Mr. Maiyo, who works in a sugarcane plantation, owns a bicycle which he sometimes rides to work. Out of the 21 working days in a month, he rides to work for 18 days. If he rides to work, the probability that he is bitten by a rabid dog is $\frac{4}{15}$ otherwise it is only $\frac{1}{13}$. When he is bitten by the dog, the probability that he will get treated is $\frac{4}{5}$ and if he does not get treated, the probability that he will get rabies is $\frac{5}{7}$.

a) Draw a tree diagram using the given information. (3mks)

b) Using the tree diagram in (a) above, determine the probability that;

(i) Maiyo will not be bitten by a rabid dog. (2mks)

(ii) He will get rabies. (3mks)

(iii) He will not get rabies. (2mks)

17. Tax rates in operation in a certain year in Kenya are as given in the table below.

Income	Tax Rates
(kf p.a.)	(sh. Per £)
1 – 4,512	2
4,513 – 9,024	3
9,025 – 13,536	4
13,537 – 18,048	5
18,049 – 22,560	6
Over 22,560	6.5

a) Mr. Koech pays Ksh. 2,172 P.A.Y.E. monthly. He was entitled to a house allowance of Ksh. 5,000 and a medical allowance of Ksh. 2,000 and gets a monthly tax relief of Ksh. 1,093. Calculate his monthly basic salary. (8mks)

b) Mr. Koech’s other deduction per month were as follows:-

NHIF – Kshs. 320

Co-op Loan – Kshs. 4,000

Calculate Koech’s net pay per month. (2mks)

18. Using a ruler and a pair of compasses only:

(a) Three points A, B and C are vertices of a triangle ABC such that AB = 8cm, BC = 5cm and AC = 6.4cm. Draw triangle ABC with AB as the base. (2mks)

Construct the locus of P such that it is equidistance from the sides AB, BC and AC. (3mks)

(b) On the opposite side of point C on AB, construct the locus L such $\angle ALB = 60^\circ$. (3mks)

(c) Hence determine the area of the major sector bounded by the locus L. (2mks)

19. (a) Complete the table below for the functions $y = 4 \cos 2x$ and $y = 3 \sin (2x + 30^\circ)$ giving the values to 1 decimal place. (2mks)

20.

	-30°	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°
$4 \cos 2x$	2.0	4.0	2.0		-4.0	-2.0		4.0	2.0		-4.0
$3 \sin (x+30^\circ)$	0.0	1.5	2.6	3.6		1.5	0		-2.6		-2.6

(b) Draw the graphs of $y = 4 \cos 2x^\circ$ and $y = 3 \sin (x + 30^\circ)$ for $-30 \leq x \leq 270^\circ$ on the same axes. Use a scale of 1cm for 30° on x-axis and 1cm for 1 unit on the y-axis (4mks)

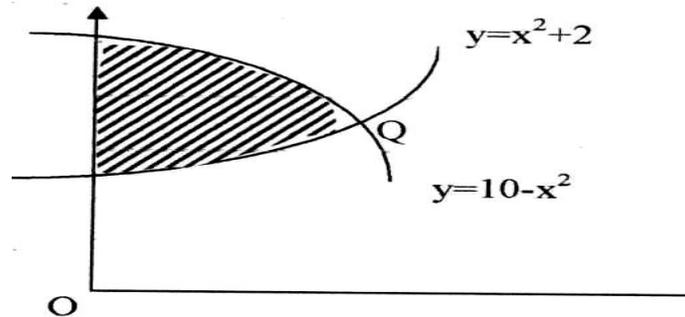
(c) Use your graphs in (b) above to solve the equation:

(i) $3 \sin (x + 30^\circ) - 4 \cos 2x = 0$. (2mks)

(ii) $\sin (2x + 30^\circ) + 1 = 0$ (1mk)

(d) Determine the period of the function $y = 4 \cos 2x$. (1mk)

21. An aircraft takes off from the airport X(65°N, 36°E) and flies by the most direct route to another airport Y (R°N, 144°W) covering a distance of 4800nm.
- a) Find R° (1mk)
- b) If instead, the aircraft had flown along the meridian 144°W to point Y, find how much further it would have flown. (5mks)
- © Two aircrafts takes off from X to Y at the same time. Given that both fly at the same speed and one flies on the direct route and the other takes the route described in (b) above, state the position of the second aircraft when the first is landing at Y. (2mks)
22. The diagram shown below represents the area between the curves $y = x^2 + 2$ and $y = 10 - x^2$ and y-axis.



Find:-

- (a) The coordinates of Q (a point of intersection) (1mk)
- (b) The area of the shaded region, by use of mid-ordinate rule with 8 ordinates (6mks)
- (c) Use integration method to calculate the same area as in (b) above. (3mks)

23. Two quantities of p and r are given below.

P	1.2	1.5	2.0	2.5	3.5	4.5
r	1.58	2.25	3.39	4.74	7.86	11.5

- (a) State the linear equation connecting p and r. (1mk)
- (b) Using the scale 2cm to represent 0.1 units on both axes, draw a suitable straight line graph on the grid provided;
Hence estimate the value of k and n. (8mks)
- (c) Write an equation connecting p and n. (1mk)
24. An aircraft leaves point A and flies on a bearing of 020° to a second point B, which is 600km from A. From B, the aircraft then flies on a bearing of 320° to a third point C which is 1000km from B. The aircraft then flies directly back to A from C at a speed of 200km/hr. By scale drawing, find:-
- (c) Time taken to fly directly from C to A. (6mks)
- (d) The bearing in which it would fly from C to A. (1mk)
- (e) Locate point D on a bearing 170° from C and 280° from A. Calculate BD in kilometers. (2mks)
- (f) What is the bearing of D from B? (1mk)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 6 PAPER 1

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

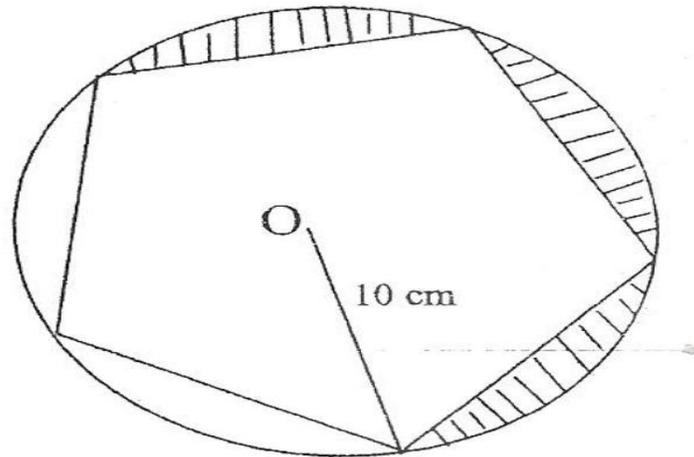
- Write your **NAME**, **SCHOOL** and **INDEX NUMBER** in the spaces provided above.
- Sign** and write **date** of examination in the spaces provided.
- This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

QUESTIONS

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

- State the name of the figure sketched (1 mark)
- Without using log tables or a calculator; solve (3marks)
 $\log \frac{1}{4} + \log 64$
 $\log 32 - \log \frac{1}{8}$
- The sum of interior angles of two regular polygons of sides; n and $n + 2$ are in the ratio 3:4
Calculate the sum of the interior angles of the polygon with n sides. (4 marks)
- A group of 10 soldiers set off with enough food to last 7 days. After 4 soldiers deserted. How many more days will the food last for the remaining soldiers? (3 marks)
- The diagram below, not drawn to scale, is a regular pentagon circumscribed in a circle of radius 10cm at centre O



Find

- (a) The length of any side of the pentagon (2 marks)
- (b) The area of the shaded region (2 marks)
- 6. A line whose gradient is positive is drawn on the Cartesian plane and its equation is $x - y\sqrt{3} = -\sqrt{3}$. Calculate the angle formed between the line and x-axis. (3 marks)
- 7. Find all the integral values of x which satisfy the inequality $3(1 + x) < 5x - 11 < x + 45$ (3 marks)
- 8. An arc subtends an angle of 0.9 radians at the centre of a circle whose radius is 13cm. Find the length of the arc. (2 marks)
- 9. The scale of a map is given as 1:50,000. Find the actual area in hectares of a region represented by a triangle of sides 6cm by 7cm (Give your answer to the nearest whole number). (3 marks)
- 10. Two passenger trains A and B, 240m apart are travelling at 164km/h and 88km/h respectively towards each other on a straight railway line. Train A is 150 metres long, while B is 100 metres long. Determine the time in seconds that elapses before the two trains completely pass each other. (4 marks)
- 11. Given that $\cos A = 5/13$ and angle A is acute, find the value of $2 \tan A + 3 \sin A$. (3 marks)
- 12. Given that $4x^2 - 32x - 20 + k$ is a perfect square, find k. (3 marks)
- 13. A watch which loses a half-minute every hour was set to read the correct time at 0545h on Monday. Determine the time, in the 12 hour system, the watch will show on the following Friday at 1945h. (3 marks)
- 14. Use the exchange rates below to answer this question.

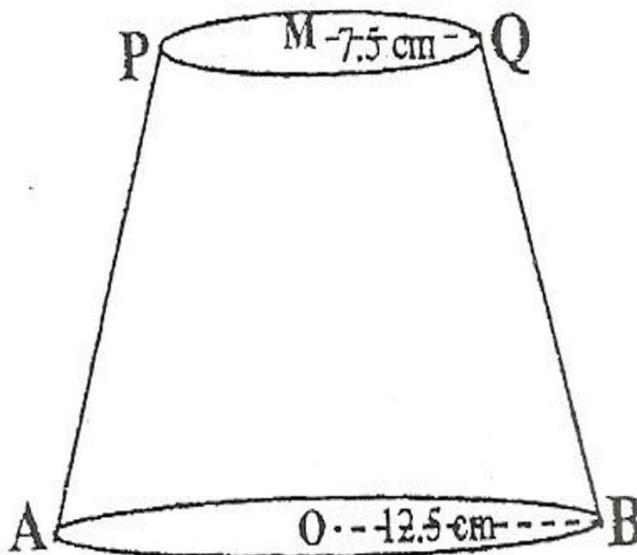
	Buying	Selling
1 US dollar	63.00	63.20
1 UK £	125.30	125.95

15. A tourist arriving in Kenya from Britain had 9600 UK Sterling pounds (£). He converted the pounds to Kenya shillings at a commission of 5%. While in Kenya, he spent $\frac{3}{4}$ of this money. He changed the balance to US dollars after his stay. If he was not charged any commission for this last transaction, calculate to the nearest US dollars, the amount he received. (3 marks)

SECTION II (50 MARKS)

Answer only Five questions from this Section

16. PQCB shows a frustum of a cone. The radius of the top and bottom circular parts of the frustum are 7.5cm and 12.5cm respectively, centres M and O are 10cm apart.



- a) Calculate the slant length QB of the frustum correct to d.p. (1 mark)
 - b) Calculate the volume of frustum (5 marks)
 - c) If the frustum is of solid metal and is melted down and recast into a solid cylinder having a radius of 10.5cm, calculate.
 - (i) The height of cylinder correct to 3 d.p. (3 marks)
 - (ii) The surface area of the cylinder (2 marks)
17. a) Complete the table below giving your values correct to 2 decimal places. (2 marks)

x°	-90°	-75°	-60°	-45°	-30°	-15°	0°	15°	30°	45°	60°	75°	90°
$3\cos 2x^\circ$	-3	-2.6 ⁰		0	1.50		3	2.60		0	-1.50		-3
$\sin (2x+30^\circ)$	-0.5		-1	-0.87		0	0.5		1	0.87		0	-0.5

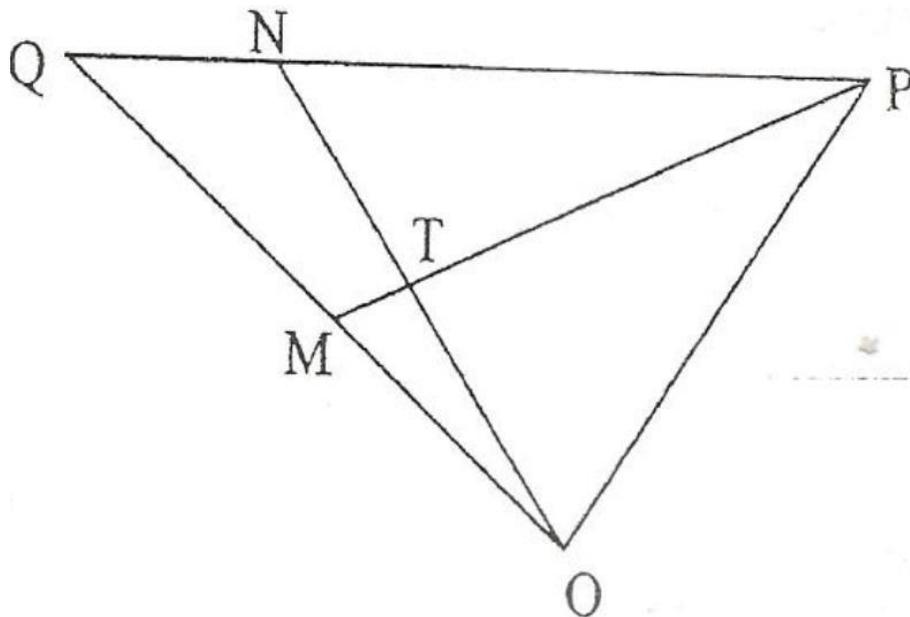
b) On the grid provided draw, on the same axes the graph of $y = 3 \cos 2x$ and $y = \sin (2x + 30^\circ)$ for interval $-90^\circ \leq x \leq 90^\circ$. Take the scale: 1cm represent 15° on x-axis and 2cm to represent 1 unit on the y-axis. (4 marks)

(c) Use the graph in (b) above to solve the equation.

(i) $3\cos 2x = \sin (2x + 30)$ (2 marks)

(ii) $6\cos 2x + 5 = 0$ (2 marks)

18. The diagram below shows a triangle OPQ in which $QN:NP = 1:2$, $OT:TN = 3:2$ and M is the midpoint of OQ.



a) Given that $\vec{OP} = p$ and $\vec{OQ} = q$, Express the following vectors in terms of p and q

i) \vec{PQ} (1 mark)

ii) \vec{ON} (2 marks)

iii) \vec{PT} (2 marks)

iv) \vec{PM} (1 mark)

b) (i) Show that point P, T and M are collinear (3 marks)

(ii) Determine the ratio MT: TP (1 mark)

19. The displacement s meters of a particle moving along a straight line after t seconds is given

by $S = 6t - \frac{t^3}{3} - \frac{t^2}{2}$ (3 marks)

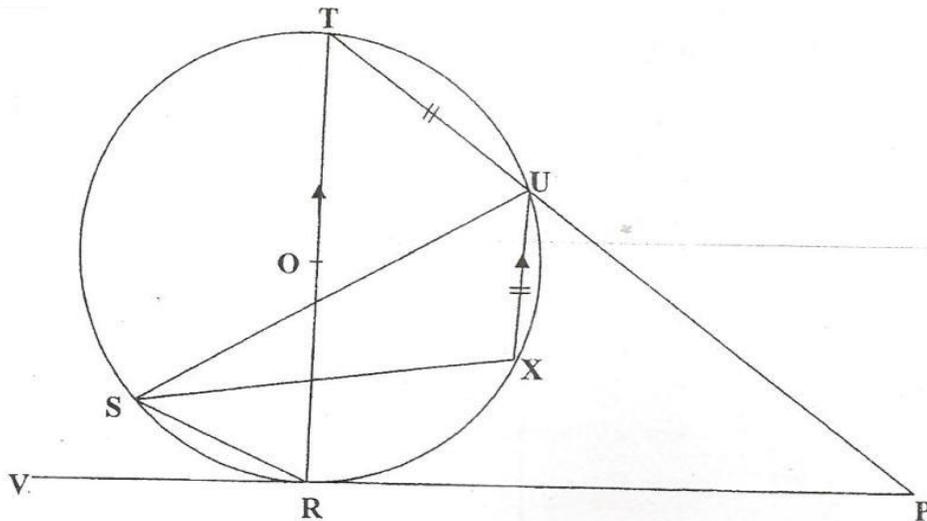
(b) Calculate:

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

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

(d) Calculate the maximum speed attained (2 marks)

20. Three ports A, B and C are situated in such a way that port A is 140km on a compass bearing of $N65^{\circ}E$ from port B. Port C is 200km on a compass bearing of $S32^{\circ}E$ from A. A ship S is docked in the sea, 86km on a bearing of 190° from port B.
- (a) Using a scale of 1cm to represent 20km, draw a diagram to show the position of ports A, B, C and ship S. **(4 marks)**
- (b) Using your diagram find
- (i) The distance between the ship and the port A **(1 mark)**
- (ii) The bearing of the ship from port C **(1 mark)**
- (iii) The distance from B to C **(1 mark)**
- (iv) Find how far C is south of A **(2 marks)**
- (v) Compass bearing of S from A **(1 mark)**
21. In the figure below, O is the centre of the circle TOR is the diameter and PRV is tangent to the circle at R.



Given that $\angle SUR = 25^{\circ}$, $\angle URP = 60^{\circ}$, $TU = UX$ is parallel to the diameter; giving reasons calculate;

- a) $\angle TOU$ **(2 marks)**
- b) $\angle XUP$ **(2 marks)**
- c) $\angle STR$ **(2 marks)**
- d) Reflex $\angle SXU$ **(2 marks)**
- e) $\angle RPU$ **(2 marks)**

23. At an agricultural Research Centre, the length of a sample of 50 maize cobs were measured and recorded as shown in the frequency distribution table below.

Length	10-11	12-13	14-15	16-19	20-26
No. of Labs	6	8	11	18	7

- a) Calculate the mean (3 marks)
- b) Draw a histogram to represent the above information (5 marks)
- c) (i) State the class in which the median length lies (1 mark)
 (ii) Draw a vertical line, in the histogram, showing where the median length lies (1 mark)

24. A youth group decided to raise Ksh.480,000 to buy a piece of land costing Kshs.80,000 per hectare. Before the actual payment was made, four of the members pulled out and each of those remaining had to pay an additional Kshs.20,000.

- a) If the original number of the group members was x , write down;
 - (i) An expression of how much each was to contribute originally. (1 mark)
 - (ii) An expression of how the remaining members were to contribute after the four pulled out. (1 mark)
- b) Determine the numbers who actually contributed towards the purchase of the land. (5 marks)
- c) Calculate the ration of the supposed original contribution to the new contribution. (1 mark)
- d) If the land was sub-divided equally, find the size of land each member got. (2 marks)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 6 PAPER 2

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your **NAME**, **SCHOOL** and **INDEX NUMBER** in the spaces provided above.
- b) **Sign** and write **date** of examination in the spaces provided.
- c) This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1. Find the percentage error in estimating the volume of a cone whose radius is 3.4cm and height is 8cm. (3 marks)
2. Make n the subject of the formula $P = ar^2 - s)^{1/n}$ (3 marks)
3. Solve the equation $2\cos^2x - \sin x = 1$ for $-180^\circ \leq x \leq 180^\circ$. (4 marks)
4. When $N = 1$ and $M = 5$ when $N = \frac{1}{2}$
- (a) Find the equation connecting M and N. (2 marks)
- (b) Calculate the value of M when $N = \frac{2}{3}$ (1 mark)
5. Solve for x in the equation $\frac{1}{2} \log_2 81 + \log^2 (x^2 - x/3) = 1$ (3 marks)

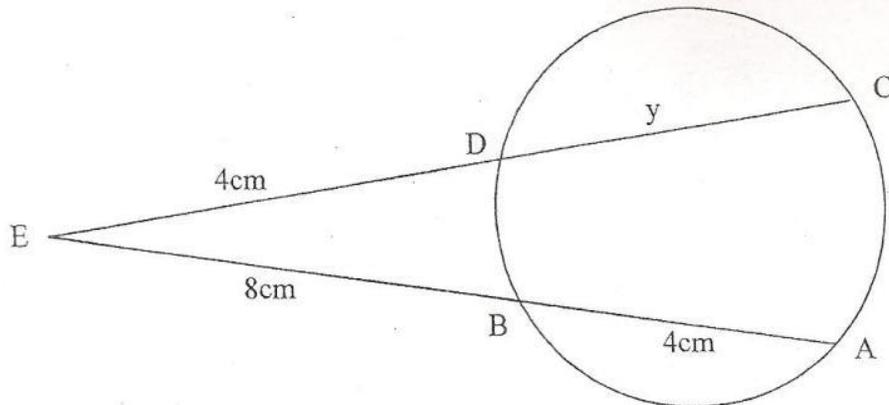
6. Use logarithms to evaluate $\left(\frac{34.65 \times 0.451}{4.675} \right)^{-1/3}$ (4 marks)

7. Table below is part of tax table for annual income for the year 2010.

Taxable income in K£4 p.a.	Rate in Kshs. Per K£
Under K£4201	
From K£4201 but under K£8401	
From K£8401 but under K£1261	

In the year 2010, the tax on Oyugi’s annual income was Ksh.12,000. Calculate Oyugi’s annual income in K£. (3 marks)

8. (a) Expand $(1 - 2x)^6$ upto the term in x^3 . (1 mark)
 (b) Use the expansion to evaluate $(1.02)^6$ to 4 decimal places. (2 marks)
9. Given that $OA = 2i + 5k$ and $OB = 7i - 5j$. A point T is on B such that $2AT = 3TB$. Calculate the magnitude of OT to 4 significant figures. (3 marks)
10. Find the quartile deviation for the set of data below. (2 marks)
 16, 18, 10, 8, 5, 11, 4 and 7
11. In the figure below, line $AB = 4\text{cm}$, $BE = 8\text{cm}$ and $DE = 4\text{cm}$. Find the value of y . (2 marks)



12. Solve the following simultaneous inequalities and state all integral values for the solution.

$$\frac{x-3}{3} < 1$$

$$3x + 1 \geq -17$$

(2 marks)

13. The curve $y = ax^3 - 3x^2 - 2x + 1$ has the gradient 7 when $x = 1$. Find the:

- (i) Value of a
 (ii) Equation of the tangent to the curve at $x = -1$ (3 marks)

14. Without using a calculator $\frac{\sqrt{252} + \sqrt{72}}{\sqrt{32} + \sqrt{28}}$, leaving the answer in the form

$$a\sqrt{b} + c$$

where a, b and c are integers. (4 marks)

15. A mixture contains two powders P and Q with masses in the ration 3: 11. If the mixture costs sh.670 per kg and powder P costs sh.560 per kg, find the cost of a kg of powder Q. (3 marks)

16. Find the radius and the centre of a circle whose equation is $3x^2 + 3y^2 + 18y = 12x - 9 = 0$ (3 marks)

SECTION 11 (50 Marks)

Answer any five questions from this Section.

17. In driving to work, Buma has to pass through three sets of traffic lights. The probability that he will have to stop at any of the lights is $\frac{3}{4}$
- (a) Draw a tree diagram to represent the above information. **(2 marks)**
- (b) Using the diagram, determine the probability that on any one journey, he will have to stop at:
- (i) All the three sets. **(2 marks)**
- (ii) Only one of the sets **(2 marks)**
- (iii) Only two of the sets **(2 marks)**
- (iv) None of the sets. **(2 marks)**
18. (a) Using a ruler and pair of compasses only, construct triangle ABC in which AB = 9cm, AC = 8cm and angle BAC = 60° . **(2 marks)**
- (b) On the same side of AB as C, draw the locus of a point such that angle APB = 60° **(3 marks)**
- (c) A region T is within the triangle ABC such that AT > 4cm and angle ACT \geq angle BCT. Show the region T by shading it. **(5 marks)**
19. Three consecutive terms in a geometric progression are 3^{2x-1} , 9^x and 81 respectively.
- (a) Calculate the value of x. **(3 marks)**
- (b) Find the common ratio of the series. **(2 marks)**
- (c) Calculate the sum of the first 10 terms of the series. **(2 marks)**
- (d) Given that the fifth and the seventh terms of this G.P form the first two consecutive terms of an arithmetic sequence, Calculate the sum of the first 20 terms of the arithmetic sequence **(3 marks)**
- (a) Sketch the curve of $y = x^2 - 4$ **(2 marks)**
- (b) Calculate the area bounded by the curve $y = x^2 - 4$, the x – axis, the lines $x = 1$ and $x = 4$ by using the trapexoidal rule with 6 equal strips. **(3 marks)**
- (c) Calculate the exact area in (b) above using the method of integration. **(4 marks)**
- (d) Find the percentage error in the area in (b) above. **(1 mark)**
21. A and B are two points on the latitude 40°N . The two points lie on the longitudes 20°W and 100°E respectively.
- (a) Calculate:
- (i) The distance from A to B along a parallel of latitude. **(3 marks)**
- (ii) The shortest distance from A to B along a great circle. **(4 marks)**
- (b) Two planes P and Q left A for B at 400 knots and 600 knots respectively. If P flew along the great circle and B along parallel latitude, which one arrived earlier and by how long. Give your answer to the nearest minute (Take $R = 6370\text{ km}$ and $\pi = 22/7$). **(3 marks)**
22. (a) Complete the table below for the equation $y = x^3 - 2x^2 - 4x + 7$. **(2 marks)**

x	-3	-2	-1	0	1	2	3	4
y	-26	-1		7		-2		23

(b) Using the scale 1cm to represent 1 unit on the x – axis and 1 unit to represent 5 units on the y – axis, draw the graph of $y = x^3 - 2x^2 - 4x + 7$. **(3 marks)**

(c) Use your graph to estimate the roots of the equation $x^3 - 2x^2 - 4x + 7 = 0$ **(1 mark)**

(d) By drawing appropriate straight lines, use your graph to solve the equations.

(i) $x^3 - 2x^2 - 4x + 2 = 0$ **(2 marks)**

(ii) $x^3 - 2x^2 - 3x + 3 = 0$ **(2 marks)**

23. The cash price of a laptop was Kshs.60,500. On hire purchase terms, a deposit of Ksh.8,000 was paid followed by 11 monthly installments of Kshs.6000 each.

(a) Calculate:

(i) The cost of a laptop on hire purchase terms. **(2 marks)**

(iii) The percentage increase of hire purchase price compared to the cash price. **(2 marks)**

(b) An institution was offered a 5% discount when purchasing 25 such laptops on cash terms. Calculate the amount of money paid by the institution. **(2 marks)**

(c) Two other institutions X and Y, bought 25 such laptops each. Institution Y bought the laptops on cash terms with no discount by securing a loan form a bank. The bank charged 12% p.a compound interest for two years. Calculate how much more money institution Y paid than institution X.

(4 marks)

24. A manager wishes to hire two types of machine. He considers the following facts.

Machine type	Number of men operators	Floors space	Hourly profit
A	4	2	4
B	3	3	8

He has a maximum of 24m² of floor space and a maximum of 36 men available. In addition he is not allowed to hire more machines of type B than of type A.

(a) If he hires x machines of type A and y machines of type B, write down all the inequalities that satisfy the above conditions. **(3 marks)**

(b) On the grid provided, draw the inequalities in part (a), above and shade the unwanted region. **(3 marks)**

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 7 PAPER 1

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your **NAME, SCHOOL and INDEX NUMBER** in the spaces provided above.
- b) **Sign** and write **date** of examination in the spaces provided.
- c) This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

QUESTIONS

SECTION I:(50 MARKS)

Answer all the question in this section in the spaces provided:

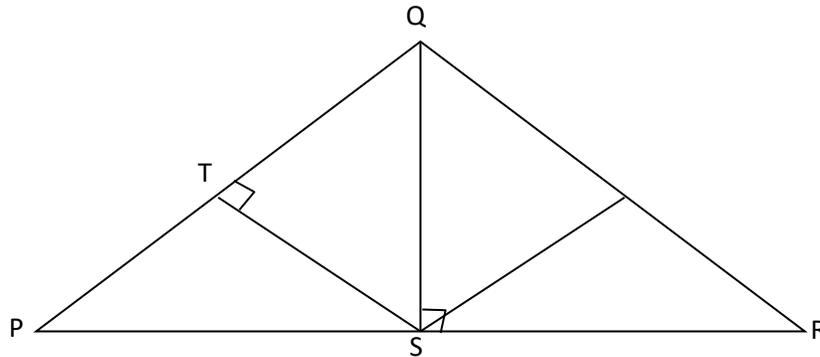
1. Evaluate:
$$\frac{-12 \div (-3) \times 4 - (-20)}{-6 \times 6 \div 3 + (-6)}$$
 (3 marks)

2. An airbus left Nairobi at 1945hrs and arrived in London at 0320hrs. It stayed for $1\frac{1}{2}$ hrs for rest and refreshment of passengers and crew. It then headed for Washington D.C and took $10\frac{1}{4}$ hrs.
 - (a) How long did the journey from Nairobi to London take in hours and minutes? **(2 marks)**
 - (b) At what time did it arrive in Washington D.C. **(2 marks)**

3. Evaluate:
$$\frac{\frac{3}{4} + 1\frac{5}{7} \div \frac{4}{7} \text{ of } 2\frac{1}{3}}{(1\frac{3}{7} - \frac{5}{8}) \times \frac{2}{3}}$$
 (3 marks)

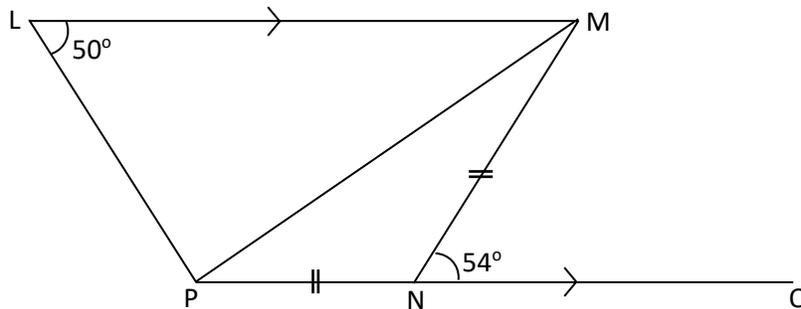
4. In the Nyamemiso station church choir, the ratio of male to female is 2:3. On one Sunday service, 10 male members were absent and six new female members joined the choir as guests for that day. If on this day the ratio of males to females was 1:3, how many regular members does the choir have? **(3 marks)**

5. The figure below represents a roof truss symmetrical about QS. Beam PQ is 5m long and strut TS is 2.4m long. The distance TQ is 1.8m.



Calculate:-

- (i) the height QS. **(2 marks)**
 - (ii) hence, find the span PR of the roof. **(2 marks)**
6. An article was bought at Ksh.2250 then later sold for Ksh.2520. Calculate:-
- (i) the percentage profit. **(2 marks)**
 - (ii) the price at which it should be sold to make a profit of 20%. **(2 marks)**
7. In a rectangle ABCD, the side AB has equation $3x + 2y = 6$ and vertex D has coordinates (-2, 4). Find the equation of side AD in the form $ax + by = C$. Where a, b and C are integers. **(3 marks)**
8. In the figure below $\angle MNO = 54^\circ$ and $\angle PLM = 50^\circ$, $PN = NM$ and PO is parallel to LM . Find the value of $\angle LPM$. **(3 marks)**



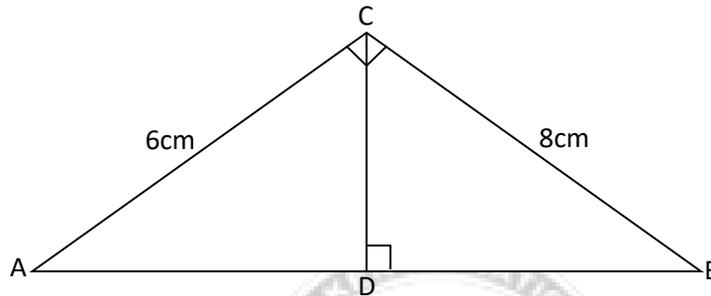
9. Using ruler and pair of compass only, construct triangle ABC in which $AB = 6\text{cm}$, $BC = 8\text{cm}$ and angle $ABC = 45^\circ$. Drop a perpendicular from A to meet BC at M. Measure AM and AC. **(3 marks)**

10. A plane leaves town P to town Q on a bearing of 130° and a distance of 350km. It then flies 500km on a bearing of 060° to town R. Find, by scale drawing the distance between town R and town P. (3 marks)

11. Use tables of reciprocal and squares to evaluate, to 4 significant figures, the expression:

$$0.4346^2 + \frac{1}{27.46} \quad (3 \text{ marks})$$

12. The figure below shows a triangle ABC which is right-angled at C. $CB = 8\text{cm}$ and $AC = 6\text{cm}$. Find the length of CD given that CD is perpendicular to AB. (3 marks)



13. Solve for t in the equation: $32^{(t-3)} \div 8^{(t-4)} = 64 \div 2^t$. (3 marks)

14. A is a reflex angle and $\tan A = \frac{7}{24}$. Determine the value of $\cos A$ without using the Mathematical table or calculator. (2 marks)

15. Translation T is represented by the column vector $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$ and another translation U by the column vector $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$. A point P is mapped to a point Q by T and point Q is mapped to a point R by U.

If point R is at (7, -4), determine the coordinates of point P. (3 marks)

16. On the grid provided,

(i) Plot the points P (4, -1), Q (5, -3), R (4, -4) and S (3, -3) and join the points to form a polygon PQRS. State the name of the polygon formed. (2 marks)

(ii) Write down the equation of the line of symmetry of the polygon. (1 mark)

SECTION II: (50 MARKS)

Answer any FIVE questions in this section.

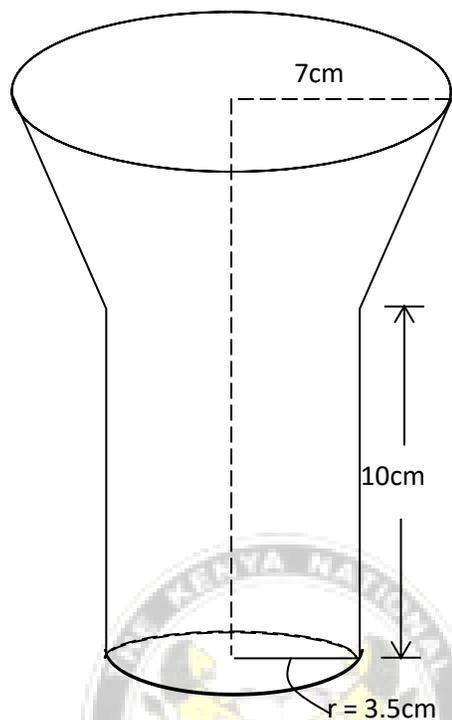
17. The capacity of two similar rectangular tanks are 1,000,000 litres and 512,000 litres respectively.

(a) Determine the length of the larger tank if the smaller one is 240cm long. (4 marks)

(b) Calculate the surface area of the smaller tank if the larger tank's surface area is 1875m^2 (3 marks)

(c) Estimate the mass of the smaller tank if the mass of the larger one is 800kg. (3 marks)

18. The diagram below represents a model of a pillar. The radii of the top and the base are 7cm and 3.5cm respectively. The height of the cylindrical part is 10cm while the height of the whole pillar is 15cm.



- (a) Calculate the volume of the model in cm^3 . (6 marks)
- (b) Calculate the mass of the material used to construct the pillar given that the actual height of the whole pillar is 60m and the density of the material used is 0.832g/cm^3 . (Give your answer in tones). (4 marks)

19. (a) Use the quadratic formula to solve the equation.
 $2x^2 - 9x + 3 = 0$ giving your answer to 4 significant figures. (3 marks)

(b) Simplify the expression completely: $\frac{(3 - 5x + 2x^2)(1 + x)}{16x^4 - 18}$ (4 marks)

(c) If the expression $25y^2 - 70y + (16 + K)$ is a perfect square; where K is a constant; find the value of K. (3 marks)

20. Christians who attended a church service on a Sunday were grouped by age as shown in the table below.

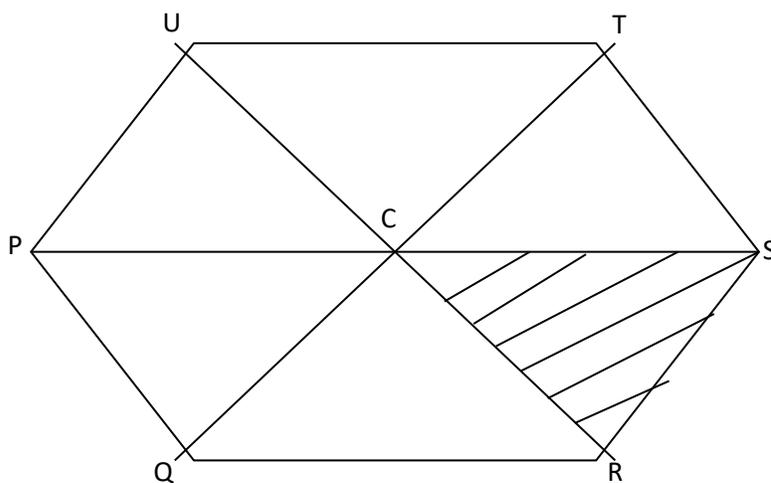
Age in x years	$0 \leq x < 5$	$5 \leq x < 15$	$15 \leq x < 25$	$25 \leq x < 45$	$45 \leq x < 75$
No. of members	14	41	59	70	15

- (a) Estimate the mean age (4 marks)
- (b) On the grid provided, draw a histogram to represent the distribution.
 Use the scale: 1cm to represent 5 units on the horizontal axis. 2cm to represent 5 units on the vertical axis. (4 marks)

- (c) On the same axes in (b) above, construct a frequency polygon and use it to determine the modal class. (2 marks)
21. Nairobi and Eldoret are each 250km from Nakuru. At 8.15a.m, a lorry leaves Nakuru for Nairobi. At 9.30am, a car leaves Eldoret for Nairobi via Nakuru at a speed of 100km/h. Both vehicles arrived Nairobi at the same time.
- (a) Calculate their time of arrival in Nairobi. (2 marks)
- (b) Find the cars speed relative to that of the lorry. (4 marks)
- (c) How far apart are the vehicles at 12.45pm. (4 marks)
22. (a) Complete the table below, for the function $y = -\chi^2 + 2\chi + 6$. (2 marks)

χ	-2	-1	0	1	2	3	4	5	6
$-\chi^2$			0						
$2\chi + 6$			6						
y			6						

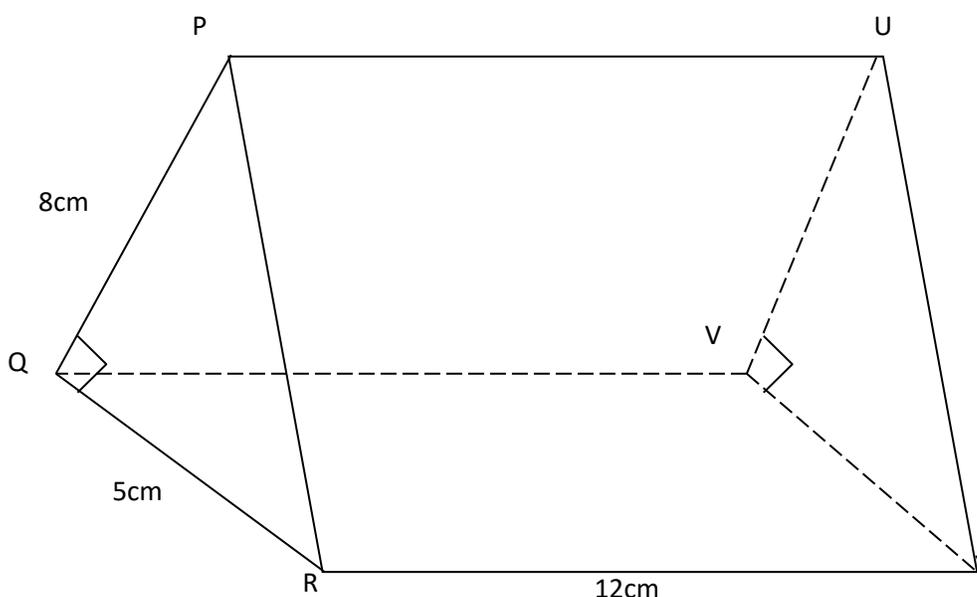
- (b) On the grid provided, draw the graph of the function $y = -\chi^2 + 2\chi + 6$ for the range $-2 \leq \chi \leq 6$ and use your graph to estimate the roots of the equation $-\chi^2 + 2\chi + 6 = 0$ to 1 decimal place (4 marks)
- (c) To solve graphically the equation $\chi^2 + 2\chi = 0$; a straight line must be drawn to intersect the curve $y = -\chi^2 + 2\chi + 6$. Determine the equation of this straight line; draw the straight line on the same axes and hence obtain the roots of the equation $\chi^2 + 2\chi = 0$ to 1 decimal place (4 marks)
23. In the figure below, PQRSTU is a regular hexagon.



Describe fully:

- (i) a reflection that maps ΔSCR onto ΔSTC . (1 mark)
- (ii) an enlargement that maps ΔSCR on ΔPCU . (2 marks)
- (iii) a rotation that maps ΔSCR to ΔTCU . (3 marks)
- (a) The ΔPQC is reflected on the line RU . The image of ΔPQC under the reflection is then rotated through an angle -120° about point C . Determine the images of P and Q :
 - (i) under the reflection. (2 marks)
 - (ii) after the two successive transformations. (2 marks)

24. The figure **below** shows a wedge in which PQR and UXY are congruent right angled triangles. $PQ = 8\text{cm}$, $QR = 5\text{cm}$ and $RY = 12\text{cm}$.



- (a) **Calculate:**
 - (i) the length of RU . (2 marks)
 - (ii) the angle the line RU makes with the plane $PQVU$. (2 marks)
- (b) Find the angle between:-
 - (i) line PY and the plane $QRYV$. (3 marks)
 - (ii) the planes $PQVU$ and $PRYU$. (3 marks)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 7 PAPER 2

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- Write your **NAME**, **SCHOOL** and **INDEX NUMBER** in the spaces provided above.
- Sign** and write **date** of examination in the spaces provided.
- This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

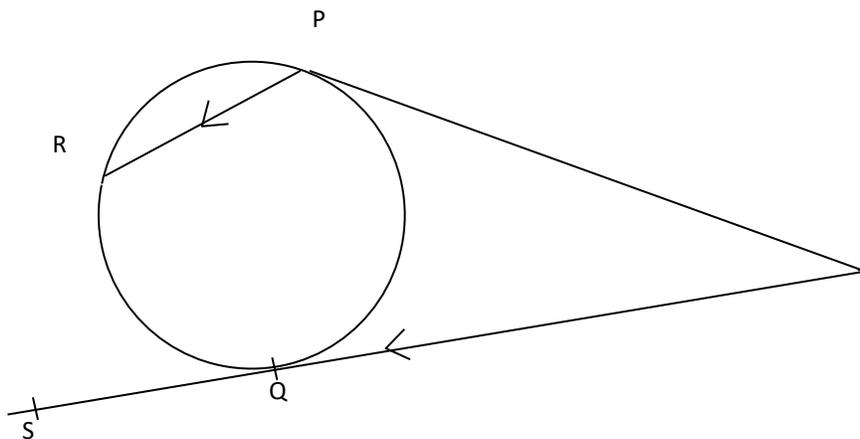
QUESTIONS

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

- A pyramid block has a square base whose side is exactly 7.5cm. Its height measured to the nearest millimeter is 3.5cm. Find the percentage error in calculating its volume correct to 3 decimal places. (3 marks)
- A blend of juice is made from pineapple and passion. The cost of two limes of pineapple is 120/= and three limes of passion is 270/=. In what ratio should the juice be mixed such that by selling the mixture at 84/= per lime a profit of 20% is realized? (3 marks)
- Solve for χ in $(\log_2 \chi)^2 + \log_2 8 = \log_2 \chi^4$. (3 marks)

4. In the figure shown **below**, angle $\angle PTS = 54^\circ$ and PT and ST are tangents to the circle and that PR is parallel to TS .



Giving reasons; find the values of angles:

- (i) $\angle PRQ$. (2 marks)
- (ii) $\angle RQS$. (2 marks)

5. Given that $\tan 15^\circ = 2 + \sqrt{3}$, find without using tables or a calculator, in the form $a + 2\sqrt{c}$, the value of $\tan 75^\circ$. (3 marks)

6. Make P the subject of the formula:

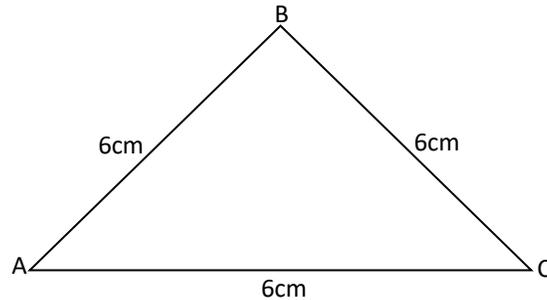
$$\chi = \left[\frac{1}{mp^3} - A^2 \right] B$$
(3 marks)

7. Expand $\left(3 - \frac{1}{2}\chi \right)^5$ up to the 5th term. Hence use the expansion to evaluate $(3.25)^5$ correct to 4 decimal places. (4 marks)

8. A commercial plot is valued at shs.500,000. The plot depreciates at a rate of 10% per six months for a period of 2 years. It then appreciates at a rate of 4% per quarter yearly for three years. Find the value of the plot after 5 years to nearest shillings. (3 marks)

9. The equation of a curve is $y = \chi^3 - 3\chi^2 + K\chi + 2$ and a normal is $9y + \chi = 18$. If they intersect at $\chi = 0$; Find the value of K . (3 marks)

10. The figure **below** drawn to scale represents a field in the shape of an equilateral triangle of sides 120m. (4 marks)



Mr. Mutai wants to plant some tea seedlings in the field. The seedling must be at most 90m from A and nearer to B than to C. If no seedling is to be more than 60m from BC, show by shading, the exact region where the seedling may be planted within the triangle.

11. The product of the digits in a two digit number is 24. Four times the ten digit exceeds the unit digit by 10. Calculate the number. **(3 marks)**

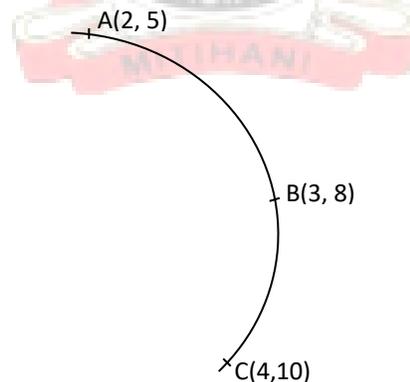
12. Solve for χ in the equation $\sin^2(3\chi + 30^\circ) = \frac{3}{4}$ for $0^\circ \leq \chi \leq 180^\circ$. **(3 mks)**

13. A Kenya airways plane flies from point P(40°N, 45°W) to a point Q(35°N, 45°W), then to point T(35°N, 135°E). Find the shortest distance between Q and T in nautical miles. **(2 marks)**

14. The position vectors of points A and B are $2\mathbf{i} - \mathbf{j} + 4\mathbf{k}$ and $4\mathbf{i} + 3\mathbf{j}$ respectively. If point R is the mid-point of \overline{AB} . Find the magnitude of \overline{AR} . **(3 mark)**

15. Water flows through a pipe whose cross sectional radius is 3.5cm at a rate of 3m/min. Calculate how long it will take the pipe to fill a 22000 line Ken tank. **(2 marks)**

16. The figure below shows an arc of a circle through three points A, B and C.



Calculate the co-ordinates of the centre of the circle. **(4 marks)**

SECTION II

Answer any five questions.

17. (a) Fill the table below using the following function $y = 3 + 4x - 2x^2$ for $-3 \leq x \leq 5$.

(2 marks)

x	-3	-2	-1	0	1	2	3	4	5
$-2x^2$	-18			0		-8			-50
$4x$			-4		4		12		
3									
y									

- (b) On the grid provided, draw the graph of the function $y = 3 + 4x - 2x^2$ for $-3 \leq x \leq 5$. (3 marks)

GRAPH

- (c) Using your graph; estimate the roots of the equations:-

(i) $3 + 4x = 2x^2$. (2 marks)

(ii) $2x^2 - 3x - 6 = 0$. (2 marks)

- (d) State the y – co-ordinate of the maximum turning point. (1 mark)

18. (a) P, Q and R are three quantities such that P varies directly as the square of Q and inversely as the square root of R.

(i) Given that $P = 12$ when $Q = 24$ and $R = 36$, find P when $Q = 27$ and $R = 121$. (3 marks)

(ii) If Q increases by 10% and R decreases by 25%, find the percentage increase in P. (4 marks)

- (b) If Q is inversely proportional to the square root of P and $P = 4$ when $Q = 3$. Calculate the value of P when $Q = 8$. (3 marks)

19. Every morning during class time, Brenda either reads a novel or solves Mathematics questions. The probability that she reads a novel is $\frac{4}{5}$. If she reads a novel, there is a probability of $\frac{3}{7}$ that she will fall asleep. If she solves Math’s questions there is a probability of $\frac{1}{2}$ that she will fall asleep. Sometimes the teacher on duty enters Brenda’s classroom.

Using a tree diagram When Brenda is asked whether she had been asleep, there is a probability of $\frac{1}{5}$ that she will admit that she had been asleep and a probability of $\frac{3}{5}$ that she will claim to have been asleep.

Find the probability that

(i) She sleeps and admits it. (2 marks)

(ii) She sleeps and does not admit. (2 marks)

- (iii) She does not sleep but claims to have been asleep. (2 marks)
 - (iv) She does not sleep and says that she has not been a slept. (2 marks)
 - (v) She sleeps and admits and changes her mind. (2 marks)
20. The table **below** shows the distribution of marks scored by 50 students of Afraha high.

Marks	11 - 20	21 - 30	31 -40	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90	91 - 100
No. of students	2	3	5	6	12	10	6	4	2

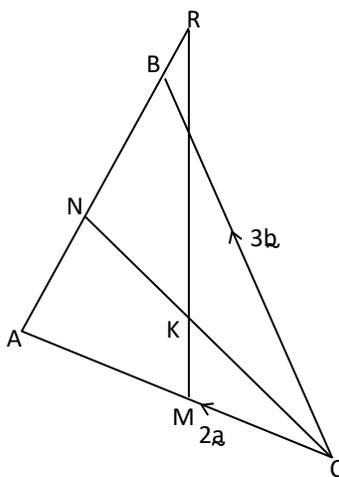
Calculate:-

- (a) interquartile range. (3 marks)
 - (b) Mean mark. (3 marks)
 - (c) Standard deviation (4 marks)
21. Two quantities P and r are connected by the equation $P = Kr^n$. Where k and n are constants. The table of values of P and r is given **below**.

P	1.2	1.5	2.0	2.5	3.5	4.5
r	1.58	2.25	3.39	4.774	7.86	11.5

- (a) State the linear equation connecting P and r. (1mark)
- (b) (i) Using a suitable scale, draw a suitable line graph from the above data on the grid provided. (5 marks)
 - (ii) Using your graph, estimate the values of K and n. (3 marks)
 - (c) Find the relation connecting P and r. (1 mark)

22. The diagram **above** shows triangle ABC, such that $\overline{CA} = 2a$ and $\overline{CB} = 3b$. M is the midpoint of \overline{CA} N is a point on AB such that $2AN = NB$ and R is a point on AB produced such that $2AR = 5RB$. If K is the point of intersection of MR and CN,



- (a) Express in terms of a and b.
 - (i) AB. (1 mark)
 - (ii) CN. (2 marks)

- (iii) **BR.** (1 mark)
- (iv) **MR.** (2 marks)
- (v) **CK.** (2 marks)

(b) Find the ratio CK: KN. (2 marks)

23. The product of the first three terms of geometric progression is 729. If the first term is a and the common ratio is r .

(a) Express r in terms of a . (2 marks)

(b) Given the sum of the three terms is 39.

(i) Find the values of a and r and hence write down two possible sequences each up to the 4th term. (6 marks)

(ii) Find the product of the 10th term of the two sequences. (2 marks)

24. The velocity of a particle, V m/s, moving in a straight line after t seconds is given by:-

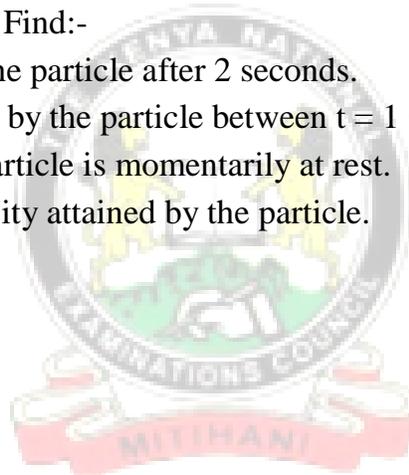
$$V = 3t^2 - 3t - 6 \quad \text{Find:-}$$

(i) the acceleration of the particle after 2 seconds. (2 marks)

(ii) the distance covered by the particle between $t = 1$ and $t = 4$ seconds. (3 marks)

(iii) the time when the particle is momentarily at rest. (2 marks)

(iv) The maximum velocity attained by the particle. (3 marks)



TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 8 PAPER 1

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your **NAME, SCHOOL and INDEX NUMBER** in the spaces provided above.
- b) **Sign** and write **date** of examination in the spaces provided.
- c) This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1. Without using tables or calculators, evaluate.

$$\sqrt{\frac{0.38 \times 0.23 \times 2.7}{0.114 \times 0.0575}}$$

(3mks)

2. Without using a calculator or tables, find the value of y given that $y = (a+b)(x-c)^2$ and $a = 5$, $b = 6$, $x = -3$ and $c = 2$.

(3mks)

3. Solve the following inequalities and represent the solution on a single number line.

$$3 - 2x < 5$$

$$4 - 3x \geq -8.$$

(3mks)

4. Use the reciprocal, square and square-root tables to evaluate to 4 significant figures the expression.

(4mks)

$$\sqrt{\frac{1}{24.56} + 4.346^2}$$

5.A Kenyan bank buys and sells foreign currencies at the exchange rates shown below.

	BUYING (KSHS)	SELLING (KSHS)
1Euro	147.56	148.00
1U.S Dollar	74.22	74.50

An American arrived in Kenya with 20,000 Euros. He converted all the Euros into Kenyan Shillings at the bank. He spent Kshs.2,510,200 while in Kenya and converted the remaining Kenya shillings into U.S Dollars at the bank. Find the amount in dollars that he received.

(3mks)

6 Determine the quartile deviation of the following data 4,9,5,4,7,6,2,1,6,7,8,3. (3mks)

7 Translation Q is represented by the column vector $\begin{pmatrix} 6 \\ 3 \end{pmatrix}$ and another translation R by the

column vector $\begin{pmatrix} -4 \\ 2 \end{pmatrix}$. A point S is mapped onto a point T by Q and a point T is mapped into a

point U by R.If point U is (8 , - 4) ,determine the co-ordinates of point S.

(3mks)

8 Find the equation of the perpendicular line that passes through the mid – point X of C(- 7 , 8) and D (3 , - 8) (4mks)

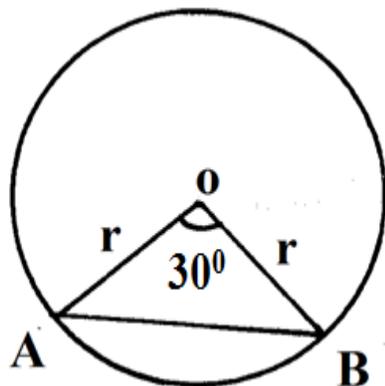
9 Mbom paid Kshs.160 for a blouse after getting a discount of 20%.The vendor made a profit of 30% on the sale of this blouse. What percentage profit would the vendor have made if no discount was allowed? (3mks)

10 The base of a triangle is 3cm longer than its height. Given that the area of the triangle is 35cm^2 , determine the height of the triangle. (3mks)

11 Solve for X in the equation. (2mks)

$$\frac{6x-4}{3} - \frac{2x-1}{2} = \frac{6-5x}{6}$$

12 The figure below shows a circle centre O. Chord AB subtends 30° at the centre. If the area of the minor segment is 5.25cm^2 , find the radius of the circle. (3mks)



13 A certain two – digit number is equivalent to five times the sum of the digits. It is found to be 9 less than the number formed when the digits are interchanged. Find the number.(3mks)

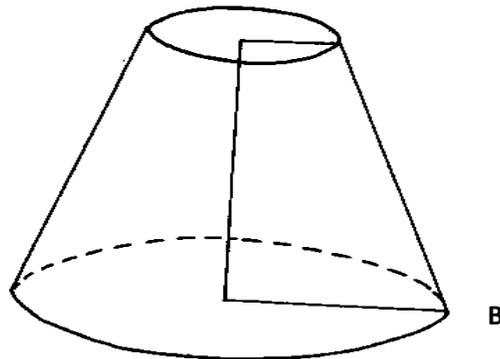
- 14 The surface area of two similar bottles are 12cm^2 and 108cm^2 respectively. If larger one has a volume of 810cm^3 . Find the volume of the smaller one. (3mks)
- 15 The exterior angle of a regular polygon is equal to one – third of the interior angle. Calculate the number of sides of the polygon and give its name. (3mks)
- 16 King’oo spends one-third of his salary on food, one – quarter on rent, three – fifth of the remainder on transport and saves the rest. If he spends Kshs.1800 on transport, find how much money he saves. (3mks)

SECTION II (50MARKS)

Choose any five questions only

- 17 John bought 3 brands of tea A , B and C. The cost price of the brands were sh.25, sh.30 and sh.45 per kilogram respectively. He mixed the brands in the ratio of 5:2:1 respectively. After selling the mixture, he made a profit of 20%.
- a) How much profit did he make per kilogram of the mixture. (4mks)
- b) After one year, the cost price of each brand was increased by 12%.
- i) For how much did he sell one kilogram of the mixture to make 20% profit. (3mks)
- ii) What would have been his percentage profit if he sold one kilogram of the mixture at shs.40.25? (3mks)

- 18 The diagram below represents a solid consisting of a hemispherical bottom and a conical frustrum at the top. $O_1O_2=4\text{cm}$, $O_2B=R=4.9\text{cm}$
 $O_1A=r=2.1\text{cm}$



- a) Determine the height of the chopped off cone and hence the height of the bigger cone. (2mks)
- b) Calculate the surface area of the solid. (4mks)
- c) Calculate the volume of the solid. (4mks)
- 19 a) The bill for completely covering the floor of a rectangular room with carpet Costing shs.70 per square metre is shs.1960. If one side of the room is X m long; show that the length of the other side is $\frac{28}{x} \text{ m}$ (3mks)

- b) By leaving a uniform width of $\frac{1}{2}$ m uncovered all round, shs.700 could have been saved. Use this information to form an equation in x and show that it reduces to $X^2 - 11x + 28 = 0$. (4mks)
- c) Solve the equation and hence find the dimensions of the room. (3mks)

20 The angle of elevation of the top of a flagpole from a point A on a level ground is 13° . The angle of elevation of the top of the flagpole from another point B nearer the pole and 12m from A is 30° . Find;

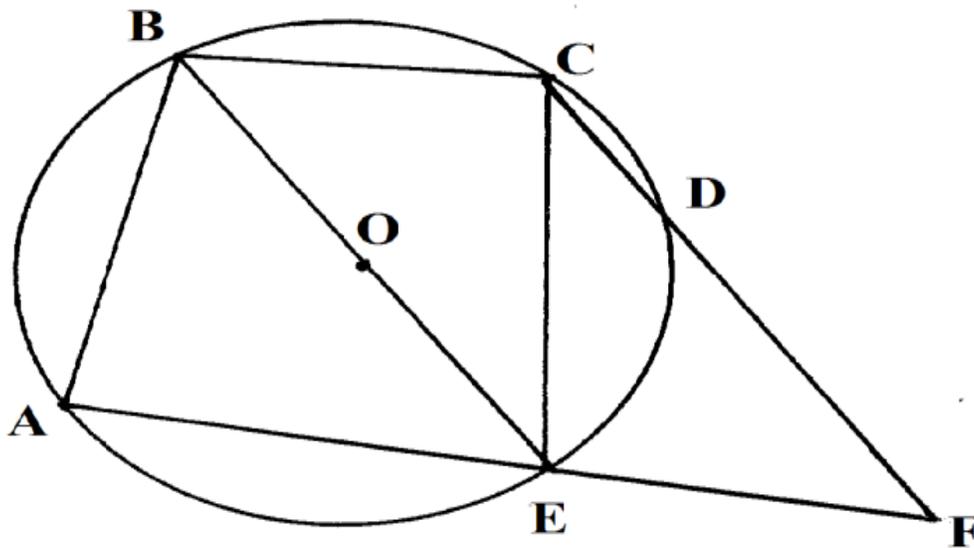
- a) i) The height of the flagpole (5mks)
 ii) The distance from point B to the top of the flagpole. (2mks)
- b) $\tan 105^\circ = -2 - \sqrt{3}$. Determine the value of $\tan 15^\circ$ in surd form. (3mks)

- 21 a) Draw the graph of the function below on the grid provided $y = 2x^2 - 7x - 2$ for the values of $-1 \leq x \leq 6$ (5mks)
- b) From your graph determine the roots of the function. $2x^2 - 7x - 2 = 0$. (1mk)
- c) By drawing a suitable graph of function $y = 2x - 7$ on the same axis, solve the simultaneous equations $y = 2x^2 - 7x - 2$ and $y = 2x - 7$. (4mks)

22 Three people; A, B and C work together to make a certain number of tins. If person C was to work alone he will take $4\frac{4}{9}$ hours to complete the job. If all working together they will take 1hr 40min to complete the job. They all started working together however person B left after first 40min, while person C left 20min later. Person A took a further 1hr 46min. Calculate how long it would take if all the tins were made by;

- a) Person A alone? (6mks)
 b) Person B alone? (2mks)
 c) Person A and C alone? (2mks)

23 In the figure below O, is the centre of the circle. $\angle AEB = 50^\circ$, $\angle EBC = 80^\circ$ and $\angle ECD = 30^\circ$.



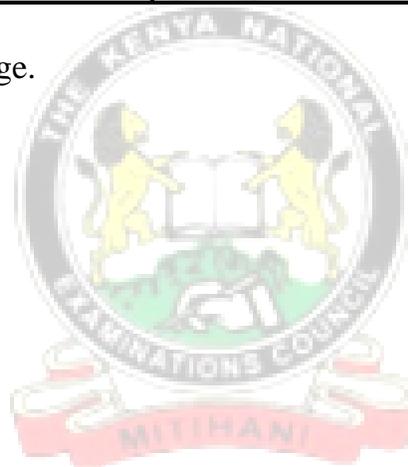
Giving reasons, calculate

- i) $\angle CDE$ (2mks)
- ii) $\angle DFE$ (2mks)
- iii) **Obtuse angle COE** (2mks)
- iv) $\angle ADE$ (2mks)
- v) $\angle CAE$ (2mks)

24 Patients who attended clinic in one week grouped by age as shown in the table below.

X Age (years)	No. of patients
0 - 5	14
5 - 15	41
15 - 25	59
25 - 45	70
45 - 75	15

- a) Estimate the mean age. (4mks)



TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 8 PAPER 2

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your *NAME, SCHOOL* and *INDEX NUMBER* in the spaces provided above.
- b) *Sign* and write *date* of examination in the spaces provided.
- c) This paper consists of *two* Sections. Answer *all* Questions in sections *A* and any five in section *B*

QUESTIONS

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1 Use logarithms only to evaluate,

$$4\sqrt{\frac{72.36 \times 0.69^2}{\log 168.4}}$$

Correct to four significant figures.

(4mks)

2 Make 4 the subject of the formula.

$$t = \frac{2m}{n} \sqrt{\frac{L-A}{3k}}$$

(3mks)

...

3 Express the recurring decimal below as a fraction; 4.372 leaving your answer in the form of $\frac{a}{b}$ where a and b are integers. (2mks)

4 Determine the amplitude, period and the phase angle of the wave represented by the equation.

$$y = \frac{-2}{3} \sin\left(\frac{2}{5}x + 40^\circ\right) \quad (3\text{mks})$$

5 Given that $\frac{3}{3+\sqrt{5}} + \frac{3\sqrt{5}}{3-\sqrt{5}} = a + b\sqrt{5}$. Find the values of a and b

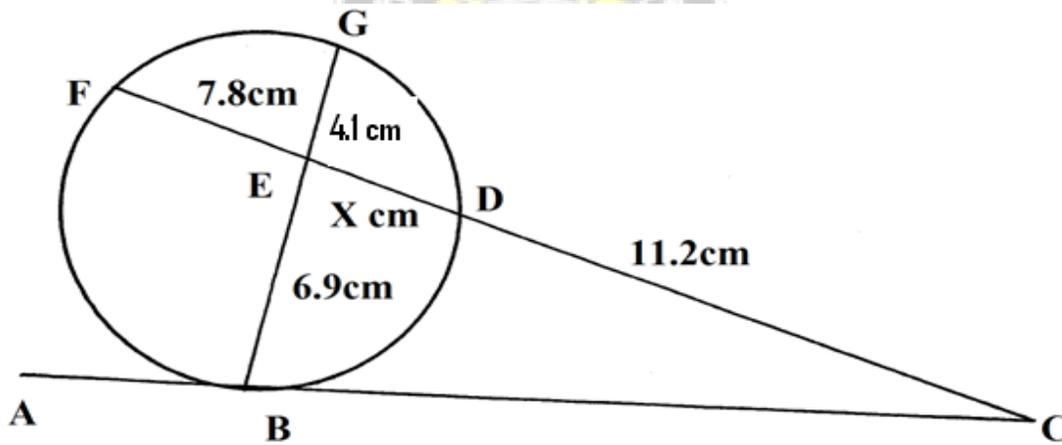
(4mks)

6 The dimensions of a cuboid are 4.5cm by 3.5cm by 2cm. Find the percentage error in its volume giving your answer to 2 significant figure. (3marks)

7 A car was valued at kshs.500,000 in January 2010. Each year its value depreciated at 12% p.a. After how long would the value depreciate to kshs.250,000? (3mks)

8 Given that the matrix $\begin{pmatrix} 5-x & 2 \\ 3x & 4 \end{pmatrix}$ has no inverse, find x. (2mks)

9 In the figure below ABC is a tangent to the circle at point B. Given that BE = 6.9cm, FE = 7.8cm, GE = 4.1cm, DC = 11.2cm and ED = xcm. Determine the length BC, give your answer in four significant figures. (4mks)



10 Find the radius and the co-ordinates of the centre of the circle whose equation is $\frac{1}{2}x^2 + \frac{1}{2}y^2 = 3x - 5y - 9$. (3mks)

11 A quantity P varies partly as t and partly as the square of t. When t = 20, p = 45, and when t = 24, p = 60.

a) Express p in terms of t. (2mks)

b) Find p when t = 32. (2mks)

12 The position vectors of points A and B are $a = 2i + j - 8k$ and $b = 3i + 2j - 2k$ respectively. Find the magnitude of AB. (3mks)

13 Write the expression of $(2 - \frac{1}{5}x)^6$ up to the term in x^4 . Hence use the expansion to find the value of $(1.96)^6$ correct to 3 decimal places. (4mks)

- 14 Five men working 8 hours daily complete a piece of work in 3 days. How long will it take 12 men working 5 hours a day to complete the same work. (2mks)
- 15 Find the integral values of x which satisfy $6 \leq 2x + 1$ and $5x - 29 < -4$. (3mks)
- 16 In a fund-raising committee of 45 people, the ratio of men to women is 7 : 2. Find the number of women required to join the existing committee so that the ratio of men to women changes to 5 : 4. (3mks)

SECTION II (50 MARKS)

Attempt any five questions from this section

- 17 The table below gives the income tax rates.

Income (k£)	Rate (p.a)
1-1980	10%
1981-3960	15%
3961-5940	25%
5941-7920	35%
7921-8650	45%
Over 8651	50%

- a) Calculate income tax of Wangari's taxable income of kshs.50,400 per month allowing a family relief of kshs. 520 per month. (8mks)
- b) Calculate the total tax as a percentage of taxable income (2mks)
- 18 a) Draw ΔPQR whose vertices are $P(1,1)Q(-3,2)$ and $R(0,3)$ on the grid provided
- b) Find and draw the image of ΔPQR under the transformation whose matrix is $\begin{pmatrix} 3 & 0 \\ 1 & 1 \end{pmatrix}$ and label the image $P'Q'R'$ (2mks)

$P'Q'R'$ is then transformed into $P^{11} Q^{11} R^{11}$ by the transformation with the matrix $\begin{pmatrix} -1 & 0 \\ 1 & 3 \end{pmatrix}$ (2mks)

- c) Find the co-ordinates of $P^{11} Q^{11} R^{11}$ and draw $P^{11} Q^{11} R^{11}$ (3mks)
- d) describe fully the single transformation which maps PQR onto $P^{11} Q^{11} R^{11}$ find the matrix of this transformation (3mks)

- 19) The probability of passing K.C.P.E depends on performance in the school mock examination. If the candidate passes in mock, the probability of passing K.C.P.E is $\frac{4}{5}$. If the candidate fails in

mock, the probability of passing K.C.P.E is $\frac{3}{5}$. If the candidate passes K.C.P.E, the probability of getting employed is $\frac{1}{3}$, the probability of passing mock is $\frac{2}{3}$.

a). Draw a well label tree diagram to represent the above information (2mks)

b) Use your tree diagram in (a) above to find the probability that she

i) Passes KCPE exams (2mks)

ii) Gets employed (2mks)

iii) Passes KCPE and gets employed (2mks)

iv) Passes mock and gets employed (2mks)

20. The diagram below shows triangle O.A.B in which N is the mid point of AB. Mis a point on OA such that OM :MA=2:1. Lines ON and BN meet at X such that vector OX=h vector ON and ,MX= kMB

Given that vector OA =a and vector OB=b

i) Express the following in terms of a and b

a) Vector AB (1mk)

b) Vector ON (2mks)

c) Vector BM (1mk)

a. By expressing vector OX in two different ways ,determine the values of h and k (6mks)

21). Using a ruler and a compass only

a) Construct a parallelogram ABCD such that AB = 10cm BC=7cm and $\angle ABC = 105^\circ$ (5mks)

b) Construct the loci of P and Q within the parallelogram such that AP < 4cm and BQ < 6cm (2mks)

c) Calculate the area within the parallelogram and outside the region bounded by the two loci (3mks)

22. a) Complete the table below

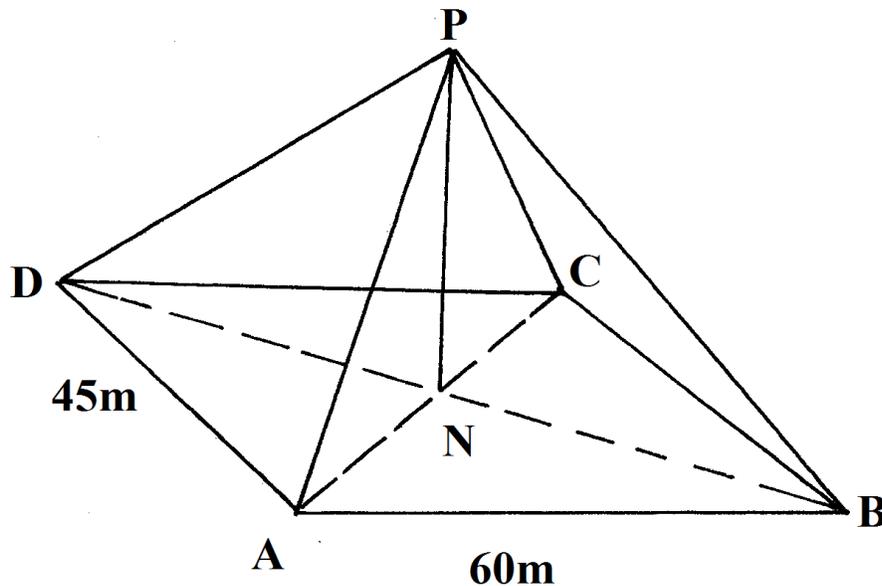
x	-30	0	30	60	90	120	150	180	210	240	270
Sin (x+30)	0	0.50		1.00	0.87			-0.50			-0.87
Cos (x-15)	0.71		0.97		0.26				-0.97	-0.71	-0.26

b) Draw the graph of $y = \sin (x+30)$ and $y=\cos(x-15)$ for $-30 \leq X \leq 270^\circ$ on the same grid. Take 1cm to represent 30° on x-axis and 1cm to represent 0.2units on y-axis.

a) Using your graph drawn (b) above

i) Find the values of x for which $\cos (x-15) -\sin (x+30) = 0$ (2mks)

- a. State the co-ordinates of the turning point of the curve for the function $y = \cos(x-15)$ on the negative section of y-axis (1mk)
- b. Estimate the angle corresponding to $\cos(x-15) = 0.6$
23. The figure below shows rectangular plot ABCD with AB = 60m and BC = 45m. PN is a vertical pole of length 30m to which four taut wire PB₁, PC₁, PD and PA are attached



Calculate

- a) length of the projection of PC on the plane ABCD (2mrks)
- b) the angle PC made with the base ABCD (3mks)
- c) The angle between the planes PBC and ABCD (3Mrks)
- d) If point A is to be the North of point C. calculate the bearing of B from A (2mks)
24. a) The first term of an arithmetic progression (AP) is 2. The sum of the first 8 terms of AP is 256.
- i) Find the common difference of AP (2mks)
- ii) Given that the sum of the first n terms of the AP is 416. Find n (2mks)
- b) The 3rd, 5th, and 8th terms of another AP form the first three terms of a geometric progression (GP). If the common difference of the AP is 3. Find
- i) The first term of GP (4mks)
- ii) The sum of the first 9 terms of the GP to 4 s.f (2mks)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 9 PAPER 1

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

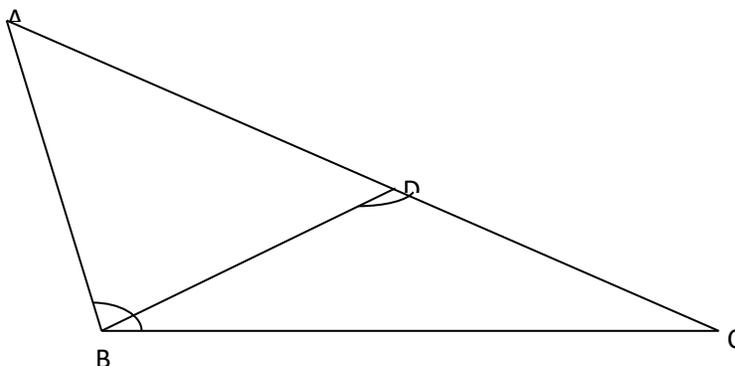
- a) Write your **NAME, SCHOOL and INDEX NUMBER** in the spaces provided above.
- b) **Sign** and write **date** of examination in the spaces provided.
- c) This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1. Evaluate without using a calculator $\frac{\left(2\frac{3}{7} - 1\frac{5}{6}\right) \div \frac{5}{6}}{\frac{2}{3} \text{ of } 2\frac{1}{4} - 1\frac{1}{7}}$ (3mks)
2. Calculate the standard deviation for the data below (3mks)
5,8,13,12,7,10,8,15,3,14
3. A straight line L_1 is perpendicular to another line L_2 whose equation is $3y+4x=12$. If the two lines meet at point P which lines on the x-axis, find:
 - (i) The co-ordinate of point P (1mk)
 - (ii) The equation of line L_1 in the form $y=mx+c$ (3mks)
4. Mr. Ochuodho who deals in electronics sells a radio to a customer at Kshs. 1,440 after giving him a discount of 10% but finds that he still makes a 20% profit. Find the profit Mr. Ochuodho would make if he does not give a discount. (3mks)
5. A solid block in the shape of a cylinder has a height of 14cm and weighs 22kg. If it is made of material of density $5g/cm^3$, find the radius of the cylinder. Take $\pi = \frac{22}{7}$ (3mks)

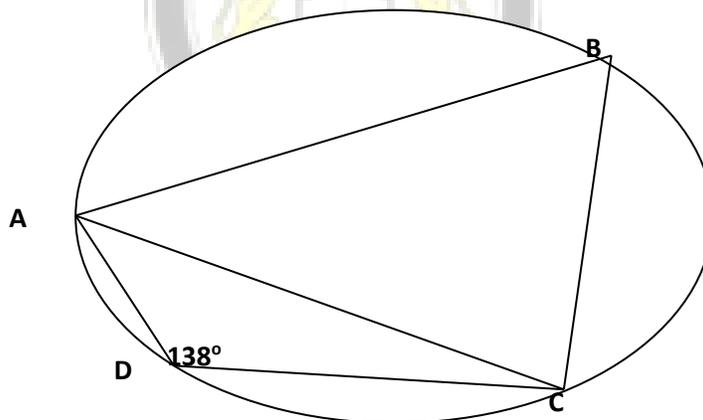
6. Simplify completely by factorization $\frac{20 - 45x^2}{6x^2 - x - 2}$ (3mks)
7. The figure below shows a triangle ABC not drawn to scale, D is a point on line AC. Given that BC=14cm, DC=7cm and $\angle ABC = \angle BDC$. Find the length of AD (3mks)



8. Solve the simultaneous inequalities given below and list all the integral values of x (3mks)

$$\frac{3-x}{2} \geq \frac{x+1}{3} \geq \frac{2x+1}{-3}$$

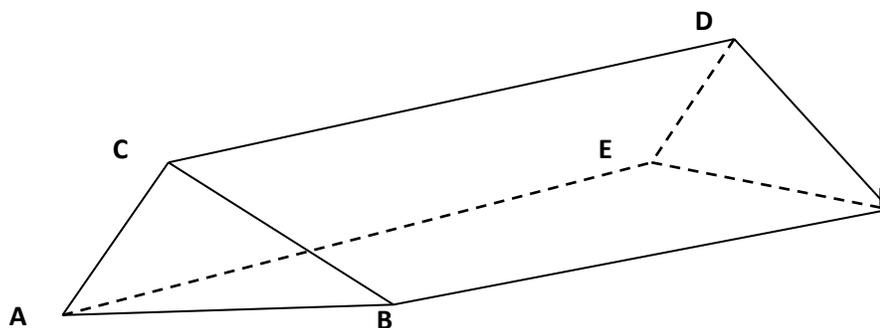
9. In the circle drawn to scale below A,B,C and D are points on its circumference, Chord BC=AC and angle ADC=138°



Giving reasons calculate the angle ACB (3mks)

10. The figure below shows a triangular prism ABCDEF. AF=CD=BE=18cm, The ends ABC and EDF are equilateral triangles of side 8cm. calculate the angle plane ABD makes with the lie CD

(3mks)



11. Patricia a student at Ongeti mixed Secondary bought 5 pens and 3 exercise books from Solving supermarket at Kshs. 135, at the same time Jane her class mate also bought 4 pens and 5 exercise books and spent Ksh. 25 more than Patricia. Find the cost of each pen and exercise book

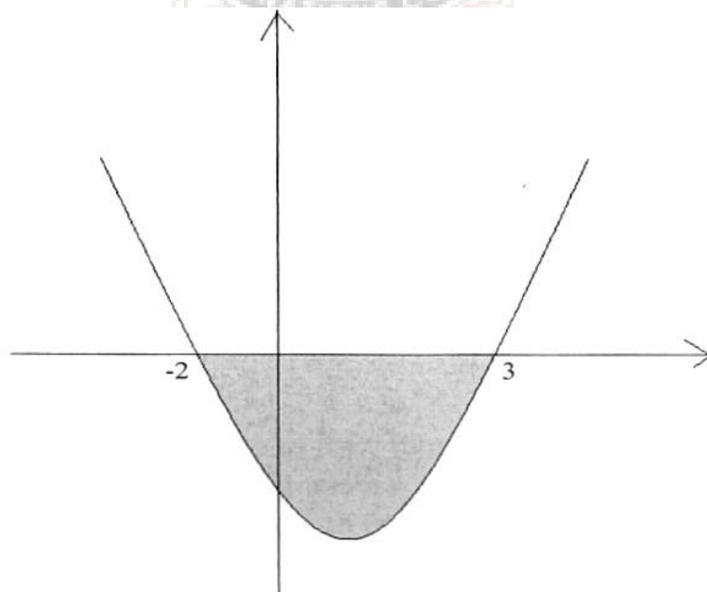
(4mks)

12. Evaluate using mathematical tables only expressing your answer to 4 significant figures

$$\frac{4}{0.2356} + (0.9873)^3$$

(3mks)

13. The diagram below shows the sketch of the curve $y=x^2-x-6$



Using the mid-ordinate rule with five rectangles, calculate the area of the shaded region

(4mks)

14. Given that $\sin (3x-35)^\circ - \cos (x+20)^\circ = 0$ and x is an acute angle, find its value

(2 mks)

- 15.** A train of length 80m crosses a bridge 20 m long in 5 seconds. Calculate the average speed of the train in km/h **(3mks)**
- 16.** Mr. Obiero the principal of Isaboke secondary would wish to cover the floor of the new administration block using the square tiles. The floor is a rectangle of sides 12.8m by 8.4m. Find the area of each of the largest tiles which can be used to fit exactly without breaking **(3mks)**



SECTION B (50 MARKS)

Answer ONLY FIVE questions in this section in the spaces provided

17. Four schools Wiobiero, Asumbi, Nyawita and Angiro are such that Wiobiero is 15km from Asumbi on a bearing of 158° , Nyawita is to the west of Asumbi and 20km away while An'giro is to the South of Nyawita and on a bearing of 240° from Wiobiero.

(a) Using a scale of 1:400,000 draw a scale diagram showing the relative positions of the four schools. (5mks)

(b) Using your diagram determine the distance and bearing of Ang'iro from Asumbi (2mks)

(c) A mast is to be erected so that its equidistant from Asumbi and Nyawita and 20km from Ang'iro on the same diagram show the position of the mast and find its distance from Wiobiero (3mks)

18. The table shows the marks obtained by 40 candidates in an examination

Marks	5-14	15-29	30-34	35-44	45-49
Frequency	2	12	7	15	x

(a) Find the value of x (2mks)

(b) On the grid provided below draw a histogram to represent the data (5mks)

(c) By drawing a straight line on the graph above determine the median mark (3mks)

19. A matatu left Oyugis for Homabay town 51km away at an average speed of 48km/h at 7.00am. At 7.30am a Boda boda left Homabay for Oyugis travelling along the same route at an average speed of 60km/h

(a) The time when Boda boda meet the matatu (3mks)

(b) How far from Oyugis did the Boda boda meet the matatu (3mks)

(c) After meeting the Boda boda the matatu stopped for fifteen minutes before resuming the journey. At what speed should it travel then to reach Homabay at the same time when the Boda boda reached Oyugis (4mks)

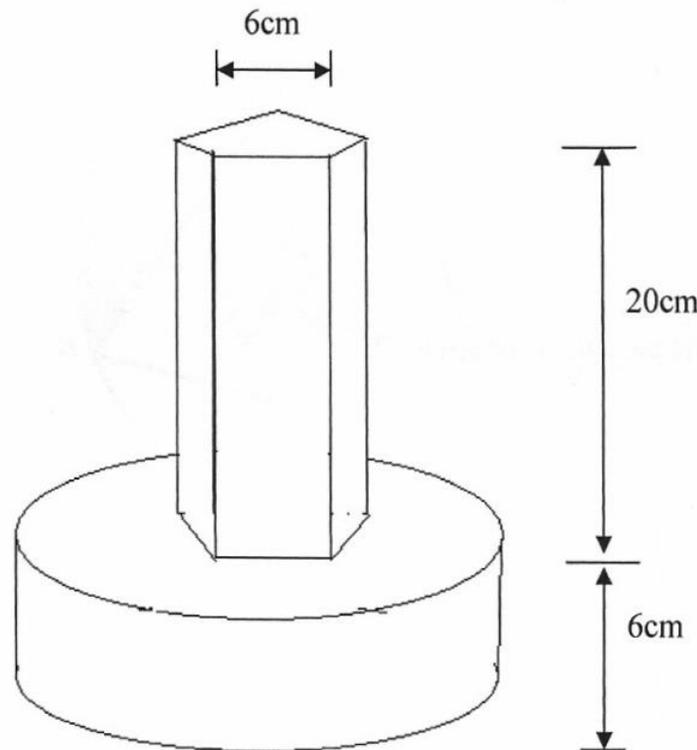
20. A group of people planned to contribute equally towards a water project which needed Ksh.2,000,000 to complete. However 40 members of the group withdrew from the project. As a result each of the remaining members were to contribute Kshs.2,500 more

(a) Find the original number of members in the group (5mks)

(b) Forty five percent of the value of the project was funded by constituency development fund (CDF). Calculate the amount of contribution that would be made by each of the remaining members. (3mks)

(c) Members contribution were in terms of labour provided and money contributed. If the ratio of the value of labour to the money contribution was 6:9. Calculate the total amount of money contributed by the members **(2mks)**

21. The figure below shows a prism whose cross section is a regular pentagon of side 6cm and whose length is 20cm joined to a cylinder of radius 14cm and height 6cm to form a the model of a solid



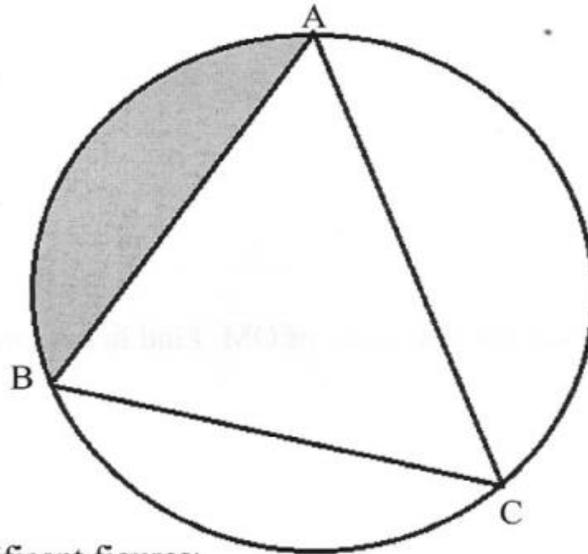
- (a) Calculate the cross section area of the pentagon **(3mks)**
- (b) Calculate the total volume of the solid **(4mks)**
- (c) The model represents a pillar of total height 5.2m, calculate the volume of the actual solid in m^3 **(3mks)**

22. The displacement of a particle S metres, t seconds after passing a fixed point O is given by $S=3+2t-5t^2$

Calculate:

- (a) The displacement of the particle 2 seconds later **(2mks)**
- (b) The time taken for the particle to return to O **(2mks)**
- (c) The maximum displacement of the particle **(3mks)**
- d) The initial velocity of the particle **(2mks)**
- (e) The acceleration of the particle after t seconds **(1mk)**

23. The diagram below shows a circle ABC with $AB=12\text{cm}$, $BC=15\text{cm}$, and $AC=14\text{cm}$



Calculate to 4 significant figures:

Calculate to 4 significance figures:

- (a) The angle ACB (3mks)
- (b) The radius of the circle (3mks)
- (c) The area of the shaded region (4mks)

24. OABC is a trapezium such that the coordinates of O, A, B and C are $(0,0)$, $(2,-1)$, $(4,3)$ and $(0,y)$

- (a) Find the value of y (2mks)
- (b) M is the mid-point of AB and N is the mid point of OM. Find in column form
 - (i) The vector AN (3mks)
 - (ii) The vector NC (2mks)
- (iii) Vector AC (1mk)
- (c) Hence show that A, N and C are collinear (2mks)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 9 PAPER 2

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

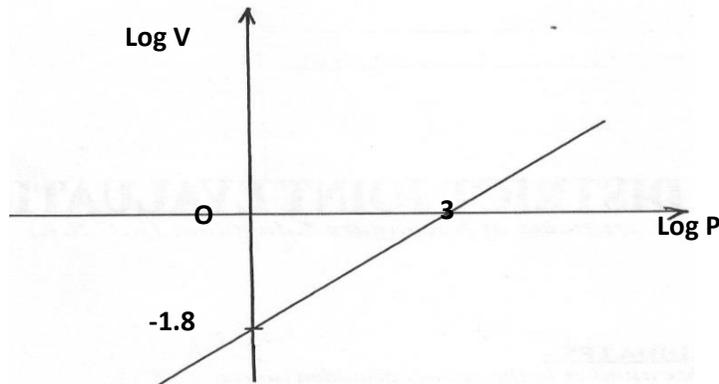
- Write your **NAME, SCHOOL and INDEX NUMBER** in the spaces provided above.
- Sign** and write **date** of examination in the spaces provided.
- This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

SECTION I: (50 MARKS)

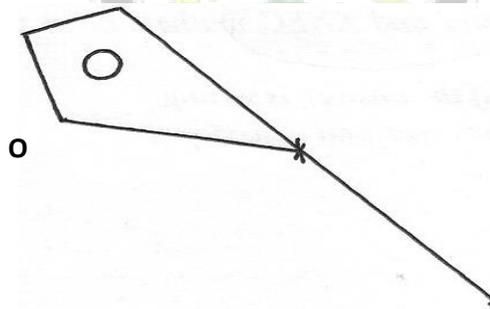
Answer all the question in this section in the spaces provided:

- Evaluate using logarithms (4mks)
- A business lady $\sqrt[5]{\frac{41.9x \log 1.159}{2.3x10^3}}$ bought 180 mangoes at Shs.60 for every five mangoes. She sold some of them at Shs.30 for every three and $33\frac{1}{3}\%$ the rest at Sh.30 for every four. If she made a $33\frac{1}{3}\%$ loss, calculate the number of mangoes sold at Shs.30 for every four (3mks)
- Write an equation of a circle that has a diameter whose end points are at (2,7) and (-6, 15) in the form $x^2+y^2+ax+by+c=0$ where a,b and c are integers (3mks)
- Miss Jaber bought a motor cycle at Shs.160,000. The depreciation rate was 6% per annum determined semi annually. How long will it take the motor cycle to be valued at a quarter of its original cost (3mks)
- Given that $d = \sqrt[3]{\left(\frac{y-1}{y+1}\right)}$ express y in terms of d (3mks)
- An arithmetic progression of 41 terms in such that the sum of the first five terms is 560 and sum of the last five terms is -250. Find the first term (3mks)

7. (a) Expand and simplify the binomial expression $(2x-y)^5$ (1mk)
 (b) Use the first four terms of the expansion above to approximate the value of $(3.8)^5$ (2mks)
8. The graph below is part of the straight line graph obtained from the initial equation $V=ap^n$



- (a) Write down the equation of the straight line in the form $y=mx+c$ (1mk)
 (b) Use the graph to calculate the values of a and n (2mks)
9. In the figure below kite ABCD represents a part of a county government logo. The logo has symmetry order 4 about O. Complete the figure to show the logo (2mks)



10. The velocity V of a body moving in a straight line at any time t is given by $V=3t-2$. Its distance S at time $t=0$ is equal to $4m$. Calculate the distance when $t=4$ seconds (3mks)
11. The sides of a triangle were measured and recorded as $4cm$, $6.2cm$ and $9.50cm$. Calculate the percentage error in its perimeter, correct to 2 decimal places (3mks)
12. The size of an interior angle of a regular polygon is x^2 while its exterior angle is $3x$. Find the number of sides of the polygon (4mks)
13. Without using logarithms table, solve the equation (3mks)

$$\log(5x - 4) = \log(x - 2) + \frac{1}{3} \log 27$$

14. A rectangle ABCD is such that $AB=6cm$, and $BC=5cm$. A variable point P moves inside the rectangle such that $AP \leq PB$ and $AP > 2.5cm$. Show the region where P lies (3mks)

15. Without using a calculator or mathematical table, express $\frac{\sin 60^\circ}{1 - \cos 30^\circ}$ (3mks)

In surd form and simplify

16. An angles of 0.9 radians at the centre of the circle subtends an arc of length 28.8cm. Find
 (a) The radius of the circle (2mks)
 (b) The area of the sector enclosed by the arc and radii (2mks)

SECTION B (50 MARKS)

Answer any five questions from the section in the spaces provided .

17. Mr. Alvin George, a civil servant gets a monthly salary of Shs. 48,000. He lives in a government house where he pays nominal rent of Shs.2500. Besides this he gets an automatic house allowance of Shs.12000 and medical allowance of shs.8000 per month. He gets a gamily relief of sh.1065 per month. The rates of income tax are shown below

Income tax in K£ per month	rates in shs. Per K£
1-400	10%
401-1200	15%
1201-2400	25%
2401-3600	35%
3601 and above	45%

Calculate:

- (a) His taxable income per month in Kenya pounds (2mks)
 (b) Net tax per month in Kshs. (6mks)
 (c) Net salary (2mks)
18. The vertices of a rectangle are A(-1,-1) B(-4,-1) C(-4,-3) and D(-1,-3)
 (a) On the grid provided, draw the rectangle and its image $A_1B_1C_1D_1$ under a transformation whose matrix is $\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$ (4mks)

- (b) A_2, B_2, C_2, D_2 is the image of A_1, B_1, C_1, D_1 under a transformation matrix $P = \begin{pmatrix} \frac{1}{2} & 1 \\ 1 & \frac{1}{2} \end{pmatrix}$
 (i) Determine the co-ordinates of $A_2B_2C_2D_2$ (2mks)
 (ii) On the same grid draw the quadrilateral $A_2B_2C_2D_2$ (1mk)
 (c) Find the area of $A_2B_2C_2D_2$ (3mks)

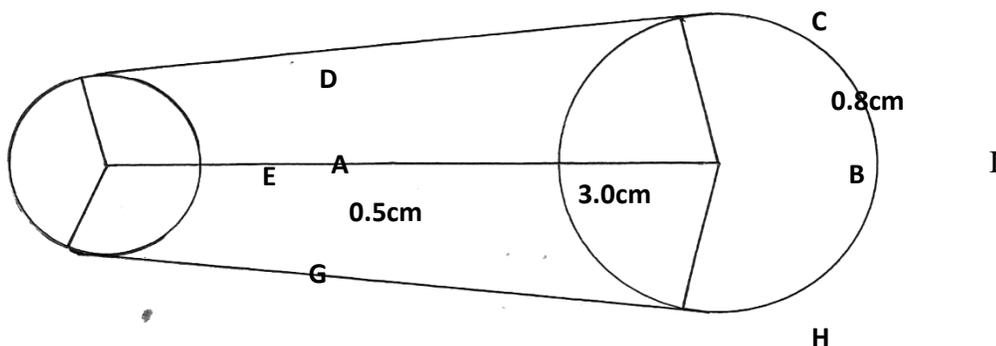
19. A solution whose volume is 120 litres is made up of 35% water and the rest alcohol. When y litres of alcohol is added the percentage of water drops to 15%
 (a) Find the value of y (4mks)

- (b) The new solution is diluted further by addition of seventy litres of water. Calculate the percentage of alcohol in the resulting solution (2mks)
- (c) A blend is made by mixing 10 litres of the solution in (b) above with 20 liters of the original solution. Calculate in the simplest form, the ratio of water to that of alcohol in the blend (4mks)
20. A passenger plane takes off from airport A(60°N,5°E) and flies directly to another airport B(60°N,17°E) and then flies due North for 600 nautical miles (nm) another airport C
- (a) Find the position of airport C (3mks)
- (b) Find the distance between airport A and B in nautical miles (3mks)
- (c) If the plane at an average speed of 300knots, find total flight time (2mks)
- (d) Given that the plane left air port A at 9.20am. Find the local time of arrival at airport C (2mks)

21. In a certain country, the probability of a school A topping in county exams is $\frac{1}{3}$. If it tops the probability of it topping in KCSE is $\frac{5}{7}$ otherwise the probability of it topping in KCSE is $\frac{2}{9}$. If the school tops in KCSE the probability of its appearing in the newspaper is $\frac{2}{5}$, otherwise the probability of its appearing in newspaper is $\frac{4}{11}$

- (a) Draw a tree diagram to represent the above information (2mks)
- (b) Use the tree diagram to find the probability that:
- (i) The school tops in the two exams and appears in the newspaper (2mks)
- (ii) The school did not appear in the newspaper (2mks)
- (iii) The school topped in atleast one exam and did not appear in the newspaper (2mks)
- (iv) The school appeared in the newspaper (2mks)

22. The diagram below shows a design model of a race course drawn to scale of 1:5000,000. It consists of two circles centre A and B radii 0.5cm and 0.8cm respectively and the distance between their centres is 3.0cm



Calculate in km:

- (i) The length of leg CD (2mks)
- (ii) The length of the leg DEG ($\pi=3.142$) (2mks)
- (iii) The length of the leg HIC ($\pi=3.142$) (2mks)

(iv) During a race, the course is manned by race officials placed 500m apart and each is paid Kshs.2300/= per day. How much is needed to pay race officials for one day event (4mks)

23. A relief organization has to transport atleast 80 people and atleast 18 tonnes of supplies to a site. There are two types of vehicles available type A and B. type A can carry 900kg of supplies and 6 people while type B can carry 1350kg of supplies and 5 people. There are at most 12 vehicles of each type available. By putting X to represent the number of vehicles of type A and y to represent the number of vehicles of type B

(a) Write down all the four inequalities to represent the above information (4mks)

(b) On the grid provided, draw all the inequalities in (a) above (4mks)

(c) Use the graph in (b) above the determine the least number of vehicles required at the site (2mks)

24. Given that $y = \sin 2x + \cos \frac{1}{2} x$, complete the table below for the missing values of y, correct to 1 decimal place

X°	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
Y=sin 2x+ cos ½ x	1	1.8			-0.4	-0.6			0.4	-0.7			-1

(b) On the grid provide below, draw the graph of $y = \sin 2x + \cos \frac{1}{2} x$ for $0 \leq x \leq 360^\circ$ Take the scale 1cm for 30° on the x-axis. 2 cm for 0.5 units on the y –axis. (4mks)

(c) Use the graph to estimate

(i) The minimum value of y

(ii) The value of X for which $\frac{1}{2} \sin 2x + \frac{1}{2} \cos \frac{1}{2} x \geq 0.25$

b) On the graph provided , draw a histogram to represent the distribution. (6mks)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 10 PAPER 1

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- a) Write your **NAME, SCHOOL and INDEX NUMBER** in the spaces provided above.
- b) **Sign** and write **date** of examination in the spaces provided.
- c) This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

1. Evaluate without using a calculator or Mathematical tables leaving your answer in the simplest form. (3mks)

$$\frac{\frac{4}{11} \text{ of } \left(\frac{3}{4} - \frac{1}{20}\right)}{\left(3 + \frac{1}{3}\right) \div \left(1 + \frac{1}{10}\right)}$$

2. A Kenya bank buys and sells foreign currencies as shown.

Buying (Ksh)	Selling (Ksh)	
1 Euro	84.15	84.26
100 Japanese Yen	65.37	65.45

A Japanese travelling from France to Kenya had 5000 Euros. He converted all the 5000 Euros to Kenya shilling at the bank. While in Kenya, he spent a total of Ksh.289850 and then converted the remaining Kenya shilling to Japanese Yens at the bank.

- Calculate the amount in Japanese Yen that he received. (3mks)

3. Line L1 passes through the points A (1, -2) and B (3, -4). Find the equation of line L2 passing through the mid-point of AB and perpendicular to L1, leaving your answer in the form $ax+by+c=0$. (4mks)

4. The curved surface area of a cylindrical container is 1980cm^2 . If the radius of the container is 21cm, calculate to one decimal place the capacity of the container in litres (3 mks)

(Take $\pi = \frac{22}{7}$).

5. State all the integral values of a which satisfy the inequality. (4mks)

$$\frac{3a + 2}{4} \leq \frac{2a + 3}{5} \leq \frac{4a + 15}{6}$$

6. Using a pair of compasses and a ruler only construct a triangle ABC such that $AB= 4\text{cm}$, $BC = 6\text{cm}$ and $\angle ABC = 135^\circ$. (2mks)

(b) Construct the height of triangle ABC in (a) above taking AB as the base, hence calculate the area of triangle ABC. (2 mks)

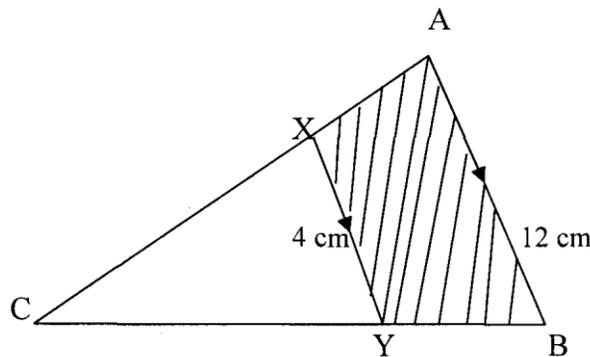
7. One interior angle of a polygon is equal to 800° and each of the other interior angles are 128° . Find the number of sides of the polygon. (3 mks)

8. Given that $\tan c = 0.75$, without using tables or a calculator find $\cos (180 - c)$ (3mks)

9. Simplify: (3 marks)

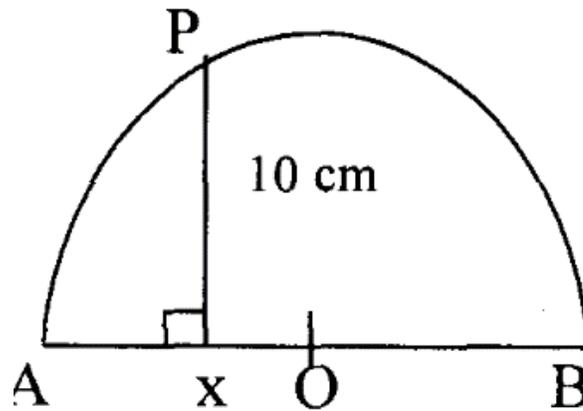
$$\left[\frac{X^3 - XY^2}{X^4 - Y^4} \right]^{-1}$$

10. In the figure below, lines AB and XY are parallel.



If the area of the shaded region is 36 cm^2 , find the area of triangle CXY. (3 marks)

11. In the figure below O is the centre of the circle diameter AB. $\angle AXP = 90^\circ$, AX 4cm and PX 10 cm. Calculate the radius of the semi-circle. (3 mks)



12. All prime numbers between ten and twenty are arranged in descending order to form a number.
- (i) Write down the number. (1 mk)
 - (ii) State the total value of the third digit of the number formed in (i) above. (1 mk)
13. Find the value of x in the following equations: (3mks)

$$(4)^{-2x} = \left(\frac{1}{32}\right)^{3x-4}$$

14. The marked price of a car in a dealer's shop was Kshs 450,000. Wekesa bought the car at 7% discount. The dealer still made a profit of 13%. Calculate the amount of money the dealer had paid for the car. (3 mks)
15. Use tables of cubes, square roots and reciprocals to evaluate. (3mks)

$$\frac{3}{(0.3375)^3 - \sqrt{337.5}}$$

16. Without using tables or a calculator, evaluate (3mks)

$$\frac{(-2) \times 7 + (-4) \div (-3)}{3 \times (-2) + 5 \times (-4)}$$

17. (a) A bus traveling at 99km/hr passes a checkpoint at 10.00am and a matatu traveling at 32km/hr in the same direction passes through the check point at 10.15am. If the bus and the matatu continue at their uniform speeds, find the time the matatu will overtake the bus. (6 mks)
- b) Two passenger trains A and B which are 240m apart and travelling in opposite directions at 164km/h and 88km/h respectively approach one another on a straight railway line. Train A is 150 metres long and train B is 100m long. Determine the time in seconds that elapses before the two trains completely pass each other. (4 mks)

18. The vertices of triangle PQR are P(O,O), Q(6, 0) and R(2, 4)

- (a) Draw triangle PQR on the grid provided. (1mk)
- b). Triangle P¹Q¹R¹ is the image of a triangle PQR under an enlargement scale factor $\frac{1}{2}$ and centre (2, 2). Write down the coordinates of triangle P¹Q¹R¹ and plot on the same grid. (2 mks)
- c). Draw triangle P¹¹Q¹¹R¹¹ the image of triangle P¹Q¹R¹ under a positive quarter turn about points (1, 1). (3 mks)
- d). Draw a triangle P¹¹¹Q¹¹¹R¹¹¹ the image of triangle P¹¹Q¹¹R¹¹ under reflection in the line y=1. (2mks)
- e). Describe fully a single transformation that maps triangle P¹¹¹Q¹¹¹R¹¹¹ onto triangle P'/Q'/R'. (2 mks)

19. A circular lawn is surrounded by a path of uniform width of 7m. The area of the path is 21% that of the lawn.

- (a) Calculate the radius of the lawn. (4 mks)
- (b) Given further that the path surrounding the lawn is fenced on both sides by barbed wire on posts at intervals of 10 metres and 11 metres on the inner and outer sides respectively. Calculate the total number of posts required for the fence. (4 mks)
- (c) Calculate the total cost of the posts if one post costs sh 105. (2 mks)

20. The velocity of a particle t seconds after passing a fixed point O, is given by $V = at^2 + bt$ m/s, where a and b are constants. Given that its velocity is 2 m/s when t = 1 sec and it returns to 0 when t = 4.5 secs, calculate;

- (a) The values of a and b. (4 mks)
- (b) Hence find;
 - i) The values of t when the particle is instantaneously at rest. (2 mks)
 - ii) The total distance travelled by the particle during the first 4 seconds. (2 mks)
 - iii) The maximum velocity attained by the particle. (2mks)

21. The table below shows marks obtained by 120 candidates. Frequencies for all the groups and also the area and height of the rectangle for the group 30 — 60 marks are shown.

Marks	0 – 10	10 – 30	30 – 60	60 – 70	70 – 100
Frequency	12	40	36	8	24
Area of rectangle			36		
Height of rectangle			1.2		

- (a) (i) Complete the table. (2mks)
- (ii) On the grid provided below, draw the histogram to represent the distribution. (4mks)
- iii) State the group in which the median mark lies. (1 mk)
- (iv) A vertical line drawn through the median mark divides the total area of the histogram into two equal parts. Using this information, estimate the median mark. (2 mks)

22. A frustum of a cone is such that one of its ends is hemispherical with a radius of 21cm and the other top end is circular with a radius of 10.5cm. The perpendicular distance between the centres of the circular parts is 20cm. Find;

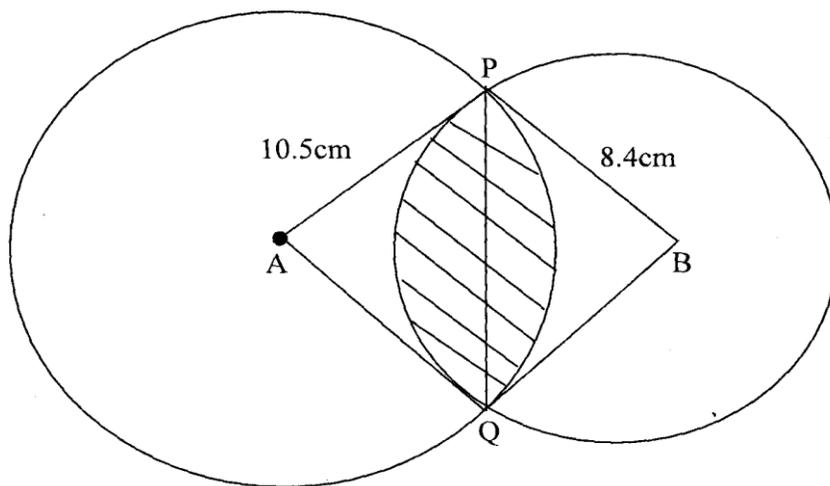
- (a) The slant length of the original cone. (3 mks)
- (b) The slant length of the frustum. (2mks)
- (c) The surface area of the frustum. (5 mks)

23. Four towns P, R, T and S are such that R is 80km directly to the north of P and T is on a bearing of 290° from P at a distance of 65km. S is on a bearing of 330° from T and a distance of 30 km. Using a scale of 1cm to represent 10km, make an accurate scale drawing to show the relative position of the towns. (4mks)

Find:

- (a) The distance and the bearing of R from T (3mks)
- (b) The distance and the bearing of S from R (2mks)
- (c) The bearing of P from S (1mk)

24. The figure below shows two circles of radii 10.5 and 8.4cm and with centres A and B respectively. The common chord PQ 9cm.



- (a) Calculate angle PAQ. (2 mks)
- (b) Calculate angle PBQ. (2 mks)
- (c) Calculate the area of the shaded part. (6 mks)

TOP KCSE PREDICTIONS

MATHEMATICS

TRIAL 10 PAPER 2

Time: 2 ½ Hours

NAME..... INDEX NO.....

SCHOOL..... SIGN.....

DATE.....

INSTRUCTIONS TO CANDIDATES.

- Write your **NAME**, **SCHOOL** and **INDEX NUMBER** in the spaces provided above.
- Sign** and write **date** of examination in the spaces provided.
- This paper consists of **two** Sections. Answer **all** Questions in sections **A** and any five in section **B**

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

- Evaluate without using Mathematical tables or a calculator. (3mks)

$$2\log 5 - \frac{1}{2}\log 6 + 2\log 40$$
- Solve for x given that the following is a singular matrix (2mks)

$$\begin{pmatrix} 1 & 2 \\ x & x-3 \end{pmatrix}$$
- Make d the subject of the formula. (3mks)

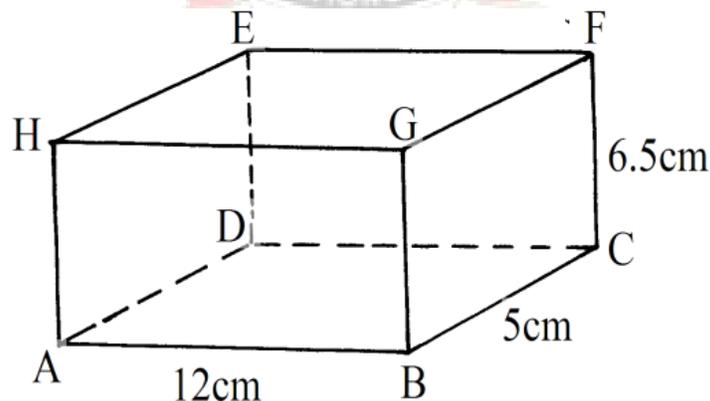
$$a^2 = \sqrt{\frac{1+d^2}{b^2} - \frac{b}{3}}$$
- Simplify $\frac{3}{\sqrt{7-2}} + \frac{1}{\sqrt{7}}$ leaving your answer in the form $a + b\sqrt{c}$, where a, b and c are rational numbers. (3mks)
- Calculate the percentage error in the volume of a cone whose radius is 9.0cm and slant length 15.0cm. (3mks)

6. A quantity A is partly constant and partly varies inversely as a quantity B. Given that $A = -10$ when $B = 2.5$ and $A = 10$ when $B = 1.25$, find the value of A when $B = 1.5$. (4mks)
7. The table below shows corresponding values of x and y for a certain curve.

y	1.0	1.2	1.4	1.6	1.8	2.0	2.2
x	6.5	6.2	5.2	4.3	4.0	2.6	2.4

Using 3 strips and mid-ordinate rule, estimate the area between the curve x axis, the line $x = 1$ and $x = 2.2$. (2mks)

8. 14 people can build 10 huts in 30 days. Find the number of people working at the same rate that will build 18 similar huts in 27 days. (3mks)
9. The coordinates of two airports M and N are $(60^{\circ}\text{N}, 35^{\circ}\text{W})$ and $(60^{\circ}\text{N}, 15^{\circ}\text{E})$ respectively. Calculate;
- (i) The longitude difference. (1mk)
- (ii) the shortest time an aeroplane whose speed is 250 knots will take to fly from M to N along a circle of latitude. (2mks)
10. (a) Expand $(x - 0.2)^5$ in ascending powers of x. (2mks)
- (b) Use your expansion up to the fourth term to evaluate 9.8^5 . (2mks)
11. The figure below is a cuboid ABCDEFGH. $AB = 12\text{cm}$, $BC = 5\text{cm}$ and $CF = 6.5\text{cm}$.



- (a) State the projection of AF on the plane ABCD. (1mk)
- (b) Calculate the angle between AF and the plane ABCD correct to 2 decimal places. (3mks)
12. Show that $\frac{\sin x(\cos x + 1)}{\cos x} = \sin x + \tan x$. (3mks)

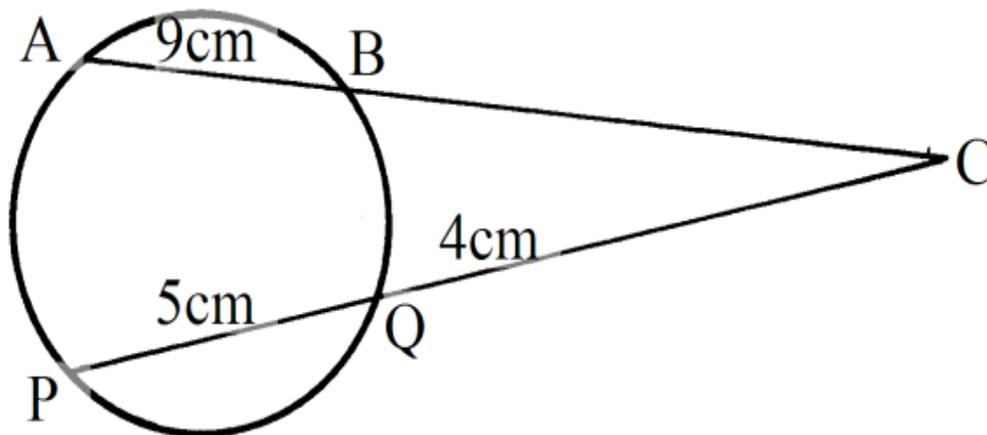
13. The mid-point of AB is $(1, -1.5, 2)$ and the position vector of a point A is $-1\mathbf{i} + \mathbf{j}$. Find the magnitude of \vec{AB} where O is the origin. (3mks)

14. Draw a line of best fit for the graph of y against x using the values in the table below. Hence determine the equation connecting y and x.

x	0.4	1.0	1.4	2.0	2.5
y	0.5	1.0	1.2	1.5	2.0

15. A coffee dealer mixes two brands of coffee, x and y to obtain 40kg of the mixture worth Ksh. 2,600. If brand x is valued at Ksh. 70 per kg and brand y is valued at Ksh. 55 per kg. Calculate the ratio in its simplest form in which brands x and y are mixed. (4mks)

16. The figure below shows a circle centre O. AB and PQ are chords intersecting externally at a point C. AB = 9cm, PQ = 5cm and QC = 4cm. Find the length of BC. (3mks)



SECTION II : (50 MARKS)

Answer only five questions in this section

17. (a) Salome invested Ksh. 250,000 for $2\frac{1}{2}$ years in an account which paid 16% compound interest p.a. The interest is compounded quarterly. At the end of $2\frac{1}{2}$ years she withdrew all the amount and spent it to the nearest thousands to buy four similar motor cycles. She earned an average of Ksh. 10,000 from each motorcycle per month.

(i) the amount she withdrew at the end of $2\frac{1}{2}$ years. (2mks)

(ii) the cost of each motorcycle. (2mks)

(iii) the total earnings from the motorcycles for 3 years. (2mks)

(b) She decided to sell the motorcycles after depreciating at an average rate of 20% p.a for the 3 years.

Find:-

- (i) the new value of each motorcycle after depreciation. **(2mks)**
- (ii) the profit earned from her initial investment to the nearest shilling. **(2mks)**

18. The table below shows the distribution of ages in years of 50 adults who attended a clinic:-

Age	21-30	31-40	41-50	51-60	61-70	71-80
Frequency	15	11	17	4	2	1

- (a) State the medium class **(1mk)**
- (b) Using a working mean of 45.5, calculate:-
 - (i) the mean age **(3mks)**
 - (ii) the standard deviation **(3mks)**
 - (iii) Calculate the 6th docile. **(3mks)**

19. An arithmetic progression (AP) has the first term a and the common difference d.

(a) Write down the third, ninth and twenty fifth terms of the AP in terms of a and d. **(1mk)**

(b) The AP above is increasing and the third, ninth and twenty fifth terms form the first three consecutive terms of a Geometric Progression (G.P) The sum of the seventh and twice the sixth terms of the AP is 78. Calculate:-

- (i) the first term and common difference of the AP. **(5mks)**
- (ii) the sum of the first nine terms of the AP. **(2mks)**
- (iii) The difference between the fourth and the seventh terms of an increasing AP. **(2mks)**

20. The probability that three candidates; Anthony, Beatrice and Caleb will pass an examination are $\frac{3}{4}$, $\frac{2}{3}$ and $\frac{4}{5}$ respectfully. Find the probability that:-

- (a) all the three candidates will pass **(2mks)**
- (b) all the three candidates will not pass. **(2mks)**
- (c) only one of them will pass **(2mks)**
- (d) only two of them will pass. **(2mks)**
- (e) at most two of them will pass. **(2mks)**

21. (a) Complete the table below for the function $y = (3 - x)(x + 1)$

x	-3	-2	-1	0	1	2	3	4
x+1	-2	-1		1		3	4	
3-x	6	5	4		2	1		-1
y	-12	-5		3	4		0	-5

(2mks)

(b) Use the values in the table to draw the graph of $y = (3 - x)(x + 1)$. Use the following scale.

Horizontal axis 2cm for 1 unit

Vertical axis 1cm for 1 unit.

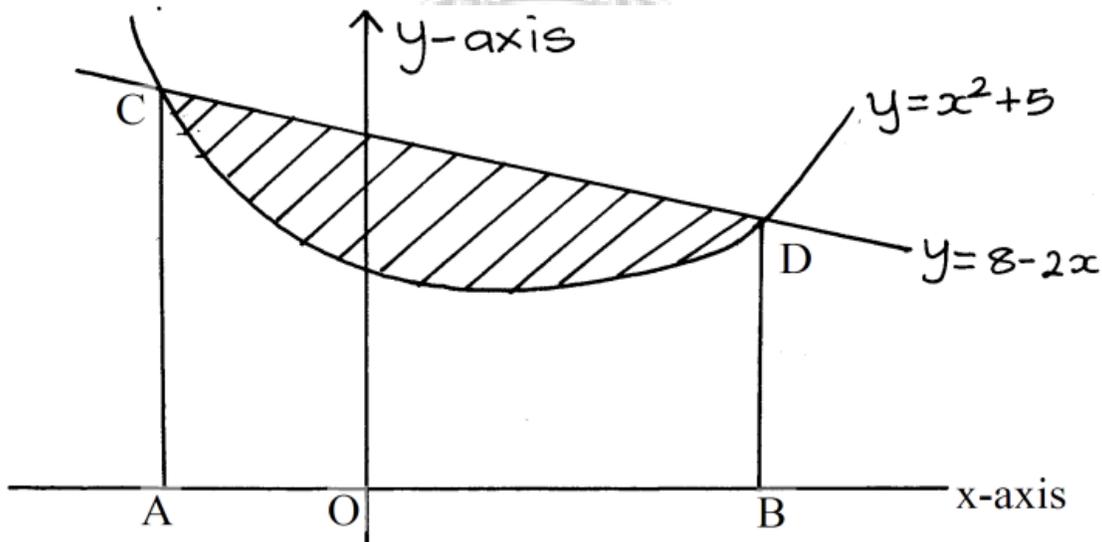
(3mks)

(c) Use your graph in part (b) above to solve the following quadratic equations

- (i) $-x^2 + 2x + 3 = 0$ (2mks)
 (ii) $-x^2 + x + 6 = 0$ (3mks)

22. Use a ruler and a pair of compasses only all constructions in this question.
- (a) Construct the rectangle ABCD such that $AB = 7.2\text{cm}$ and $BC = 5.6\text{cm}$. (3mks)
- (b) Constructs on the same diagram the locus L_1 of points equidistant from A and B to meet with another locus L_2 of points equidistant from AB and BC at M. measure the acute angle formed at M by L_1 and L_2 . (3mks)
- (c) Construct on the same diagram the locus of point K inside the rectangle such that K is less than 3.5cm from point M. Given that point K is nearer to B than A and also nearer to BA than BC, shade the possible region where K lies. Hence calculate the area of this region. Correct to one decimal place. (4mks)

23. The diagram below, not drawn to scale shows part of the curve $y = x^2 + 5$ and the line $y = 8 - 2x$. The line intersects the curve at points C and D. Lines AC and BD are parallel to the y-axis.



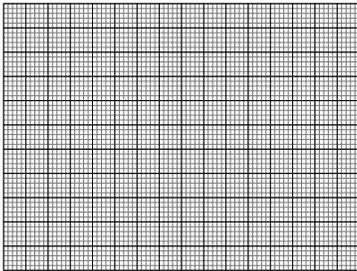
- a) Determine the coordinates of C and D. (4mks)
- b) Use integration to calculate the area bounded by the curve and the x-axis between the points C and D. (3mks)
- c) Calculate the area enclosed by the lines CD, CA, BD and the x-axis. (3mks)
- d) Hence determine the area of the shaded region. (1mk)
24. A tailoring business makes two types of garments A and B. Garment A requires 3 metres of material while garment B requires $2\frac{1}{2}$ metres of material. The business uses not more than 600 metres of material daily in making both garments. It must make not more than 100 garments of type A and nor less than 80 of type B each day.

(a) Write down three inequalities from this information other than $x \geq 0$ and $x \geq y$, where x is the number of garments of type A and y the number of garments of type B.

(3mks)

(b) Graph these inequalities.

(3mks)



(c) If the business makes a profit of sh 80 on garment A and a profit of sh. 60 on garment B, how many garments of each type must it make in order to maximize the profit and what is the total profit?

(4mks)

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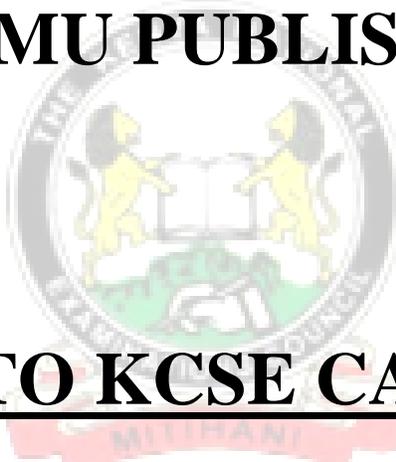
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