KCSE FINAL PREDICTION

MATHEMATICS

(KCSE PREDICTIONS 1-10)

An Exclusive Top-Notch KCSE Model Prediction Questions.

A special preview of Possible Expected sample KCSE Questions Most likely to be Tested in the Forthcoming KNEC examinations.

SERIES 1

Proudly prepared by an Exceptional team of Experienced Veteran KNEC examiners within the National Group of Mwalimu Agency.

For Marking Schemes/Answers

0746 222 000

MWALIMU AGENCY

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 1 PAPER 1

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
- ***d)*** *All your workings must be clearly shown as must be awarded for correct working even if the answer is wrong.*
- ***e)*** *Non programmable silent scientific calculators and KNEC mathematical tables may be used.*

FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Evaluate $\dfrac{\frac{3}{4}+1\frac{5}{7}\div\frac{4}{7}of\,2\frac{1}{3}}{\left(1\frac{3}{7}-\frac{5}{8}\right)x\frac{2}{3}}$ **(3mks)**

2. A fruit juice dealer sell the juice in packet of 300ml, 500ml and 750ml. find the size of the smallest container that can fill each of the packets and leave a remainder of 200ml. **(3mks)**

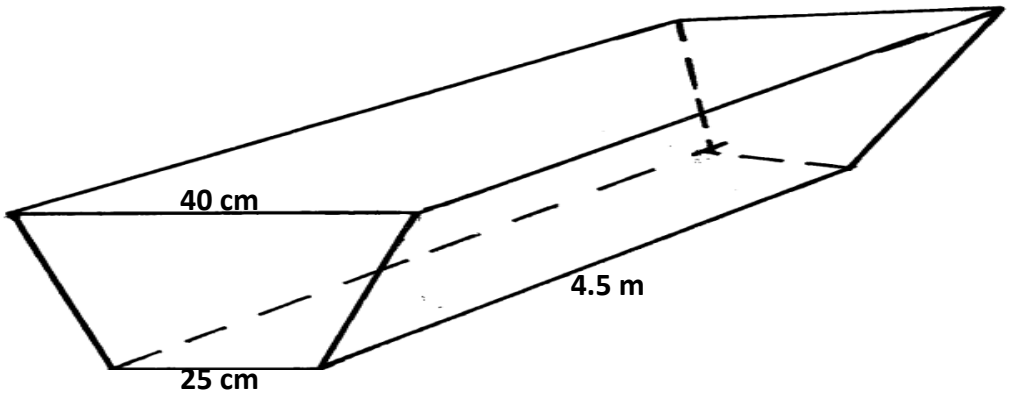
3. Without using table or calculators, evaluate $\sqrt{\dfrac{0.0032+0.0608}{1.44x0.4}}$ **(3mks)**

4. Simplify the following quadratic expression. $\dfrac{8b^2-50a}{(2b+5a)^2}^2$ **(3mks)**

5. In a fundraising 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 is changed to 5: 4. **(3mks)**

6. A student expanded $(x+y)^2$ incorrectly as x^2+y^2 calculate the percentage error in the answer if $x = 4$ and $y = 6$ **(3mks)**

7. The figure below shows a trough which is 40 cm wide at the top and 25 cm wide at the bottom. The trough is 20cm deep and 4.5 m long. Calculate the capacity of the trough in litres. **(3mks)**

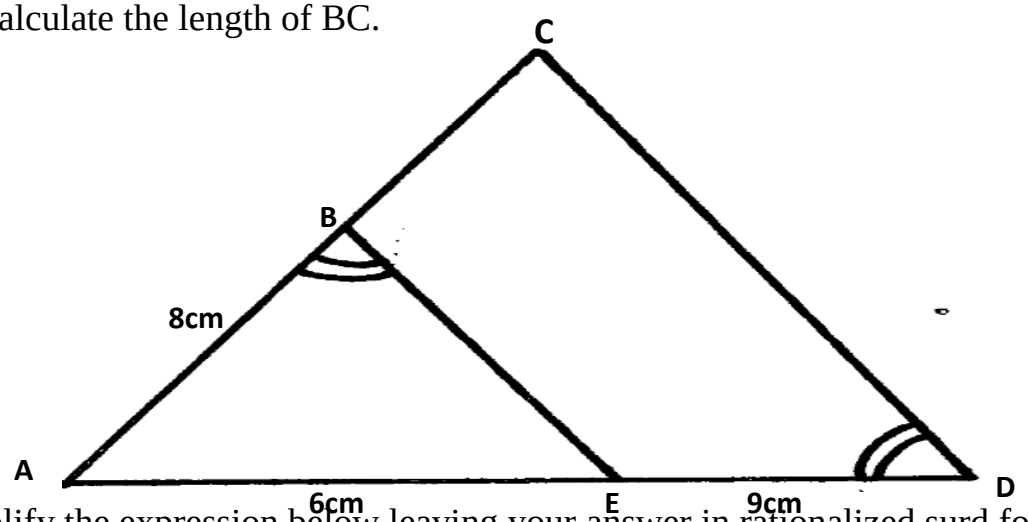


8. Jemima's team entered a contest where teams of students compete by answering questions that earn either 3 points of 5 points. Jemima's team scored 44 points after answering 12 questions correctly. How many five-points questions did the team answer correctly. **(3mks)**

9. Using compass and ruler only construct a triangle ABC such that AB= 6cm ,BC = 5cm and angle ABC = 67.5° measure the length of AC. **(3mks)**

10. Use table of reciprocals only to work out : $\dfrac{13}{0.156}-\dfrac{3}{0.6735}$ **(3mks)**

11. In the figure below, angle ABE is equal to angle ADC AE = 6cm, ED = 9cm and AB = 8cm, calculate the length of BC. **(3mks)**



12. Simplify the expression below leaving your answer in rationalized surd form of $a + b\sqrt{c}$

$$\frac{1+\tan 120^o}{1+Cos\ 330^o}$$ **(4mks)**

13. The two sides of a triangle are given 6 cm and 5 cm. the angle between them is 130°. calculate the area of the triangle (giving your answer to 2 decimal places) **(3mks)**

14. Given that $k\underset{\sim}{m} + h\underset{\sim}{n} = \underset{\sim}{r}$ and that $\underset{\sim}{m} = \begin{pmatrix}-3\\-2\end{pmatrix}$ $\underset{\sim}{n} = \begin{pmatrix}0\\4\end{pmatrix}$ and $\underset{\sim}{r} = \begin{pmatrix}-6\\0\end{pmatrix}$. Find the scalars k and h **(3mks)**

15. A Kenyan bank buys and sells foreign currencies as shown.

	Buying (Kshs.)	Selling (Kshs.)
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 shillings at the bank. While in Kenya, he spent a total of Kshs. 289,850 and then converted the remaining Kenya shilling to Japanese Yen. Calculate the amount in Japanese Yen that he received. **(3mks)**

16. The length of a rectangular mat is 1.5 m longer that its width, Find the length of the mat if its area is 6.5 m^2(give your answer to 4 significant figures) **(3mks)**

SECTION II

Answer only five questions from this section

17. Five towns V,W,X,Y and Z are situated such that W is 200km east of V. X is 300km from W on a bearing of 150°. Y is 350km on a bearing of 240° from X. Z is 150° from V but 200° from X.

Draw the diagram representing the position of the towns. (use a scale of 1cm to represent 50km) **(5mks)**

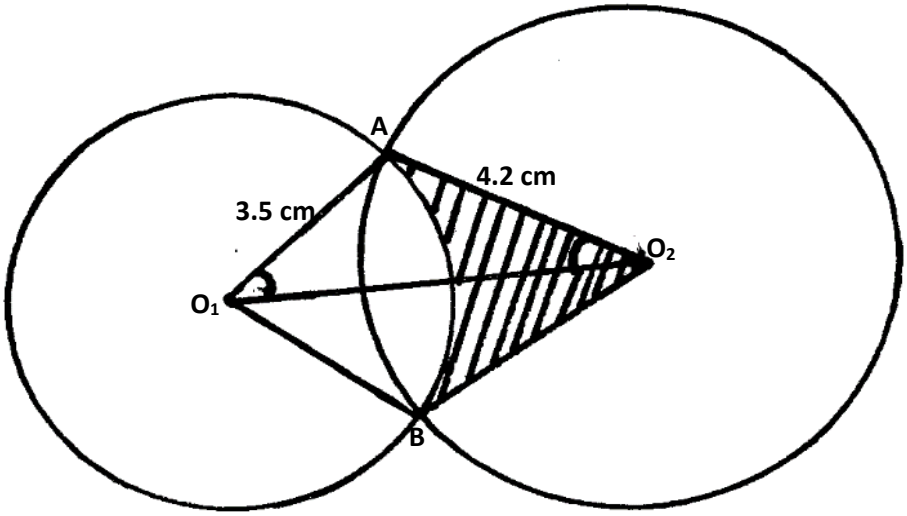
(b) From the diagram determine

(i) the distance in km of V from Z **(1mk)**

(ii) The bearing of Y from W **(1mk)**

(c) A plane heading to town X takes off from town Y and flies upwards at a constant angle which is less than 90^o. After flying a distance of 350km in the air it sees town X at an angle of depression of 50^o. Calculate the distance of the plane from X at this point to the nearest km. **(3mks)**

18. Two circles of radii 3.5 and 4.2 cm with centres O_1 and O_2 respectively intersect at points A and B as shown in the figure below. The distance between the two centres is 6 cm.



Calculate

(a) The size of $\angle AO_1B$ (to the nearest degree) **(3mks)**

(b) The size of $\angle$ A O_2 B (to the nearest degree) **(3mks)**

(c) The area of quadrilateral O_1AO_2B, correct to 2 decimal places. **(2mks)**

(d) The shaded area correct to 2 significant figures. (take $\pi\ ^{22}/_{7}$) **(2mks)**

19 (a) Complete the table below for the function $y = 2x^2 + 4X - 3$

X	-4	-3	-2	-1	0	1	2
$2x^2$	32		8	2	0	2	
4x-3			-11		-3		
Y			-3			3	13

(b) Draw the graph of the function $y = 2x^2 + 4x - 3$ on the grid provided. **(3mks)**

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

(d) Use your graph to obtain the roots of the equation $2x^2 + x - 5 = 0$ to 1 decimal place. **(3mks)**

(e) Draw the line of symmetry to pass through the turning point of this curve. **(1mk)**

20. The table below shows patients who attend a clinic in one week and were grouped by age as shown in the table below.

(a) Estimate the mean age **(4mks)**

Age x years	$0 \leq x < 5$	$5 \leq x < 15$	$15 \leq x < 25$	$25 \leq x < 45$	$45 \leq x < 75$
Number of patients	14	41	59	70	15

(b) On the grid provided draw a histogram to represent the distribution. **(3mks)**
Use the scales: 1cm to represent 5 units on the horizontal axis 2 cm to represent 5 units on the vertical axis.

(c) (i) State the group in which the median mark lies **(1mk)**

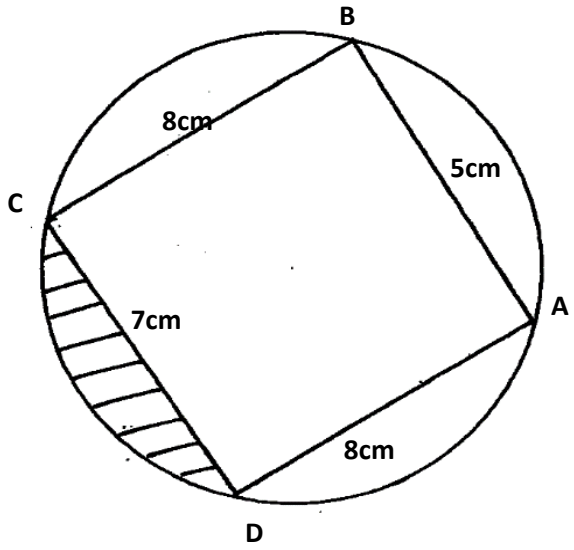
(ii) A vertical line drawn through the median mark divides the total area of the histogram into two equal. Using this information estimate the median mark. **(2mks)**

21. (a) Show by shading the unwanted region, the region which satisfies the following inequalities **(8mks)**

$y > -3$
$4y \leq 5x + 20$
$2y < -5x + 10$
$4y \leq -3x - 12$

(b) Calculate the area of this region in a square units **(2mks)**

22. The figure below (not drawn to scale) shows a quadrilateral **ABCD** inscribed in a circle. **AB** = 5cm, **BC** = 8cm,**CD** = 7cm and **AD** = 8cm. **AC** is one of the diagonals of length 10cm.



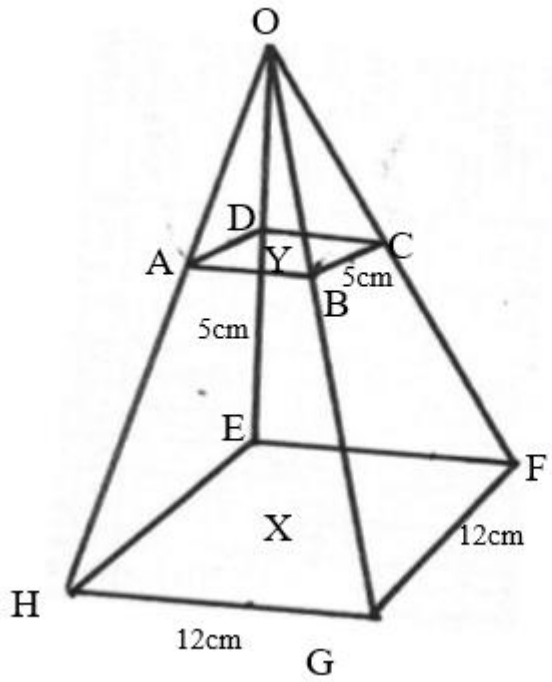
(a) Find the size of angle **ABC**. **(3mks)**

(b) Find the radius of the circle. **(2mks)**

(c) Hence, calculate the area of the shaded region. **(5mks)**

23. The diagram shows a frustum ABCDEF GH formed from a smaller pyramid ABCDO. The base the top of the frustums are squares of sides 12cm and 5 cm respectively. If Ob = 6cm and each of the slant edges of the frustum is 15 cm long. Calculate to 1 decimal place:

(a) the height OY of the small pyramid **(3mks)**



(b) the vertical height X Y of the frustum **(4mks)**

(c) the volume of the frustum **(3mks)**

24. The table below shows the income tax rates

Total income per month In Kenya Pounds	**Rate in shillings per pound**
1 - 325	2
326 - 650	3
651 - 975	4
976 - 1300	5
1301 and above	7

Mr. Musango earned a basic salary of shs. *x* and a house allowance of shs. 3000 per month. He claimed a tax relief for a married person of shs. 455 month. He paid shs. 1794 income tax per month.

a) Calculate Mr. Musango's basic salary in shs. per month **(6mks)**

b) Apart from the income tax, the following monthly deductions are made. Service charge – shs. 100, health insurance fund – shs 280 and 2% of his basic salary as widow and children pension scheme.

Calculate:

i) The total monthly deductions **(2mks)**

ii) Mr. Musango's net income p.m **(2mks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 1 PAPER 2

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

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SECTION 1

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Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Use logarithms tables to evaluate

$$\sqrt[3]{\frac{36.72\times(0.46)^2}{185.4}}$$ **(4mks)**

2. T is a transformation represented by the matrix $\begin{pmatrix}5x & 2\\ -3 & x\end{pmatrix}$ under T, a square of area $10cm^2$ is mapped onto a square of area $110cm^2$. Find the value of x **(3mks)**

3. Given that $2\cos(2x-30^0)=-\frac{6}{5}$ find x where $180^0\le x\le 360^0$ **(3mks)**

4. Make A the subject of the formula

$$T=\frac{2m}{n}\sqrt{\frac{L-A}{3K}}$$ **(3mks)**

5. A quantity P is partly constant and partly varies inversely as square of t. P = 6 when t = 6 and p = 18 when t = 3. Find t when p = 11 **(3mks)**

6. i) Expand $\left(5+\frac{x}{2}\right)^6$ up to the term in x^3. **(2mks)**

ii) Use your expansion to estimate the value of $\left(\frac{11}{2}\right)^6$. Correct to one decimal place. **(2mks)**

7. Solve for x in the equation. **(3 Mks)**

$$\text{Log}_8(x+6)-\text{Log}_8(x-3)=\frac{2}{3}$$

8. Solve for x and y in the simultaneous equation below. **(3 mks)**

$$xy+6=0$$
$$x-2y=7$$

9. The size of each interior angle of a regular polygon is five times the size of the exterior angle. Find the number of sides of the polygon. **(3mks)**

10. If $\frac{1}{3-\sqrt{5}}-\frac{2+2\sqrt{5}}{3+\sqrt{5}}=a+b\sqrt{c}$, find the value of a, b and c **(3 mks)**

11. The data below shows marks scored by 8 form four students in Molo district mathematics contest 44, 32, 67, 52, 28, 39, 46, 64.Calculate the mean absolute deviation**.** **(3 Mks)**

12. Steve deposited ksh.50, 000 in a financial institution in which interest is compounded quarterly. If at the end of second year he received a total amount of ksh79, 692.40. Calculate the rate of interest p.a **(3 Mks)**

13. The points with coordinates (5,5) and (-3,-1) are the ends of a diameter of a circle Centre A

Determine:

(a) The coordinates of A **(1mk)**

(b)The equation of the circle, expressing it in form $x^2 + y^2 + ax + by + c = 0$ Where

Marks	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
Frequency	2	6	10	16	24	20	12	8	2

a, b, and c are constants **(2mks)**

14. Pipe x can fill an empty tank in 3 hours while pipe y can fill the same tank in 6 hours. When the tank is full, it can be emptied by pipe z in 8 hours. pipe x and y are opened at the same time when the tank is empty. If one hour later pipe z is also opened, find the total time taken to fill the tank. **(3marks)**

15. Fatima bought maize and beans from Kami. She mixed the maize and beans in the ratio 3: 2 she bought the maize at sh.90 per kg and the beans at sh.150 per kg. If she was to make a profit of 30% what would be the selling price of 1kg of the mixture. **(3mks)**

16. Given $A=\begin{pmatrix}7 & 4\\ 5 & 3\end{pmatrix}$ and $B=\begin{pmatrix}2 & 11\\ 1 & 6\end{pmatrix}$ find $A^{-1}B^{-1}$ **(3mks)**

SECTION II

17. a) A figure whose co-ordinates are A(-2, -2), B(-4, -1), C(-4, -3) and D (-2, -3) undergoes successive transformations ERS; where E, R and S are transformations represented by the matrices,

$$E=\begin{pmatrix}-2 & 0\\ 0 & -2\end{pmatrix}, S=\begin{pmatrix}0 & -1\\ -1 & 0\end{pmatrix} \text{ and } R=\begin{pmatrix}0 & 1\\ -1 & 0\end{pmatrix}$$

On the grid provided, show the figure ABCD and its image under the successive transformations ERS. **(6mks)**

b)Find the matrix representing the single transformation mapping the image found in (a) above back the object figure ABCD. **(2mks)**

c)Triangle PQR has vertices at P(2, 2), Q(4, 1) and R(6, 4). On the same grid, show the image of triangle PQR under a shear with line y = 2 invariant and point R(6, 4) is mapped onto $R^1(2, 4)$. **(2mks)**

18. The following are marks by form four students in a mathematics test.

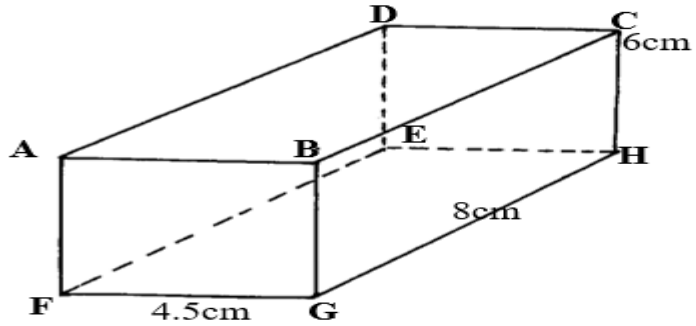
Using an assumed mean of 54.5, calculate the

(a) Mean mark **(4mks)**

(b) Variance **(4mks)**

(c) Standard deviation **(2mks)**

19. The diagram below represents a Cuboid **ABCDEFGH** in which **FG** =4.5cm, **GH** =8cm **HC**=6m



(a) Calculate the length **FC** **(2mrks)**

(b) **(i)**The size of the angle between the lines **FC** and **FH** **(2mks)**

(ii) Size of the angle between the line **AB** and **FH.** **(2mks)**

(c) The size of the angle between the planes **ABHE** and the plane **FGHE.(2mks)**

(d) The total surface area of the cuboid (closed) **(2mks)**

20. Complete the table below, giving all your values correct to 2 d. p. for the functions $y = cos\ x$ and $y = 2cos\ (x + 30)^0$

x^0	0^0	60^0	120^0	180^0	240^0	300^0	360^0	420^0	480^0	540^0
Cos x	1.00			-1.00		0.50				
2cos(x + 30)	1.73		-1.73		0.00					

State:

(i)The period **(1mk)**

(ii)Phase angle **(1mk)**

(c) On the same axes draw the waves of the functions$y = cos\ x$ and $y = 2cos\ (x + 30)^0$ for $0^0 \leq x \leq 540$.Use the scale 1cm rep 30^0 horizontally and 2cm rep 1 unit vertically.**(4mks**

(d)Use your graph above to solve the inequality $2\cos(x + 30^o) \leq \cos$ **x** **(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)**

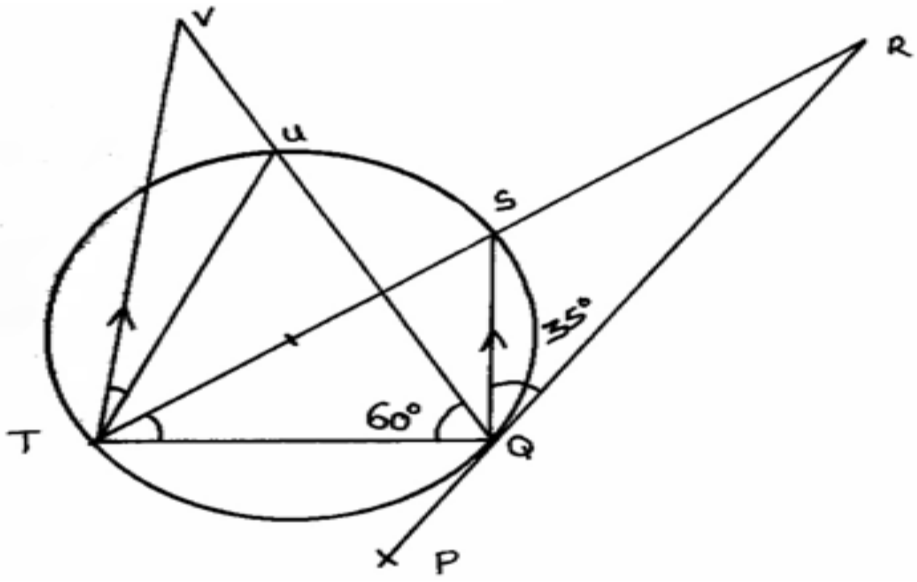
(a) The teacher asked a student to pick two pens from the box, one at a time, without replacement. Find the probability that

(i) Both pens are of the same colour. **(3mks)**

(ii) They are of different colours. **(2mks)**

(b) 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, 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 SQR = 35° and TQV = 60°.



(a) Find the following angles, giving reasons for each answer.

(i) QTS. **(2mks)**

(ii) QRS. **(2mks)**

(iii) QVT. **(2mks)**

(iv) UTV. **(2mks)**

(v) QUT. **(2mks)**

23. Use ruler and a pair of compasses only in this question

a) Construct triangle ABC such that AB = 6cm, AC=BC and angle ACB = 135° **4mks**

b) On one side only construct the locus of P such that:

i) < APB = 67.5° **1mk**

ii) area of triangle , APB = 9cm² **3mks**

c) i) Locate P1 and P2 the two possible positions of P which satisfy the two conditions above **1mk**

ii) Measure the distance between P1 and P2. **1mk**

24. 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 Mks)**

(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 Mks)**

(ii) The sum of the first nine terms of the arithmetic progression **(2 Mks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 2 PAPER 1

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

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SECTION II

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Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Without using tables or calculators, evaluate **(3mks)**

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

2. A line which joins the points A(3,K) and B(-2,5) is perpendicular to the line 5y+2x = 10. Find the value of K. **(3mks)**

3. The exterior angle of a regular polygon is equal to one –third of the interior angle. Calculate the number of sides of the polygon. **(3mks)**

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

	Buying	Selling
1 Euro	Sh . 147.56	Sh. 148.00
1 US Dollar	Sh. 74.22	Sh 74.50

An American tourist arrived in Kenya with 20, 000 Euros. He converted all the Euros into Kenya shillings at the bank. He spent Ksh 2, 510, 200 while in Kenya and converted the remaining into US Dollars at the bank. Find the amount in dollars that he received to the nearest dollar. **(3mks)**

5. Solve the equation $(\log x)^2 - \log x - 2 = 0$ **(4mks)**

6. During a certain ceremony, goats and chicken were slaughtered. The number of heads for both goats and chicken was 45. The total number of legs was 100. Determine the exact number of goats and chicken slaughtered. **(4mks)**

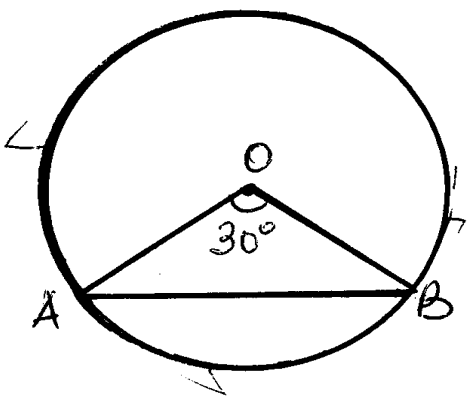
7. Find the integral values of X which satisfy the inequality

$x+11>4x-9\geq 2(2-x)$ **(3mks)**

8. Momanyi paid Ksh 160 for a shirt after getting a discount of 20%. The vendor made a profit of 30% on sale of this shirt. What percentage profit would the vendor have made if no discount was allowed? **(3mks)**

9. The figure below shows a circle centre O. Chord AB subtends 30^0 at the centre. If the area of the minor segment is 5.25cm^2, find the radius of the circle $\left(Take\ \pi=\frac{22}{7}\right)$

(3mks)



10. Expand the expression **(2mks)**

$(x^2-4)(x^2+4)(x^4-16)$

11. A point P is 40m on a bearing of 320^0 from a point R. The bearing of point Q from R is 080^0 and 60m from it. Using a scale of 1:10. Show the relative positions of P,Q and R, hence find the distance PQ. **(3mks)**

12. The figure below shows a triangle

Draw the net of the solid hence or otherwise find its surface area. **(3mks)**

13. Simplify $\dfrac{a^4-b^4}{a^3-ab^2}$ **(3mks)**

14. Solve for x in the equation **(3mks)**

$2^{x-1}\times\left(\dfrac{1}{8}\right)^{1-x}=4^{3x-1}$

15. A solid cone of radius 13cm and height 18cm is recasted into a hemispherical solid. Find the surface area of the hemisphere to 1d.p $(Use\ \pi=3.142)$ **(4mks)**

16. Using a ruler and a pair of compasses only, construct a rhombus ABCD given that AB = 6cm and $\angle ABC=105^0$. **(3mks)**

SECTION II (50 MARKS)

Answer any five questions in this section

17. A cinema hall has 200 seats. Ticket prices are Sh 50 for an adult and sh 25 for a child

(a) One evening 80% of the seats in the cinema hall were occupied and 20 of the people present were children. Calculate the total money collected from the sale of tickets.**(3mks)**

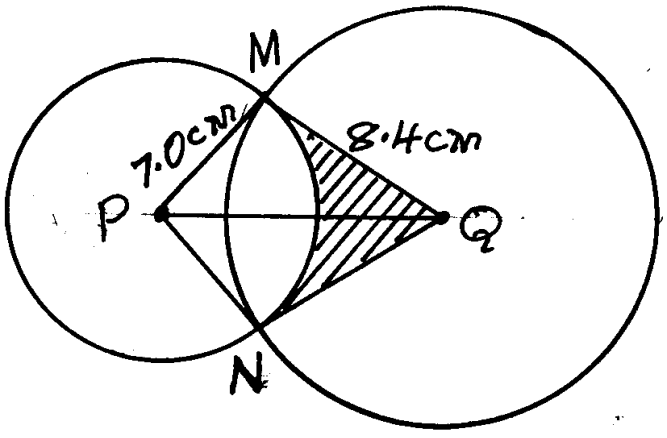
(b) On another evening, x children were present and all seats were occupied. The money colleted from the ticket sales was sh 9050. Calculate the value of x. **(3mks**

(c) The money collected from tickets for a week is divided among costs, wages and profits in the ratio 2:3:7. If the profit for the week is sh 63,000. Calculate

(i) total amount collected for the week. **(2mks)**

(ii) the cost for the week **(2mks)**

18. Two circles of radius 7cm and 8.4cm with centres P and Q respectively intersect at points M and N as shown below.



Given that the centres of the circles are 12cm apart, find

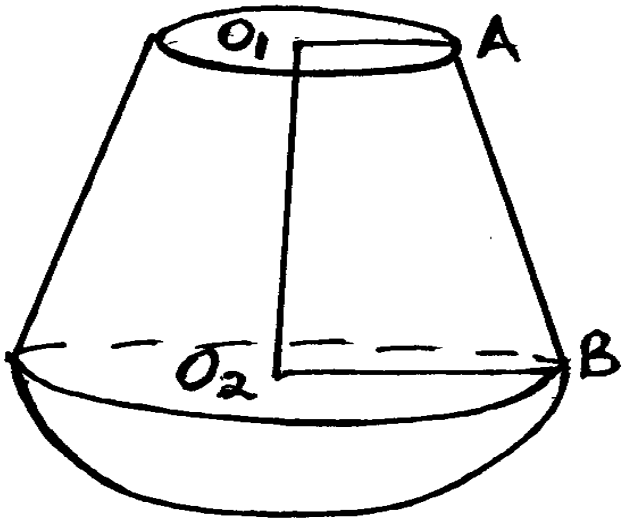
(a) Angle MPN **(3mks)**

(b) Angle MQN **(3mks)**

(c) The area of quadrilateral MPNQ correct to 2dp **(2mks)**

(d) The area of the shaded part correct to 2d.p (Take $\pi = \frac{22}{7}$) **(2mks)**

19. The diagram below represents a solid consisting of a hemispherical bottom and a conical frustum at the top. O_1O_2 = 4cm, O_1,B= 4.9cm and O_1,A = 2.1cm (Take $\pi = 3.142$)

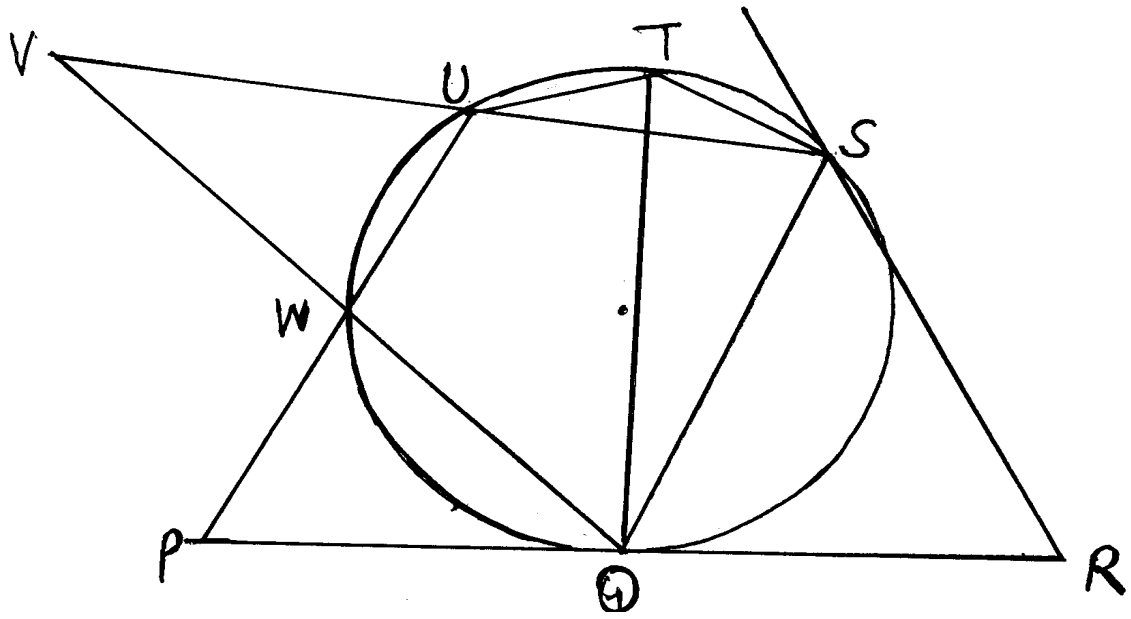


(a) Determine the height of the chopped off cone and hence the height of the bigger cone. **(2mks)**

(b) Calculate the surface area of the solid to 2d.p. **(4mks)**

(c) Calculate the volume of the solid to 4 s.f **(4mks)**

20. The figure below show a circle with chord UW and tangent PQR meeting at P. RS is another tangent that meets tangent PQR at R



Given that

$\angle WUS = 82^O, \angle QWU = 150^0, \angle WPQ = 72^0$ *and* $\angle RQS = 28^0$, *Find by giving reasons*

(a) $\angle TSQ$ **(2mks)**

(b) $\angle$ SQV **(2mks)**

(c) $\angle$ WVU **(2mks)**

(d) $\angle$ QTS **(2mks)**

(e) $\angle$ PWQ **(2mks)**

21. **(a)** Find A^{-1} given that A = $\begin{pmatrix} 2 & 4 \\ 3 & 4 \end{pmatrix}$ **(2mks)**

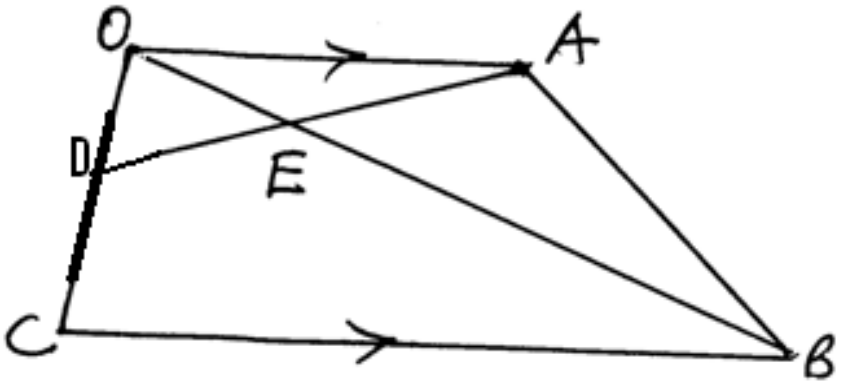
(b) Afflex bought 16 shirts and 32 trousers for sh 20, 800, in January.If he had bought 15 shirts and 20 trousers, he would have saved sh. 6, 300.

(i) From a matrix equation to represent the above information. **(1mk)**

(ii) Use matrix A^{-1} to find the price of each item. **(3mks**

(c) The following Month the cost of a shirt increased by 10% while that of a trouser increased by 5%. If he bought 12 shirts and 10trousers, find the percentage increase in the total cost of both items. **(4mks)**

22. The figure below shows a trapezium OABC in which OA is paralled to CB.



Given CB = 4OA, D is a point on OC such that OC:OD = 5:1 AD and OB intersect at E. If OA = $\underset{\sim}{a}$ and OD = $\underset{\sim}{d}$

(a) Express interms of $\underset{\sim}{a}$ and $\underset{\sim}{d}$

(i) AD **(1mk)**

(ii) OB **(2mks)**

(b) (i) If AE = k AD where k is a scalar, express in terms of a, d and k

OE **(2mks)**

(ii) If OE = hOB where h is a scalar, find values of h and k **(4mks)**

(iii) State the ratio of DE: EA **(1mk)**

23. Use data below to answer the questions that follow

Class	1 – 15	16 – 30	31 – 45	46 – 60	61 – 75	76 – 90	91 – 105
Frequency	4	1	7	9	2	5	2

(a) State the modal frequency. **(1mk)**
(b) Calculate the mean using 38 as an assumed mean **(5mks)**
(c) State the median class. **(1mk)**
(d) Calculate the Median **(3mks)**

24. Below are the measurements of a wheat field using a baseline XY recorded in metres.

	Y	
	240	
TO R 60	190	
	180	75 TO Q
	150	50 TO P
TO S 100	120	
	100	100 TO N
TO T 30	50	
	20	20 TO M
	X	

(a) Using a scale of 1cm represents 20m. Sketch the map of the wheat field.**(4mks)**
(b) Find the area of the field in hectares. **(4mks)**
(c) If the cost of one hectare is sh 65,000 find the cost of the wheat field. **(2mks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 2 PAPER 2

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
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- ***e)*** *Non programmable silent scientific calculators and KNEC mathematical tables may be used.*

FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Use logarithm tables to evaluate **(4mks)**

$$\sqrt[3]{\frac{0.0485\times\log 3.846}{(0.9834)+88.3}}$$

2. Make Q the subject of the formula. (3mks)

$$T=\sqrt[3]{\frac{Q^2}{Q^2-1}}$$

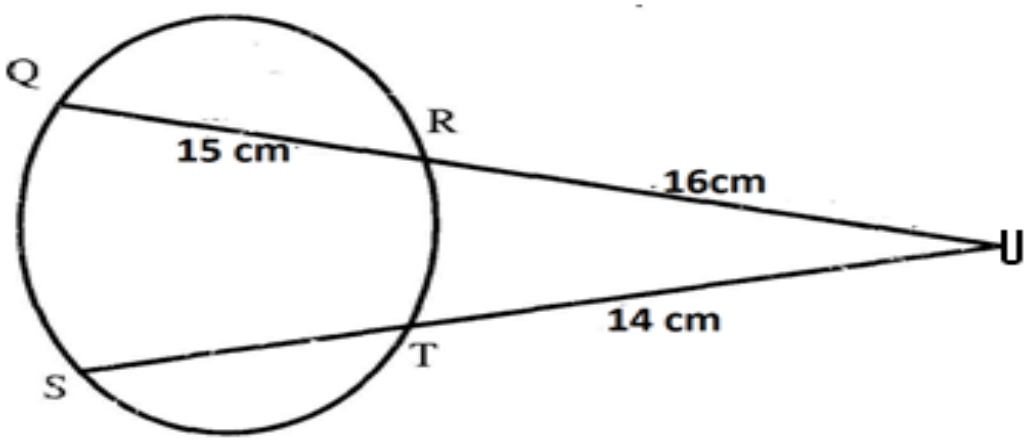
3. A student misreads $(p+q)^2$ as P^2+q^2 find the percentage error if p = 5 and q = 3. **(3mks)**

4. **(a)** Expand $(x-y)^6$ upto the term with y^3 **(2mks)**

(b) Use the first four terms in ascending powers of y to find the approximate value of $(0.98)^6$.Correct to 4 significant figure **(2mks)**

5. Given that matrix $\underset{\sim}{A}=\begin{pmatrix}2 & 1\\ 3 & 4\end{pmatrix}$, Find matrix $\underset{\sim}{B}$ such that: $A^2=\underset{\sim}{A}+\underset{\sim}{B}$ **(3mks)**

6. Chord QR and ST intersect at U. QR = 15cm, RU = 16cm and TU = 14 cm. **(3mks)**



Find the length SU to 2 dp

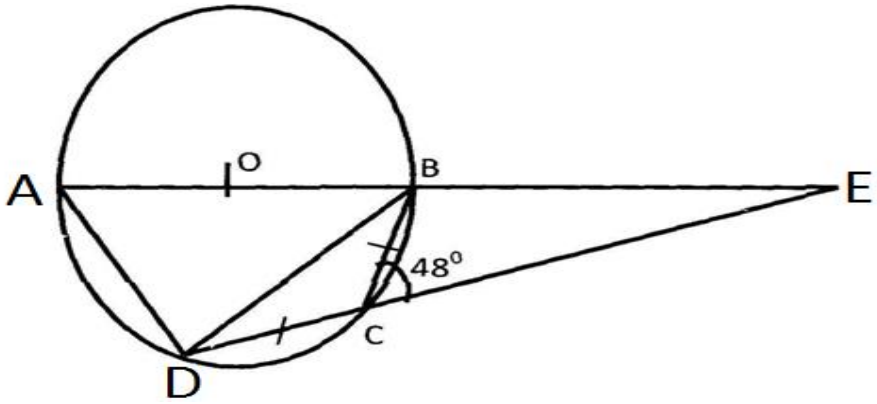
7. Simplify $\frac{3}{\sqrt{5}-2}+\frac{1}{\sqrt{5}}$ leaving your answer in the form $a+b\sqrt{c}$, where a, b and c are rational numbers. **(3mks)**

8. Achang'a deposited sh. 20 000 in a saving account. Find the interest after two years. If the intrest was paid at 16% per annum compound semi-annually.**(3mks)**

9. A coffee blender has two brands of coffee, Tamu and Chungu. A kilogram of Tamu costs sh. 70 while a kilogram of Chungu costs Shs. 64. In what ratio should he mix the two brands to make a blend which costs Shs. 68 per kilogram?**(3mks)**

10. Find the centre and radius of a circle whose equation is $x^2+8+y^2-2y-1=0$ **(3mks)**

11. In the figure below ABCD is a circle with centre O. AB and DC meet a point E outside the circle. DC = BC and $\angle BCE = 48^0$. Find the angles **(3mks)**



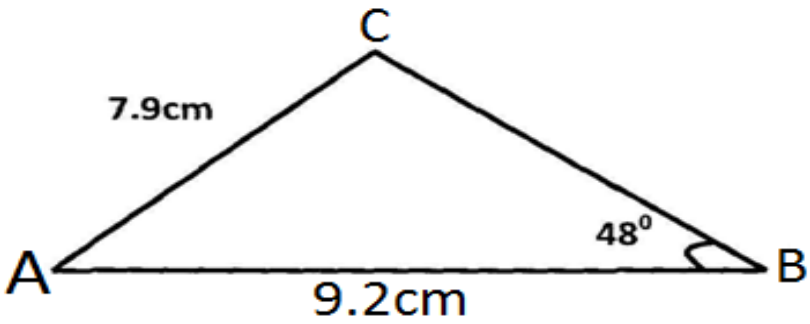
(i) BAD

(ii) BDC

(iii) BEC

12. Given that $4x^2 - 32y - 20 + k$ is a perfect square , Find K. **(3mks)**

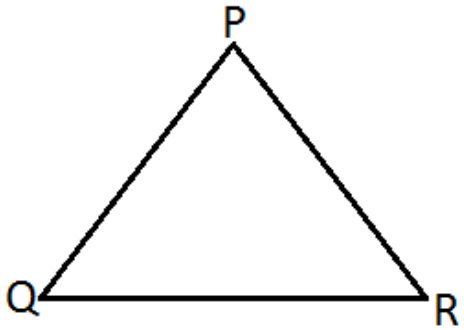
13. Given the triangle ABC below, AB = 9.2cm, AC = 7.9cm and $\angle ABC = 48^0$.**(2mks)** Calculate to 1 decimal place the angle A C B.



14. A geometric progression has its first and second terms as 128 and 32 respectively. If the sum of the first five terms of the progression is $\frac{2^x - 1}{6}$, find x **(4mks)**

15. P varie directly as the square of B and inversely as the square root of C. Find the percentage change in P when C increases by 4% and B decreases by 10%.**(3mks)**

16. The diagram below represents a field PQR



(a) Draw the locus of points equidistant from sides PQ and PR. **(1mk)**

(b) Draw the locus of points equidistant from points P and R. **(1mk)**

(c) (i)Label the point of intersection of the two loci (a) and (b) as X. **(1mk)**

(ii) Measure QX **(1mk)**

SECTION II (50 MARKS)

Answer any five questions in this section

17. James' earning are as follows:- Basic salary 38,000 p.m, House allowance Sh. 14, 000p.m Travelling allowance Sh. 8,500p.m. Medical allowance sh. 3,300

The table for the taxable income is as shown below

Income tax in k£ p.a	Tax in Sh. Per pound
1 – 6000	2
6001 – 12000	3
12001 – 18000	4
1001 – 24 000	5
24001 - 30 000	6
30001 - 36000	7
36001 – 42 000	8
42001 – 48 000	9
Over 48 000	10

(a) Calculate Jame's taxable income in p.a **(2mks)**

(b) Calculate Jame's P.A.Y.E if he is entitled to a tax relief of Sh. 18 000 p.a **(4mks)**

(c) James is also deducted the following per month:-

NHIF	Sh.	320
Pension scheme	Sh.	1000
Co-operative shares	Sh.	2000
Loan repayment	Sh.	5000
Interest on loan	Sh.	500

(i) Calculate James' total deduction per month in Ksh. **(2mks)**

(ii) Calculate his net salary per month. **(2mks)**

18 .i) Fill the table, below of the function $y = 2x^2 + 5x - 12$ *for* $-8 \le x \le 4$ **(2mks)**

x	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4
y	76					-9		-5					40

ii) Using the table draw the graph of the function $y = 2x^2 + 5x - 12$. Use the scale of 1cm to 1 unit for x – axis and 1cm for 10units for y-axis. **(3mks)**

(b) Using the graph drawn above, solve the following equation.

(i) $2x^2 + 5x - 12 = 0$ **(2mks)**

(ii) $3 - 7x - 3x^2 = 0$ **(3mks)**

19. The first three consecutive terms of a geometric progression are $3^{2x+1}, 9^x$ *and* 81 *respectively*.

(a) Calculate the value of x. **(3mks)**

(b) Find the common ratio of the series **(1mk)**

(c) Calculate the sum of the first 4 terms of this series. **(3mks)**

(d) Given that the fifth and the seventh terms of the G.P form the first two consecutive terms of an arithmetic sequence, Calculate the sum of the first 20 terms of the sequence. **(3mks)**

20. The table below shows marks scored by some students in a Maths exam

Marks	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 - 89
No. of candidates	3	17	27	23	8	2

(a) Draw a cumulative frequency curve for the data. **(4mks)**

(b) Use your graph to find

(i) The median **(1mk)**

(ii) Quartile deviation **(3mks)**

(iii) The pass mark if 55 students passed the exam. **(2mks)**

21. A tank has two inlet taps P and Q and an outlet tap R. When empty, the tank can be filled by tap P alone in 4 ½ hour or by tap Q alone in 3 hours. When full, the tap can be emptied in 2 hours by tap R.

(a) The tank is initially empty. Find how long it would take to fill up the tank.

(i) If tap R is closed and taps P and Q are opened at the same time. **(2mks)**

(ii) If all the three taps are opened at the same time. **(2mks)**

(b) The tank is initially empty and the three taps are opened as follows

P at 8.00 a.m

Q at 8.45 a.m

R at 9.00 a.m

(i) Find the fraction of the tank that would be filled by 9.00 a.m **(3mks)**

(ii) Find the time the tank would be filled up. **(3mks)**

22. At a rifle contest, the probability of any particular rifle being accurate is $\frac{1}{16}$. A soldier chooses a rifle at random. If the rifle is accurate, the probability of hitting the target is $\frac{4}{5}$. If the rifle is inaccurate the probability of hitting target is $\frac{6}{25}$.

By use of a tree diagram determine the probability that;

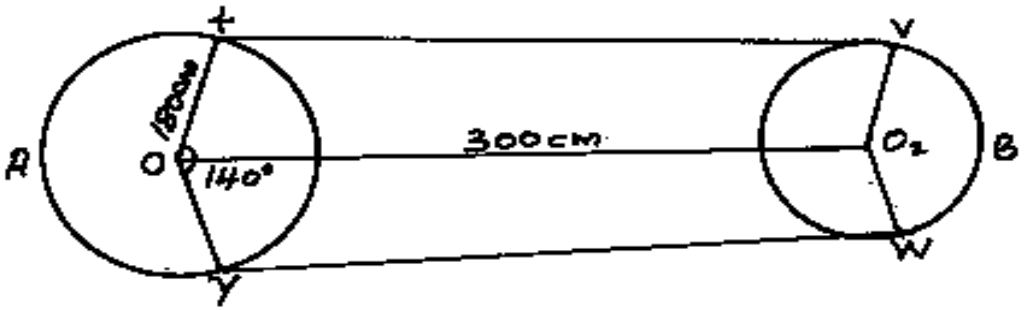
(a) The soldier selecting an accurate rifle and hitting the target in the first shot. **(3mks)**

(b) The soldier selecting an inaccurate rifle and hitting the target in the first shot. **(2mks)**

(c) The soldier misses the target in the first shot. **(4mks)**

(d) the soldier gets the target in the first shot. **(1mk)**

23. The figure below shows a pulley system where a conveyor belt is tied round the two wheels. The radius of the large wheel is 180cm and the distance between the centres of the wheel is 300cm and $\angle XOY = 140^0$



Determine

(a) Length XV **(3mks)**

(b) Length VBW **(3mks)**

(c) Length XAY **(2mks)**

(d) The total length of the conveyor belt

24. The vertices of a triangle ABC are A(3,1) B(0,2) and C(2,-1) is $A^1B^1C^1$ the image of ABC under a reflection on the line $y + x = 0$

(a) State the coordinates of $A^1B^1C^1$ hence draw triangles ABC and $A^1B^1C^1$ on the grid provided. **(3mks)**

(b) $A^{11}B^{11}C^{11}$ is the image of $A^1B^1C^1$ under positive quarter turn about the origin. Draw $A^{11}B^{11}C^{11}$ and state the coordination of the vertices. **(2mks)**

(c) $A^{111}B^{111}C^{111}$ is the image of $A^{11}B^{11}C^{11}$ under a shear matrix with y axis invariant and linear scale factor 3.

(d)(i) Write down the shear matrix **(1mk)**

(ii) Find the coordinates of the vertices of triangle $A^{111}B^{111}C^{111}$. **(2mks)**

(iii) Find the ratio of area of triangle ABC to that of $A^{111}B^{111}C^{111}$. **(2mks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 3 PAPER 1

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
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FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Simplify $\frac{\left(1\frac{3}{7}-\frac{5}{8}\right)+\frac{2}{3}\ of\ 1\frac{1}{5}}{\frac{3}{4}+1\frac{5}{7}\div\frac{4}{7}\ of\ 2\frac{1}{3}}$ **(4mks)**

2. A straight line ax + by = 16 passes through A (2, 5) and B (3, 7). Find the values of a and b **(3mks)**

3. Simplify $\frac{2-x-x^2}{3x^2-2x-1}$ **(3mks)**

4. Solve for X where $0 \leq x \leq = \ 90^0$

$\sin 2x\ - \cos(x-30) = 0$ **(2mks)**

5. Solve for X in

$2x - 4\ \leq 3x + 2\ < 10 - x$

Hence represent your solution on a number line **(3mks)**

6. Two similar cylindrical solids have heights of 18 cm and 24 cm. The volume of the larger cylinder is 320cm^3, find the volume of the smaller cylinder **(4mks)**

7. Solve for X **(3mks)**

$$\mathbf{8^{3x-2}\ x\ 16^{\frac{1}{2}X}\ = \frac{1}{4}}$$

8. A quantity P varies jointly as Q and inversely as on the square root of R. If Q is increased by 10% and R is reduced by 19%, find the percentage change in P **(3mks)**

9. Okedi sold goods whose marked price is sh. 340,000 at a discount of 2%. He was paid sh. 16660 as commission for the total sales. Calculate the percentage rate of commission **(3mks)**

10. The interior angle of a regular polygon is three and a half times the exterior angle. Determine the sides of the polygon **(3mks)**

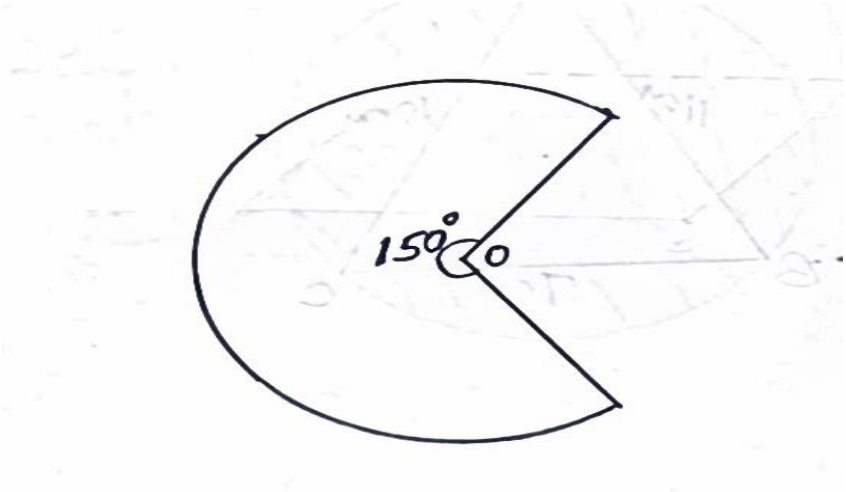
11. Give that A = $\begin{pmatrix}2 & 3\\ 1 & 4\end{pmatrix}$, $B\ \begin{pmatrix}-1 & 3\\ 2 & -1\end{pmatrix}$;find matrix C where AC = B **(3mks)**

12. Amoit bought 2 pens and 5 exercise books at a cost of sh. 275. Allan bought 4 such pens and exercise books from the same shop at a cost of sh. 415 by letting sh. X and y to be the costs of a pen and a book respectively, find the cost of each item **(4mks)**

13. Okech left some money in his will to be shared amongst his wife, son and daughter in the ratio 4:3:2 respectively. If the daughter received sh. 120,000 less than the mother's share, find the total amount of money Okech left in his will. **(2mks)**

14. Use tables of reciprocals to find the reciprocal of 0.3758. Hence find the value $\frac{\sqrt[3]{0.125}}{0.3758}$ correct to 4.S.f **(4mks)**

15. A major sector of a circle subtends an angle of 150 at the centre. The radius of the circle is 7cm and the centre is at O as shown



If the sector is folded into a conical shape, calculate the radius of the cone correct to 1 d.p **(3mks)**

16. A Kenyan bank buys and sells currencies at the exchange rates below

Currency	Buying (ksh)	Selling (ksh)
1 euro	147.87	148.00
1 us dollar	74.22	74.50

An American tourist arrived in Kenya with 24,000 Euros. He converted all the euros to Kenya shillings at the bank. He spent a total sh. 200,000 while in Kenya and converted the rest into US dollars at the bank. Find the amount in dollars that he received. **(3mks)**

SECTION II (50MKS)

Answer Any Five Questions In This Section

17. The diagonals of a rectangle P, Q, R, S intersect at (5, 3). Given that the equation of line PQ is 4y - 9x =13 and that of line PS is y -4x =5

a) The co-ordinators of P **(3mks)**

b) The co-ordinates of R **(2mks)**

c) The equation of line RQ **(2mks)**

d) The equation of a perpendicular line drawn to meet PR at (5,3) **(3mks)**

18. A bus left Malaba town at 6.00am and travelled at an average speed of 80km/h towards Nairobi which is 510km away. At 6.30am a salon car left Nairobi the same day following the same route and travelled at average speed of 100km/h towards Malaba. After 1 hour, the car had a puncture which took 15minutes to repair before proceeding with the journey;

Determine

a) The distance covered by the bus in 30minutes **(1mks)**

b) The time of the day when car met the bus. **(6mks)**

c) The distance from Nairobi to the point where the car met with the bus **(2mks)**

d) The time of the day to the nearest minute when the bus got to Nairobi **(1mk)**

19. Points P, Q and R are a straight line on a level ground. An electricity pole is erected at P with a point X and Y on it. From point X, the angle of depression of point Q is 48^o while the angle of depression of R from Y which is 3m above X is 60^o

a) Illustrate the position of X, Y, P and R by sketching. **(1mk)**

b) Hence calculate to 1 d.p.

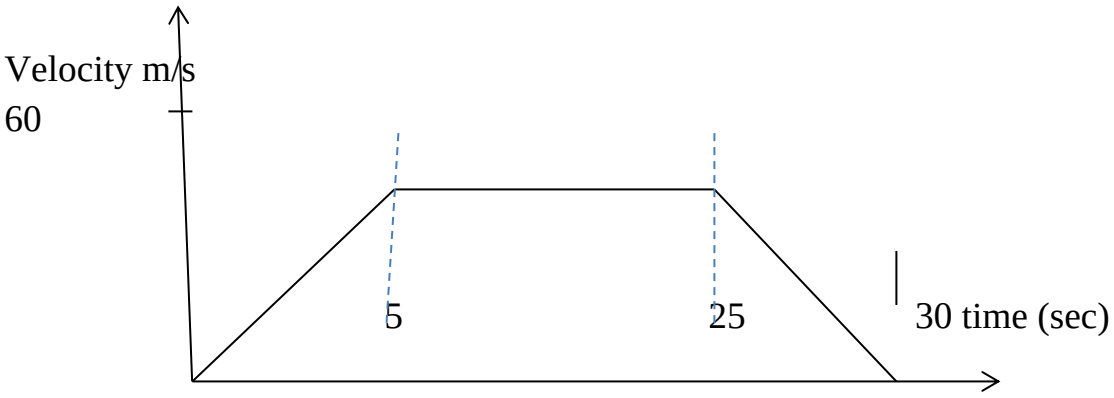
i) The length XP **(3mks)**

ii) The distance YQ **(2mks)**

iii) The distance PQ **(2mks)**

iv) The angle of elevation of Y from R given that PR = 8cm **(2mks)**

20. a) The figure shows a velocity- time graph of a car



i) Find the total distance covered by the car in metres **(3mks)**

ii) Calculate the deceleration of the car **(3mks)**

b) A lorry left kisumu at 8.00am and travelled towards the Nakuru at an average speed of 72km/h. At 8.30am a matatu left kisumu and followed the lorry at an average speed of 96km/h.

Determine the time of the day when the matatu caught up with the lorry **(4mks)**

21. The date below shows marks scored by 48 students in a geography exam.

Marks %	30-39	40-49	50-59	60-69	70-79	80-89
Students	6	10	x	9	12	2

a) Determine the value of x **(2mks)**

b) State the modal class **(1mk)**

c) Calculate the **(3mks)**

i) Mean mark

ii) Median mark **(4mks)**

22.a) Complete the table below for the equation $Y = x^2 + 3x - 6$ where $-7 \leq x \leq 4$

x	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4
y		4			6				-2			

(3mks)

b)Using the scale 1 cm to represent 1 unit on the X- axis and 1cm to represent 2 units on the Y - axis, draw the graph of $y = x^2 + 3x - 6$ for $-7 \leq x \leq 4$ **(4mks)**

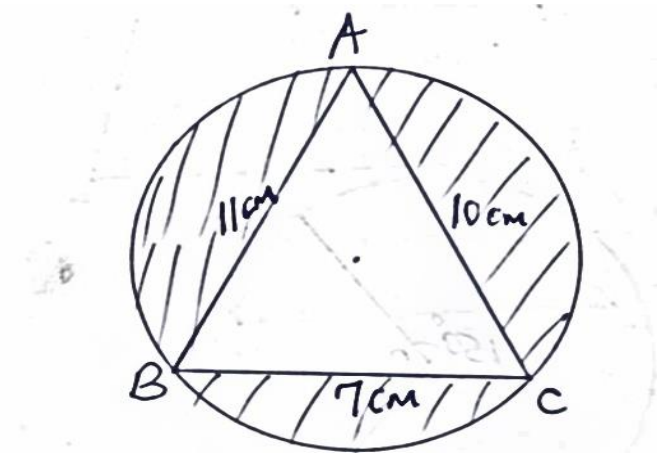
c) Use your graph to solve for x in $x^2 + 3x - 6 = 0$ **(2mks)**

d) State the;

i) Turning point of the curved **(1mk)**

ii) Equation of the line symmetry **(1mk)**

23.the figure shows triangle ABC inscribed in a circle where AC = 10cm, BC = 7cm and AB =11cm



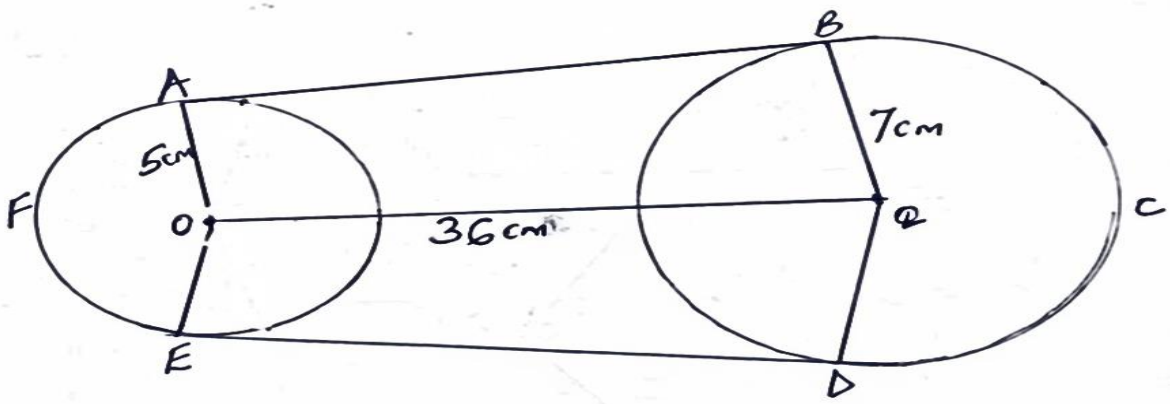
Calculate correct 1 d p ($use\ \pi = \frac{22}{7}$)

a) The size of the angle CAB **(4mks)**

b) The radius of the circle **(2mks**

c) Hence, find the area of the shaded region **(4mks)**

24.ABCDEFGA is a belt tied around two wheels whose centres are O and Q forming a pulley system. Given that Q =36cm, AO = 5cm BQ = 7cm. calculate correct 1 d.p ($Take\ \pi = \frac{22}{7}$)



a) Angle AOQ **(3mks)**

b) The length of the belt in contact with

i) The wheel whose centre is O **(2mks)**

The wheel whose centre is Q **(2mks)**

c) The length of AB, hence the total length of the belt **(3mks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 3 PAPER 2

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

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SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

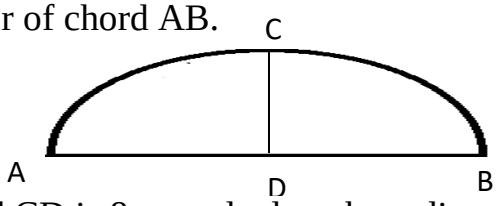
SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Use a calculator to find V if $\frac{1}{V} = \frac{1}{23.9} - \frac{1}{38.45}$ **(2mks)**
2. Solve for X in **Log (7X – 3) + 2 Log 5 = 2 + Log (X+3)** **(3mks)**
3. A quantity P is partly constant and partly varies as the square of Q. when Q = 2, P = 40 and when Q = 3, P = 65. Determine the equation connecting P and Q **(3mks)**
4. Expand $(1 - \frac{1}{2X})^6$ up to the fourth term; hence use your expansion to evaluate $\mathbf{0.996^6}$ correct to 4 decimal places. **(4mks)**
5. Simplify $\frac{\sqrt{5}+3}{\sqrt{5}-2}$. Give the answer in the form of $a + b\sqrt{c}$ where a, b and c are integers **(3mks)**
6. Given that **X-5**, **X-3** and **2X-3** are three consecutive terms of a geometric progression, find the possible values of X and the ratio **(2X+1):(X+2)** **(4mks)**
7. The figure below is a segment of a circle cut off by a chord AB. Line CD is a perpendicular bisector of chord AB.



If AB is 24cm and CD is 8cm, calculate the radius of the circle. **(3mks)**

8. By completing the square, solve for x in the equation $\mathbf{2x^2 - 6 = x.}$ **(3mks)**
9. Given that $\mathbf{y = \frac{b - bx^2}{cx^2 - a}}$ make x the subject **(3mks)**
10. The base and height of a right-angled triangle are 4cm and 5cm respectively. Calculate the percentage error in its area. **(3mks)**
11. Given that $\mathbf{P} = \begin{pmatrix} 5 & 3 \\ 6 & 4 \end{pmatrix}$, find ;
    a. Its inverse **(1mk)**
    b. The value of x and y if $\mathbf{P}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ **(3mks)**
12. The equation of a circle is given by $x^2 + y^2 + 6x – 10y - 30 = 0$. Determine the radius and center of the circle **(3mks)**
13. Find the value of X which satisfies the equation $5^{2x} - 6\times5^x + 5 = 0$ **(3mks)**
14. A scooter mixes oil and petrol in the ratio 5:19. If petrol costs Ksh. 130 per liter and oil costs Ksh. 250 per liter, find the cost of a liter of the mixture. **(2mks)**
15. Solve the pair of equations simultaneously **(4mks)**

    $2x – y = 3$

    $x^2 – xy = -4$

16. The cash price of a water pump is Ksh. 38,000. Mr. Ahero opts to buy the pump on hire purchase terms by paying a deposit of Ksh. 6,500 and 24 equal monthly installments. Calculate the amount of each installment, if simple interest of 20% p.a is charged. **(3mks)**

SECTION II (50 MARKS)

Attempt any five questions in this section

17. The first term of an arithmetic sequence is equal to the first term of the geometric sequence. The second term of the arithmetic sequence is equal to the fourth term of the geometric sequence, while the tenth term of the arithmetic sequence is equal to the seventh term of the geometric sequence.

a. Given that a is the first term and d is the common difference of the arithmetic sequence while r is the common ratio of the geometric sequence, write down two equations connecting the arithmetic and geometric sequences. **(2mks)**

b. Find the value of **r** that satisfies the geometric sequence **(4mks)**

c. Given that the tenth term of the geometric sequence is 5120, find the values of **a** and **d** **(2mks)**

d. Calculate the sum of the first 20 terms of the arithmetic sequence **(2mks)**

18. Three quantities R, S and T are such that R varies directly as S and inversely as the square of T.

a. Given that R = 480 when S = 150 and T = 5, write an equation connecting R, S and T **(3mks)**

b. Find,

i) the value of R when S = 160 and T = 1.6 **(3mks)**

ii) the percentage change in R if S increases by 5% and T decreases by 20%**(4mks)**

19. The table below shows income tax rates

Monthly income in Kenya shillings (Ksh)	**Tax rate % in each shilling**
Up to 9680	10 %
From 9681to18800	15 %
From 18801 to 27920	20 %
From 27921 to 37040	25 %
From 37041 and above	30 %

In that year Okumu's salary amounted to K£ 45,000 p.a and he received allowances totaling Ksh. 300,000 p.a. He was entitled to:-

(i) Monthly personal relief of Ksh. 1,056

(ii) Monthly insurance relief at the rate of 15% of the premium paid Okumu paid a monthly premium of Ksh. 2,500 towards his life insurance policy

Calculate

(a) His gross monthly income in Ksh **(2mks)**

(b) The monthly income tax he pays **(5mks)**

(c) His net monthly income, if his other monthly deductions were: - Ksh. 4,800 to HELB, Ksh. 5,000 to his co-operative and Ksh. 2,800 towards a bank loan repayment. **(3mks)**

20. Square OABC with vertices O(0,0),A(2,0), B(2,2) and C(0,2) is mapped onto O'(0,0), A'(2,0), B'(5,2) and C'(3,2) by the matrix **T** = $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$

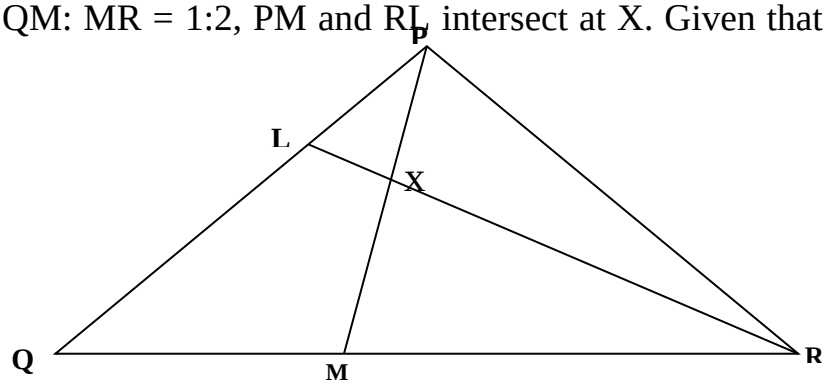
a. Find T **(3mks)**

b. Draw O'A'B'C' and reflect it on the line x + y = 0 to obtain O"A"B"C" **(4mks)**

(attach graph paper)

c. What single matrix P maps OABC to O"A"B"C" **(3mks)**

21. In the triangle PQR below L and M are points on PQ and QR respectively such that PL: LQ = 1:3 and QM: MR = 1:2, PM and RL intersect at X. Given that **PQ = b** and **PR=c**,



a. Express the following vectors in terms of **b** and **c**.

i. QR **(1mk)**

ii. PM **(1mk)**

iii. RL **(1mk)**

b. By taking **PX** = *h***PM** and **RX** = *k***RL** where ***h*** and ***k*** are constants find two expressions of PX in terms of *h*, *k*, b and c. Hence determine the values of the constants ***h*** and ***k***. **(6mks)**

c. Determine the ratio **LX : XR** **(1mk)**

22. During a traffic crackdown, 1,000 motor cycles were sampled. 250 of these were found to lack necessary driving gear, 200 had no valid insurance and 300 lacked the driving license. Taking the sample to represent all motorcycles in the country;

a. Represent the information in a tree diagram **(3mks)**

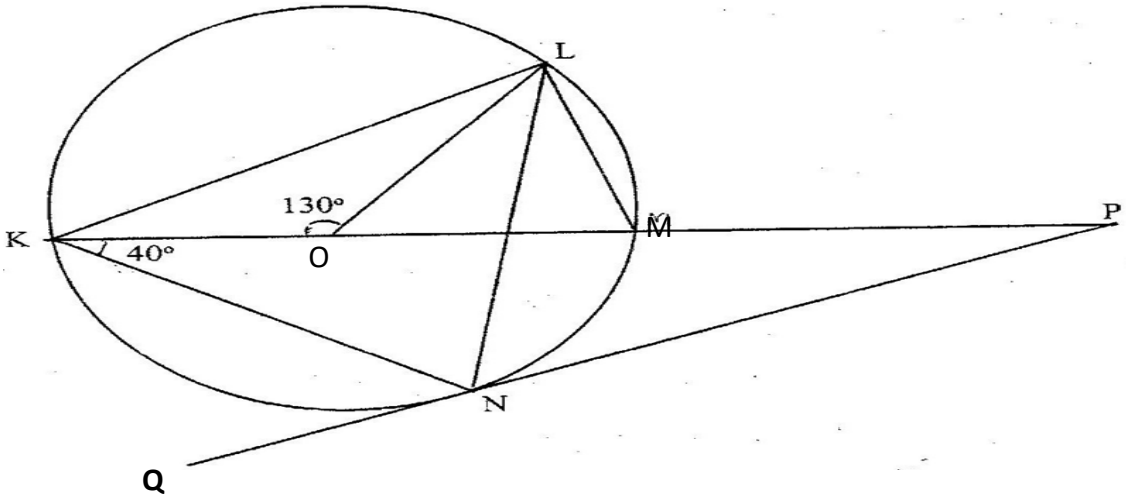
b. Find the probability that, a motorcyclist at any given time

i. Has no driving license **(3mks)**

ii. Lacks a valid insurance but is in proper driving gear and has a valid driving license **(2mks)**

iii. Has none of the offence **(2mks)**

23. In the figure below, K L M and N are points on the circumference of a circle centre O. The points K, O, M and P are on a straight line. PQ is a tangent to the circle at N. Angle KOL = 130^0 and angle MKN = 40^0



Find the values of the following angles, stating the reasons in each case:

a. <MLN **(2mks)**

b. <OLN **(2mks)**

c. < LNP **(2mks)**

d. <MPQ **(2mks)**

e. <KNQ **(2mks)**

24. Complete the table below for y = Sin 2x and y = $\text{Sin}(2x+30)^0$ giving values to 2 d.p **(1mk)**

X^0	0^0	15^0	30^0	45^0	60^0	75^0	90^0	105^0	120^0	135^0	150^0	165^0	180^0
Sin 2x	0.00				0.87				-0.87				0.00
Sin $(2x+30)^0$	0.50				0.50				-1.00				0.50

a. Draw the graph of y = Sin 2x and y = $\text{Sin}(2x+30)^0$ on the same axis **(4mks)**

b. Use your graph to solve $\text{Sin}(2x+30)^0$ - Sin 2x = 0 **(1mk)**

c. Describe the transformation which maps the wave Sin 2x onto the wave Sin (2x +30) **(2mks)**

d. State the amplitude and period of y = a cos (bx +c) **(2mks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 4 PAPER 1

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
- ***d)*** *All your workings must be clearly shown as must be awarded for correct working even if the answer is wrong.*
- ***e)*** *Non programmable silent scientific calculators and KNEC mathematical tables may be used.*

FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Evaluate $\frac{-4\{(-4+-15\div5)+-3-4\div2\}}{84\div-7+3--5}$ **(3 marks)**
2. Simplify completely the expression: $\frac{6x^2y^2-20xy+16}{2x^2y^2-8}$ **(3 marks)**
3. Given that $\cos\theta = \frac{3}{5}$, find $\sin\theta - \tan(90^0 - \theta)$ without using tables or calculator. **(2 marks)**
4. Under an enlargement, the images of points A(3,1) and B(1,2) are $A^1(3,7)$ and $B^1(7,5)$. Without construction, find the centre and the scale factor of enlargement. **(4 marks)**
5. List all the integral values of x that satisfy the inequalities; **(3 marks)**

$$x - \frac{3}{2} \leq 2x + 1 < 5$$

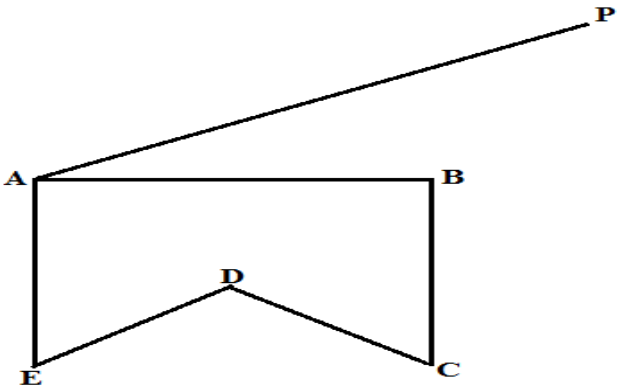
6. A bus travelling at an average speed of x km/h left station at 8.15 am. A car, travelling at an average speed of 80km/h left the same station at 9.00 am and caught up with the bus at 10.45 am. Find the value of x. **(3 marks)**
7. The interior angle of a regular polygon with 3x sides exceeds the interior angle of another regular polygon having x sides by 40^0. Determine the value of x. **(3 marks)**
8. Use squares, cubes and reciprocals tables to evaluate, to 4 significant figures, the expression:

$$\frac{1}{\sqrt[3]{27.56}} + \frac{3}{(0.071)^2}$$ **(3 marks)**

9. From a point 20m away on a level ground the angle of elevation to the bottom of the window is 27^0 and the angle of elevation of the top of the window is 32^0. Calculate the height of the window. **(3 marks)**
10. Solve for x in the equation: $5^{3y+3} + 5^{3y-1} = 125.2$ **(4 marks)**
11. Mr. Kanja, Miss Kanene and Mrs. Nyaga have to mark a form three mathematics contest for 160 students. They take 5 minutes, 4 minutes and 12 minutes respectively to mark a script. If they all start to mark at 9.00 am non-stop, determine the earliest time they will complete the marking. **(4 marks)**
12. Evaluate $4.\dot{4}\dot{1} - 0.\dot{2}\dot{1}$ **(2 marks)**
13. Two similar cylinders have diameter of 7cm and 21cm. If the larger cylinder has a volume of $6237cm^3$, find the heights of the two cylinders. (take $\pi = \frac{22}{7}$) **(3 marks)**
14. The cost of providing a commodity consists of transport, labour and raw materials in the ratio 8:4:12 respectively. If the transport cost increases by 12%, labour cost by 18% and raw materials by 40%, find the percentage increase of producing the new commodity. **(3 marks)**

15. Given that $4\boldsymbol{p} - 3\boldsymbol{q} = \begin{pmatrix} 10 \\ 5 \end{pmatrix}$ and $\boldsymbol{p} + 2\boldsymbol{q} = \begin{pmatrix} -14 \\ 15 \end{pmatrix}$, find value of **p** and **q** **(4 marks)**

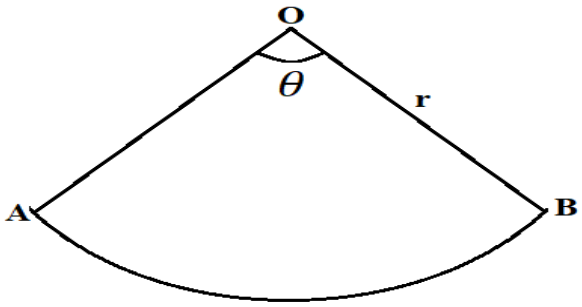
16. In the figure below ABCDE is a cross-section of a solid. The solid has a uniform cross-section. Given that AP is an edge of the solid, complete the sketch showing the hidden edges with a broken lines. **(3 marks)**



SECTION II (50 Marks)

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

17. The figure below represents a sector of a circle radius r units. The area of the sector is 61.6 cm^2 and the length of the arc AB is one tenth of the circumference of the circle from which the sector was obtained. (Take $\pi = \frac{22}{7}$)



a) Calculate;

i) the angle θ subtended by the sector at the centre. **(2 marks)**

ii) The radius r of the circle. **(3 marks)**

b) If the sector above is folded to form a cone;

i) Calculate the base radius of the cone. **(2 marks)**

ii) The volume of the cone**.** **(3 marks)**

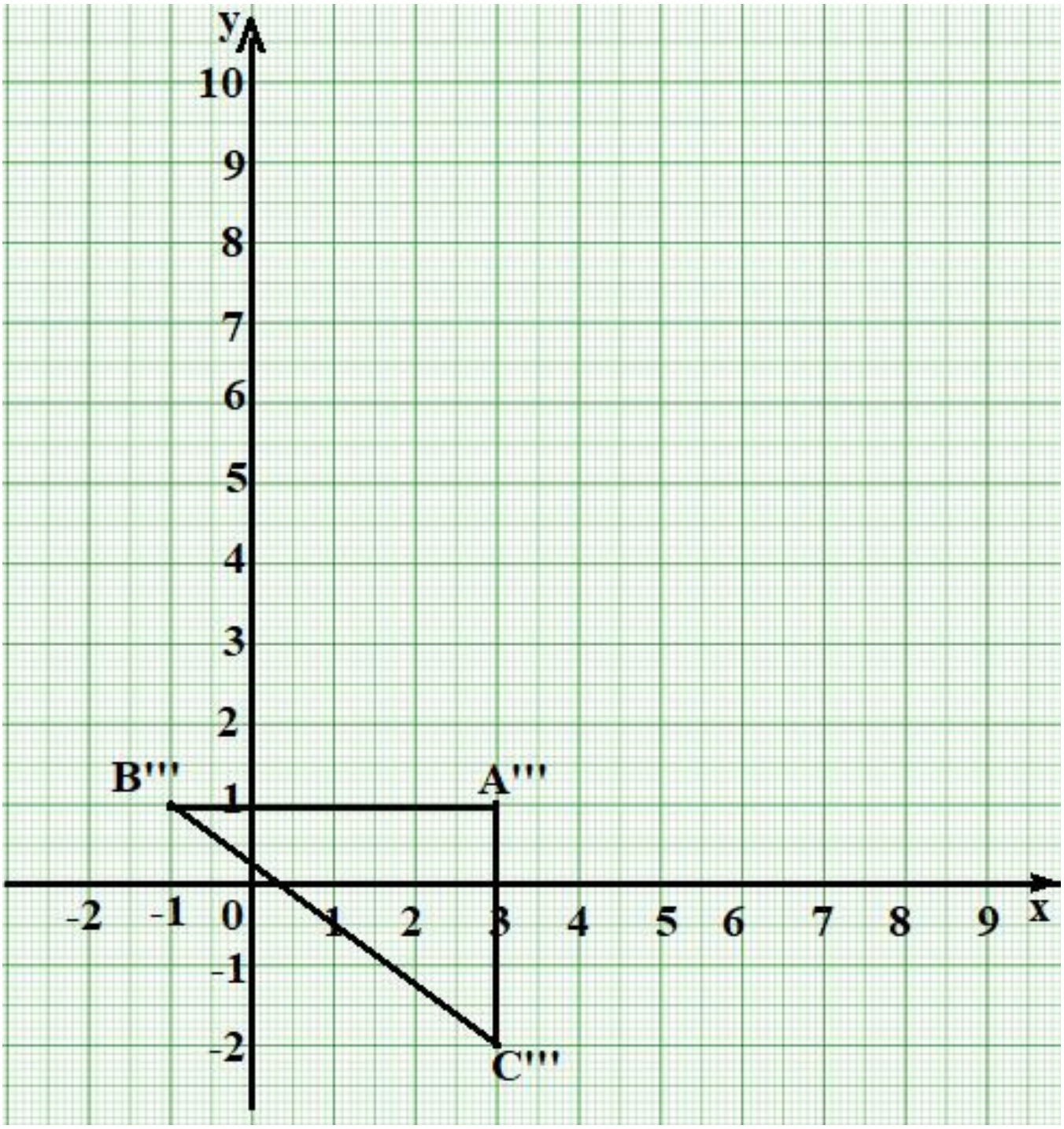
18. Two factories A and B produce both chocolate bars and eclairs. In factory A, it costs Kshs x and Kshs y to produce 1 kg of chocolate bars and 1 kg of eclares respectively. The cost of producing 1 kg of chocolate bars and 1 kg of eclairs in factory B increases by the ratio 6:5 and reduce by the ratio 4:5 respectively.

a) Given that it costs Kshs 460 000 to produce 1 tonne of chocolate bars and 800kg of eclares in factory A and Kshs 534 000 to produce the same quantities in factory B, form two simplified simultaneous equations representing this information.**3 marks)**

b) Use matrix method to find the cost of producing 1 kg of chocolate bars and 1 kg of eclaires in factory A. **(5 marks)**

c) Find the cost of producing 100 kg of chocolate bars and 50 kg of eclaires in factory B. **(2 marks)**

a) The vertices of triangle ABC are A(6,2), B(8,2) and C(6,0). On the grid provided below, draw triangle ABC. **(1 mark)**



b) Triangle A'B'C' is the image of triangle ABC under a reflection in the line $y = x$. On the same grid draw triangle A'B'C' and state its coordinates **(2 marks)**

c) Triangle A"B"C" is the image of triangle A'B'C' under and enlargement scale factor 2 about the centre (-1,9). On the same grid, draw triangle A"B"C" and states its coordinates. **(2 marks)**

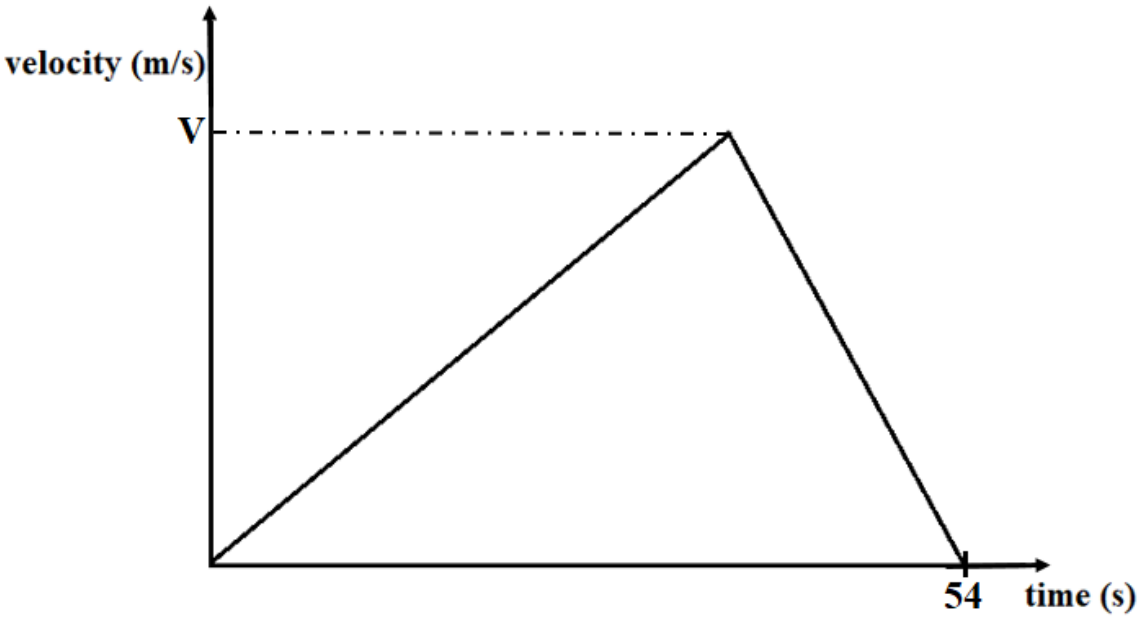
d) By construction, find and write down the co-ordinates of the centre and angle of rotation which can be used to rotate triangle A"B"C" onto triangle A'''B'''C''' shown on the grid above. **(3 marks)**

e) State any pair of triangles that are:

i) Oppositely congruent. **(1 mark)**

ii) Directly congruent. **(1 mark)**

19. The figure below shows a velocity-time graph of an object a which accelerates from rest to a velocity of V ms^{-1} then decelerated to rest in a total time of 54 seconds.



a) If it covered a distance of 810 metres;

i) Find the value of V. **(2 marks)**

ii) Calculate its deceleration, given that its initial acceleration was $1\frac{2}{3}ms^{-2}$ **(2 marks)**

b) A bus left town X at 10.45 am and travelled toward town Y at an average speed of 60 km/h. A car left town X at 11.45 am on the same day and travelled along the same road toward Y at an average speed of 100km/h. The distance between town X and town Y is 500km.

i) Determine the time of the day when the car overtook the bus. **(3 marks)**

ii) Both vehicles continued towards town Y at their original speeds. Find how long the car had to wait in town Y before the bus arrived. **(3 marks)**

20. The masses to the nearest kilogram of some students were recorded in table below.

Mass(kg)	41-50	51-55	56-65	66-70	71-85
Frequency	8	12	16	10	6
Height of rectangle					0.2

a) Complete the table above to 1 decimal place. **(2 marks)**

b) On the grid provided below, draw a histogram to represent the above information. **(3 mks)**

c) Use the histogram to:

i) State the class in which the median mark lies. **(1 mark)**

ii) Estimate the median mark. **(2 marks)**

iii) The percentage number of students with masses of at least 74kg. **(2 marks)**

21. (a) a straight line L_1 whose equation is $9y - 6x = -6$ meets the x-axis at Z. Determine the coordinates of Z. **(2 marks)**

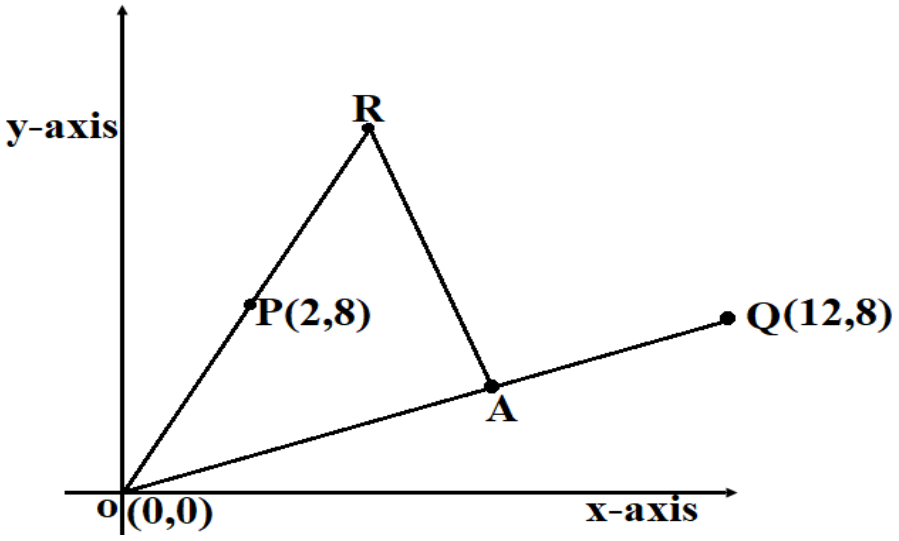
(b) A second line L_2 is perpendicular to L_1 at Z. Find the equation of L_2 in the form $ax + by = c$, where ,b and c are integers. **(3 marks)**

(c) a third line L_3 passes through the point (2,5) and is parallel to L_1. Find:

i) The equation of L_3 in the form $ax + by = c$, where a, b and c are integers. **(2 mks)**

ii) The coordinate of point R at which L_2 intersects L_3. **(3 marks)**

22. In the diagram below, the coordinates of points O, P and Q are (0,0), (2,8) and (12,8) respectively. A is a point on **OQ** such that 4**OA**=3**OQ**. Line **OP** produced to R is such as **OR**=5**OP**.



a) Find vector **RA**. **(3 marks)**

b) Given that point L is on **PQ** such that **PL**: **LQ**=12:5, find vector **RL**. **(4 marks)**

c) Show that R, L and A are collinear. **(2 marks)**

d) Find the ratio of **RL**:**LA**. **(1 marks)**

23. Five points, P, Q, R, V and T lie on the same plane. Point Q is 53km on the bearing of 055^0 of P. Point R lies 162^0 of Q at a distance of 58km. Given that point T is west of P and 114km from R and V is directly south of P and $S40^0E$ from T.

a) Using a scale of 1:1,000,000, show the above information in a scale drawing. **(3 mks)**

b) From the scale drawing determine:

i) The distance in km of point V from R. **(2 marks)**

ii) The bearing of V from Q. **(2 marks)**

iii) Calculate the area enclosed by the points PQRVT in squares kilometers. **(3 marks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 4 PAPER 2

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
- ***d)*** *All your workings must be clearly shown as must be awarded for correct working even if the answer is wrong.*
- ***e)*** *Non programmable silent scientific calculators and KNEC mathematical tables may be used.*

FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Evaluate using squares, cubes and reciprocal tables **(4 marks)**

$$\left[\frac{1}{\sqrt[3]{27.56}} + \frac{3^{-2}}{(0.071)^2}\right]$$

2. Make x the subject in $\frac{x^4 - 4}{x^2 - 2} = K$ **(3 marks)**

3. Ali deposited Ksh.100,000 in a financial institution that paid simple interest at the rate of 12.5% p.a. Mohamed deposited the same amount of money as Ali in another financial institution that paid compound interest. After 4 years, they had equal amounts of money. Determine the compound interest rate per annum to 1 decimal place. **(3 marks)**

4. Simplify **(3 marks)**

$$\left(\frac{a^3 - ab^2}{a^4 - b^4}\right)^{-1}$$

5. Expand $(1 - 2x)^4$, hence find the value of $(1.02)^4$ correct to 3 significant figures. **(3 marks)**

6. If $\sin x = 2b$ and $\cos x = 2b\sqrt{3}$, find the value of b **(3 marks)**

7. Find the relative error in $\frac{a + b}{c - d}$ given that $a = 77ml$, $b = 23ml$, $c = 36ml$, and $d = 16ml$. **(3 marks)**

8. Without using a calculator or mathematical tables, express

$\frac{\sqrt{3}}{1 - \cos 30°}$ in surd form and simplify. **(3 marks)**

9. The equation $3x^2 - 8px + 12 = 0$ has real roots.

Find the value of P. **(2 marks)**

10. A construction company employs 200 artisans and craftsmen in the ratio 1:3 every week. An artisan is paid 2 ½ times as much as a crafts man. At the end of 3 weeks the company paid ksh 1485000 to those employees. Find how much each artisan and each craftsman is paid. (a working week has six days) **(3 marks)**

11. A dam containing 4158m^3 of water is to be drained. A pump is connected to a pipe of radius 3.5cm and the machine operates for 8 hours per day. Water flows through the pipe at the rate of 1.5m per second. Find the number of days it takes to drain the dam. **(4 marks)**

12. Two brands of coffee Arabica and Robusta costs sh.4,700 and sh.4,200 per kilogram respectively. They are mixed to produce a blend that costs shs.4,600 per kilogram. Find the ratio of the mixture. **(3 marks)**

13. Under a transformation represented by a matrix $\begin{pmatrix} 5X & 2 \\ -3 & X \end{pmatrix}$, a triangle of area 10cm^2 is mapped onto a triangle whose area is 110cm^2. Find x **(3 marks)**

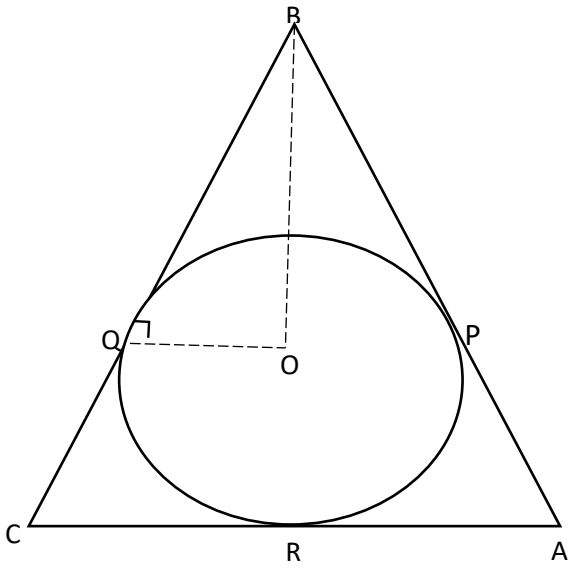
14. Find the distance between the centre 0 of a circle whose equation is

$2x^2 + 2y^2 + 6x + 10y + 7 = 0$ and a point $B(-4,1)$. **(3 marks)**

15. Solve for x in the equation:

$(\log_2 x)^2 + \log_2 8 = \log_2 x^4$ **(4 marks)**

16. The figure below shows a circle inscribed in an isosceles triangle ABC. If Q, P and R are the points of contact between the triangle and the circle, O is the centre of the circle, $BO = 19.5cm$ and $BQ = 18cm$. Find the radius of the circle and hence the length of the minor arc PQ. **(3 marks)**



SECTION II (50 MARKS)

Answer Only Five Questions

17. (a) Mr. Mackey pays a tax of Kshs.5,800 per month according to the income tax table given below. He is married and entitled to a family relief of K 420p.a.

Taxable income (K€ p.a.)	**Rate (Ksh per K)**
1 – 9,600	2
9,600 – 19,200	3
19,201 – 29,800	5
29,801 - 38,400	7
38,401 - 47,200	9
Over 47,200	10

Calculate Mackey's gross annual salary in K€ **(6marks)**

(b) The difference between compound interest and simple interest on Kshs.P over a duration of 36 months at the rate of 15% p.a. is Kshs.52,477.50. Calculate the value of P. **(4 marks)**

18. (a) Complete the table below for $y = x^3 + 4x^2 - 5x - 5$ **(2 marks)**

X	-5	-4	-3	-2	-1	0	1	2
y			19			-5		

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

(c) i) Use the graph to solve the equation

$x^3 + 4x^2 - 5x - 5 = 0$ **(2 marks)**

ii) By drawing a suitable straight line on the graph, solve the equation

$x^3 + 4x^2 - 5x - 5 = -4x - 1$ **(3 marks)**

19. OPQ is a triangle in which OP=P and OQ=q. x is a point on OP such that OP:XP=5:2 and y is another point on PQ such that PY:YQ=1:2. Lines OY and XQ intersect at T.

(a) Express the following vectors in terms of P and q

(i) PQ **(1 mark)**

(ii) OY **(1 mark)**

(iii) OX **(1 mark)**

(b) If $OT = kOY$ and $QT = hQX$ express OT in two different ways. Hence or otherwise find the values of h and k. **(6 marks)**

(c) Determine the ratio OT:TY **(1 mark)**

20. If $\left(x - 1\,{}^{1}/_{8}\right)$, x and $\left(x + {}^{3}/_{2}\right)$ are the first three consecutive terms of a geometric progression;

(a) Determine the values of x and the common ratio. **(4 marks)**

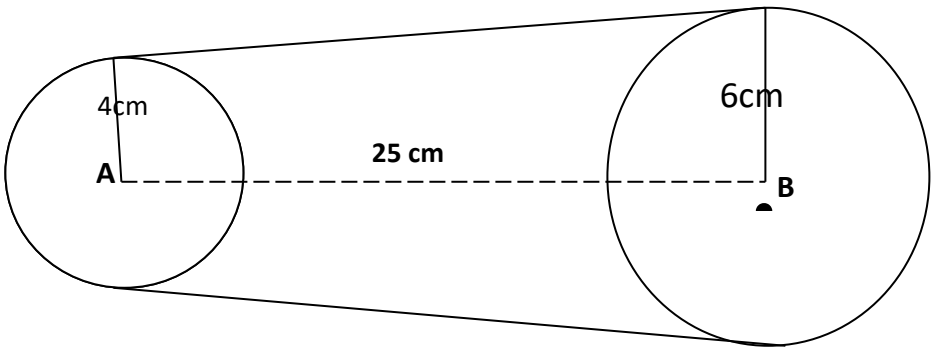
(b) Calculate the sum of the first 6 terms of this progression. **(3 marks)**

(c) Another sequence has the terms

-13, -16, -19, ……-310.

Find the sum of this sequence. **(3 marks)**

21. The figure below shows a belt passing round two pulleys of centres A and B. The radius of the pulleys is 4cm and 6cm respectively and the distance between the centres is 25cm.



Calculate the length of the belt used for the pulley system. **(10 marks)**

22. The points P(2,1), Q(4,1) R(4,3) and S(3, 3) are coordinates of a quadrilateral.

(a) Plot the quadrilateral PQRS on the grid provided. **(1 mark)**

(b) Find the coordinates of $P^1Q^1R^1S^1$ the image of PQRS under the transformation represented by the matrix $M = \begin{pmatrix} 1 & 1 \\ 2 & 0 \end{pmatrix}$ **(2 marks)**

(c) Draw and label $P^1Q^1R^1S^1$ on the same grid.

(d) Find the coordinates of $P^{11}Q^{11}R^{11}S^{11}$ on the image of $P^1Q^1R^1S^1$ under the transformation represented by the matrix $N = \begin{pmatrix} -2 & 1 \\ 0 & 1 \end{pmatrix}$ **(2 marks)**

(e) Draw and label $P^{11}Q^{11}R^{11}S^{11}$ on the same grid. **(1 mark)**

(f) Determine the matrix that maps PQRS directly onto $P^{11}Q^{11}R^{11}S^{11}$. **(3 marks)**

23. The table below shows the ages of people in years who attended a wedding ceremony.

Age in years	10-19	20-29	30-39	40-49	50-59	60-69	70-79
Frequency	2	4	4	8	6	3	2

(a) State the modal class **(1 mark)**

(b) Using an assumed mean of 44.5 calculate

(i) The mean age **(3 marks)**

(ii) The standard deviation **(3 marks)**

(iii) The median age **(3 marks)**

24. A supermarket is stocked with plates which come from two suppliers A and B. They are bought in the ratio 3:5 respectively, 10% of plates from A are defective and 6% of the plates from B are defective.

(a) A plate is chosen by a buyer at randon.Find the probability that

i) It is from A **(2 marks)**

ii) It is from B and it is defective **(2 marks)**

iii) It is defective **(2 marks)**

(b) Two plates are chosen at random. Find the probability that;

i) Both are defective **(2 marks)**

ii) At least one is defective **(2 marks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 5 PAPER 1

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
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FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

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

$$\frac{-2(5+3)-9\div 3+5}{-3+-16\div -8\times 4}$$

2.Wafulauses $^{1}/_{6}$ of his land for planting maize, $^{1}/_{12}$ for beans and $^{4}/_{9}$ of the remainder for grazing. He still has 10 hectares of unused land. Find the size of Wafula's land.**(4 mk)**

3. A straight line passing through point $(-3,-4)$is perpendicular to the line whose equation is 2y + 3x = 11 and intersects **x** axis and **y** axis at A and B respectively. Determine the equation of the second line and hence write down the co-ordinates of A and B. **(3 mks)**

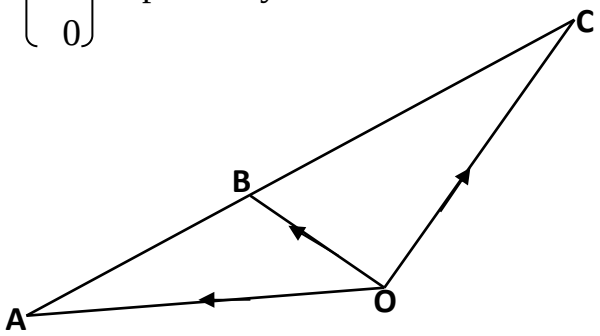
4.A bus left Kitale at 8.00 a.m. and travelled towards Lodwar at an average speed of 80 km/h. At 8.30 a.m a car left Lodwar towards Kitale at an average speed of 120km/h. Given that the distance between Kitale and Lodwar is 400km. Calculate the time the two vehicles met. **(3 mks)**

5.The sum of four consecutive odd integers is greater than 24. Determine the first four such integers. **(3 mks)**

6.Wanyama on arrival in Kenya to play for Harambee Stars against Uganda Cranes converted 6000 Euros into Kenyan Shillings. During his stay in Kenya he spent Kshs. 260,000 and converted the remaining amount into US Dollars before travelling back to England. Using the exchange rates below, find how many US Dollars he got?**(4 mks)**

Currency	**Buying (Kshs.)**	**Selling (Kshs.)**
1 US Dollar	96.20	96.90
1 Euro	112.32	112.83

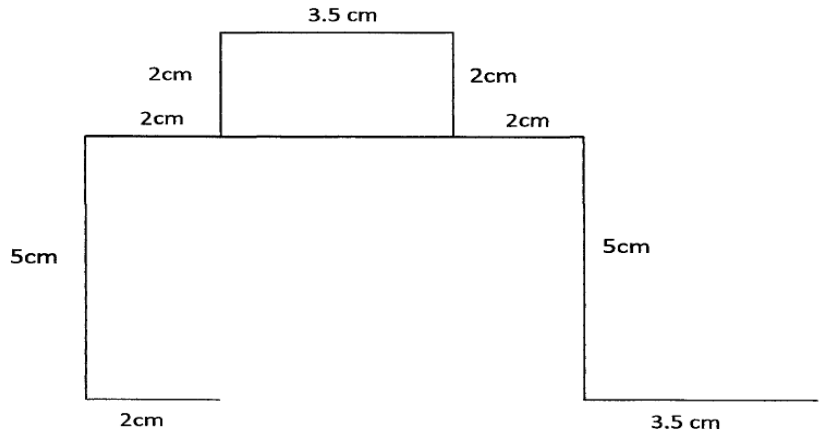
7.In the diagram below, the position vector of points A and B with respect to point O are $\begin{pmatrix} -6 \\ -2 \end{pmatrix}$ and $\begin{pmatrix} -3 \\ 0 \end{pmatrix}$ respectively.



Given that B is a point on AC such that AB = ½ BC. Use vector method to determine the coordinates of C. **(3 mks)**

8.Simplify:- $(8y)^{\frac{2}{3}} \times y^{1\frac{1}{3}} - 6 \div 2y^{-2}$

9. Complete the diagram below so as to make a net for a cuboid. Hence find the surface area of the cuboid. **(3 mks)**



10. Using a ruler and a pair of compasses **only**, construct a rhombus PQRS such that PQ = 6 cm and angle PQR = 135^0 hence measure the shortest diagonal. **(3mks)**

11.Janice, a fruit vendor obtained a total of Kshs. 6144 from her sales of oranges on Saturday at Kshs. 8.00 each. She had bought 560 more oranges to add to what had remained on Friday where she had sold 240 more oranges than on Thursday. She had sold 750 oranges on Thursday. Calculate the total number of oranges Janice had bought on Thursday. **(4 mks)**

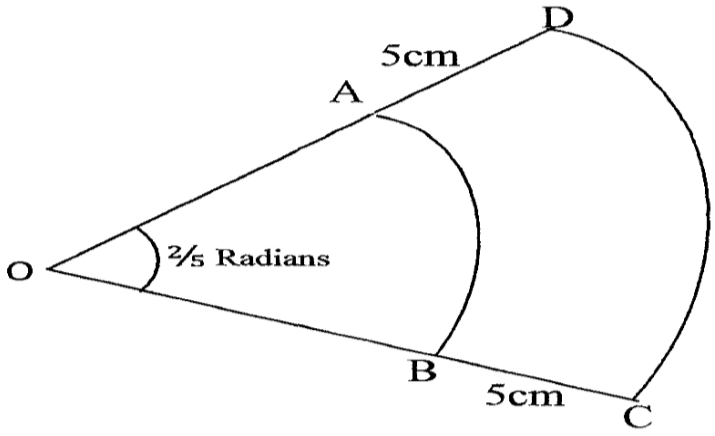
12. Factorise Completely:-

$x^4 - 2x^2y^2 + y^4$ **(2 mks)**

13. Solve for **y** given that **y** is acute and $\sin(3y - 50^0) - \cos(2y + 10^0) = 0$ **(3 mks)**

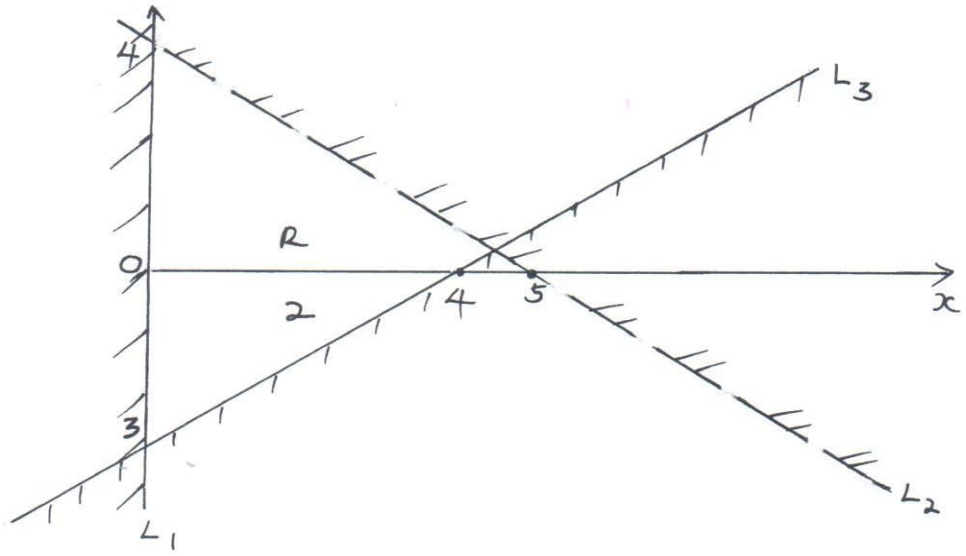
14. A solid consists of a cone and a hemisphere. The common diameter of the cone and the hemisphere is 12 cm and the slanting height of the cone is 10 cm. Calculate correct to two decimal places, the surface area ofthe solid. **(3 mks)**

15. The figure below shows two sectors in which AB and CD are arcs of concentric circles centre O. Angle AOB = $^2/_5$ radians and AD = BC = 5 cm.



Given that the perimeter of the shape ABCD is 24 cm, calculate the length of OA.**(3 mks)**

16. Find the inequalities that define the region R shown in the figure below.**(3 marks)**



SECTION II

Answer only five questions from this section

17. Nyongesa is a sales executive earning a salary of Kshs. 120,000 and a commission of 8% for the sales in excess of Kshs. 1,000,000. If in January he earned a total of Kshs. 480,000 in salaries and commission.

(a) Determine the amount of sales he made in the month of January. **(4 mks)**

(b) If the total sales in the month of February increased by 18% and in the month of March dropped by 30% respectively;Calculate**:-**

(i) Nyongesa's commission in the month of February. **(3 mks)**

(ii) His total earning in the month of March. **(3 mks)**

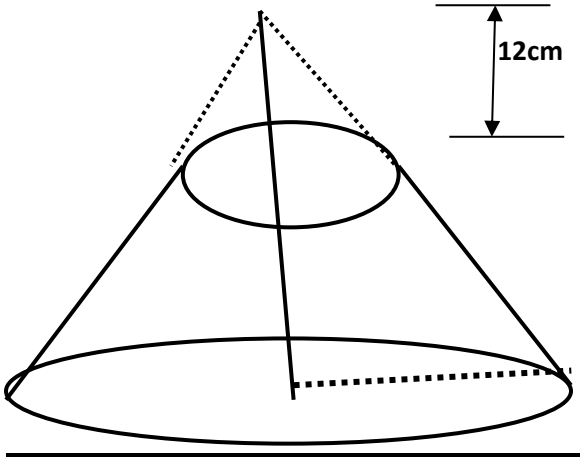
18. A sector of angle 108^0 is cut from a circle of radius 20 cm. It is folded to form a cone. Calculate**:**

(a) The curved surface area of the cone. **(2 mks)**

(b) The base radius of the cone. **(2 mks)**

(c) The vertical height of the cone. **(2 mks)**

(d) If 12 cm of the cone is chopped off to form a frustrum as shown below.



Calculate the volume of the frustum formed. **(2 mks)**

19. a) Find A^{-1}, the inverse of matrix $A\begin{pmatrix} 6 & 5 \\ 4 & 7 \end{pmatrix}$ **(2 mks)**

b) Ibanda sells white and brown loaves of bread in his kiosk. On a certain day he sold 6 white loaves of bread and 5 brown ones for a total of Kshs. 520. The next day he sold 4 white loaves and 7 brown ones for a total of Kshs. 530.

i. Form a matrix equation to represent the above information. **(1 mk)**

ii. Use matrix method to find the price of a white loaf of bread and that of a brown loaf of bread. **(3 mks)**

c) A school canteen bought 240 white loaves of bread and 100 brown loaves of bread. A discount of 10% was allowed on each white loaf whereas a discount of 13% was allowed on each brown loaf of bread. Calculate the percentage discount on the cost of all the loaves of bread bought. **(4 mks)**

20. A village Q is 7 km from village P on a bearing of 045^0. Village R is 5 km from village Q on a bearing of 120^0 and village S is 4 km from village R on a bearing of 270^0.

a) Taking a scale of 1 m to represent 1 Km, locate the three villages. **(3 mks)**

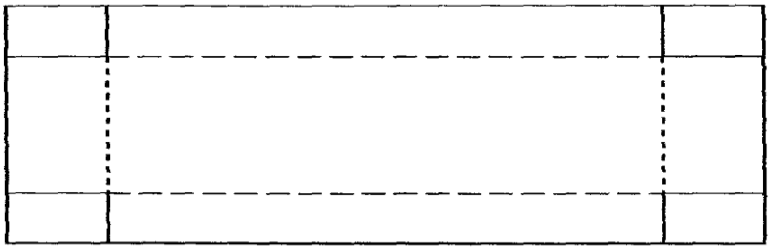
b) Use the scale drawing to find the:

i. Distance and bearing of the village R from village P. **(2 mks)**

ii. Distance and bearing of village P from village S. **(2 mks)**

iii. Area of the polygon PQRS to the nearest 4 significant figures. **(3 mks)**

21. The figure below shows a rectangular sheet of metal whose length is twice its width.



An open rectangular tank is made by cutting equal squares of length 60 cm from each of its four corners and folding along the dotted lines shown in the figure above. Given that the capacity of the tank so formed is 1920 litres and the width of the metal sheet used was x cm;

a) (i) Express the volume of the tank formed in terms of **x** cm. **(3 mks)**

(ii) Hence or otherwise obtain the length and width of the sheet of metal that was used. **(3 mks)**

b) If the cost of the metal sheet per m^2 is Kshs 1000 and labour cost for making the tank is 300 per hour. Find the selling price of the tank in order to make a 30% profit if it took 6 hours to make the tank. **(4 mks)**

22. (a) On the Cartesian plane below, draw the quadrilateral PQRS with vertices P(4,6), Q(6,3), R(4,4), and S(2,3) **(1 mk)**

(b) Draw P′Q′R′S′ the image of PQRS under the transformation defined by the translation vector

$T = \begin{pmatrix} -7 \\ -6 \end{pmatrix}$. Write down the coordinates of P′Q′R′S′. **(2 mks)**

(c) P″Q″R″S″ is the image of P′Q′R′S′ when reflected in the line **y= 1**. On the same plane, draw P″Q″R″S″. **(2 mks)**

(d) Draw P‴Q‴R‴S‴ the image P″Q″R″S″ when reflected in the line **y – x = 0(2 mks)**

(e) Find by construction, the centre of the rotation that maps P‴Q‴R‴S‴ onto PQRS and hence determine the coordinates of the centre of the rotation and the angle of the rotation **(3 ms)**

23. Andai recorded data on observation of time spent by a local university's first year bachelor of Commerce students at library as follows;-

Time spent in minutes	11 – 20	21- 30	31 – 40	41 – 50	51 - 60
Cumulative frequency	70	170	370	470	500

Calculate:

a) The mean **(6 mks)**

b) The median **(4 mks)**

24. (a)After t seconds, a particle moving along a straight line has a velocity of Vm/s and an acceleration of $(5 – 2t)m/s^2$. the particles initial velocity is 2m/s.

(i) Express V in terms of t. **(3 marks)**

(ii) Determine the velocity of the particle at the beginning of the third second.**(2 mks)**

(b) Find the time taken by the particle to attain maximum velocity and the distance it covered to attain the maximum velocity. **(5 marks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 5 PAPER 2

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
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FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Factorise $x^2 - y^2$, hence evaluate $3282^2 - 3272^2$ **(3mks)**

2. Find cos x – Sin x, if tan x= ¾ and $90^o \leq x \leq 360^o$ **(3mks)**

3. Expand $\left[1-2x\right]^6$ up to the fourth term. Hence use your expansion to evaluate $(1.02)^6$ to four decimal places. (4mks)

4. The average of the first and fourth terms of a GP is 140. Given that the first term is 64. Find the common ratio. **(3mks)**

5. Make b the subject of the formula. **(3mks)**

$$A = \sqrt{\frac{bd}{b^2 - d}}$$

6. Two variables P and Q are such that P varies partly as Q and partly as the square root of Q. Determine the equation connecting P and Q. When Q=16, P=500 and when Q = 25, P = 800 **(4mks)**

7. **Calculate** the interest on sh 10,000 invested for 1 ½ years at 12 % p.a. Compounded semi-annually**.** **(3 mks)**

8. Given that x=2i+j-2k, y= -3i+4j-k and z =5i + 3j+2k and that P= 3x-y+2z, find the magnitude of vector p to 3 significant figure **(4mks)**

9. Eighteen labourers dig a ditch 80m long in 5 days. How long will it take 24 labourers to dig a ditch 64 m long? **(3mks).**

10.

The expression $1+ {}^{x}/_{2}$ is taken as an approximation for $\sqrt{1+x}$

Find the percentage error in doing so if x = 0.44 (3mks)

11. The matrices $A = \begin{bmatrix} 3 & 0 \\ 0 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} a & b \\ o & c \end{bmatrix}$

are such that AB = A + B

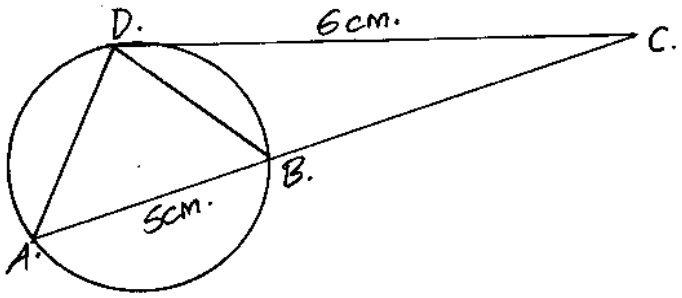
Find a, b, and c. **(3mks)**

12. Simplify **(3mks)**

$$\frac{2x^2 - x - 1}{x^2 - 1}$$

13. On map of scale 1:25000 a forest has an area of $20cm^2$. What is the actual area in Km^2 **(3mks)**

14. In the figure below, DC = 6cm, AB = 5cm. Determine BC if DC is a tangent**.(3mks).**



15. Evaluate without using logarithm tables. **(3mks)**

$$3\log_{10} 2 + \log_{10} 750 - \log_{10} 6$$

16. A bag contains 10 balls of which 3 are red, 5 are white and 2 green. Another bag contains 12 balls of which 4 are red, 3 are white and 5 are green. A bag is chosen at random and a ball picked at random from the bag. Find the probability that the ball so chosen is red. **(4mks)**

SECTION II (50 MARKS)

Answer any five questions in this section.

17. Income tax is charged on annual income at the rates shown below.

Taxable Income K£	Rate (shs per K£)
1 – 1500	2
1501 – 3000	3
3001 – 4500	5
4501 – 6000	7
6001 – 7500	9
7501 – 9000	10
9001 – 12000	12
Over 12000	13

A certain headmaster earns a monthly salary of Ksh. 8570.. He is entitled to tax relief of Kshs. 150 per month.

(a) How much tax does he pay in a year. **(6 mks)**

(b) From the headmaster's salary the following deductions are also made every month;

W.C.P.S 2% of gross salary
N.H.I.F Kshs. 1200
House rent, water and furniture charges Kshs. 246 per month.
Calculate the headmaster's net salary. **(4 mks)**

18. (a) (i) Taking the radius of the earth, R = 6370 km and $\pi = {}^{22}/_{7}$ calculate the shorter distance between the two cities P (60°N , 29°W) and Q (60°N, 31°E) along the parallel of latitude. **(3mks)**

(ii) If it is 1200Hrs at P, what is the local time at Q. **(3mks)**

(b) An aeroplane flew due South from a point A (60^0N, 45^0E) to a point B. The distance covered by the aeroplane was 800km. Determine the position of B. **(4mks).**

19. Triangle PQR whose vertices are p(2,2), Q(5,3) and R(4,1) is mapped onto triangle P′Q′R′ by a transformation whose matrix is $\begin{matrix} 1 & -1 \\ -2 & 1 \end{matrix}$

a) On the grid draw PQR and $P^1Q^1R^1$. **(4mks)**

b) The triangle $P^1Q^1R^1$ is mapped onto triangle $P^{11}Q^{11}R^{11}$ whose vertices are P^{11}(-2,-2), Q^{11}(-5,-3) and R^{11} (-4,-1)

(i) Find the matrix of transformation which maps triangle $P^1Q^1R^1$ onto $P^{11}Q^{11}R^{11}$. **(2mks)**

(ii) Draw the image $P^{11}Q^{11}R^{11}$ on the same grid and describe the transformation that maps PQR onto $P^{11}Q^{11}R^{11}$. **(2mks)**

c) Find a single matrix of transformation which will map PQR on to $P^{11}Q^{11}R^{11}$**.** **(2mks)**

20.(a) Complete the table for y = Sin x + 2 Cos x. **(2mks)**

X	0	30	60	90	120	150	180	210	240	270	300
Sinx	0			1.0		0.5		-0.5			-0.87
2 cos x	2			0		-1.73		-1.73			1.0
Y	2			1.0		-1.23		-2.23			0.13

(b) Draw the graph of y = Sin x + 2 cos x. **(3mks)**

(c) Solve sinx + 2 cos x = 0 using the graph. **(2mks)**

(d) Find the range of values of x for which $y \leq -0.5$ **(3mks).**

21. A bag contains 3 red, 5 white and 4 blue balls. Two balls are picked without replacement. Determine the probability of picking.

(a) 2 red balls **2mks**

(b) Only one red ball **2mks**

(c) At least a white ball **2mks**

(d) Balls of same colour. **2mks**

(e) Two white balls **2mks**

22. (a) Draw the graph of the function **2mks**

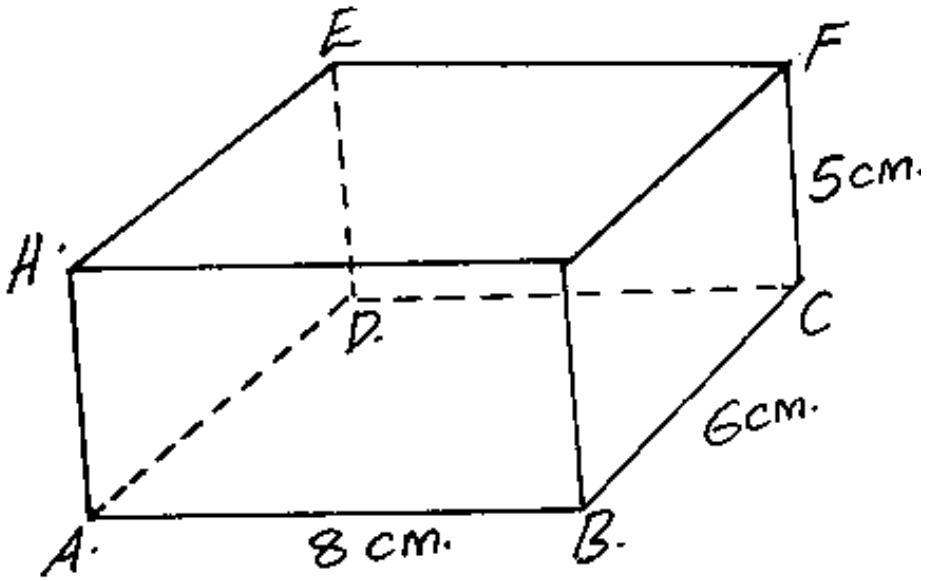
$$y = 10+3x - x^2 \text{ for } -2 \leq x \leq 5$$

(b) use of the trapezoidal rule with 5 stripes, find the area under the curve from x = -1 to x = 4. **4mks**

(c) Find the actual area under the curve from x = -1 to x = 4. **2mks**

(d) Find the percentage error introduced by the approximation. **2mks**

23. The figure below is a cuboid ABCDEFGH such that AB = 8cm, BC = 6cm and CF 5cm.



Determine (a) the length (i) AC **(2mks)**

(ii) AF **(2mks)**

(b) The angle AF makes with the plane ABCD. **(3mks)**

(c) The angle AEFB makes with the base ABCD. **(3mks**

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

	Machine A	**Machine B**
Floor space	$2m^2$	$3m^2$
Number of men required to operate	4	3

He has a maximum of $24m^2$ 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. **3mks**

(b) Represent the inequalities on the grid and shade the unwanted region. **3mks**

(c) If the profit from machine A is sh. 4 per hour and that from using B is kshs8 per hour. What number of machines of each type should the manager choose to give the maximum profit? **(4mks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 6 PAPER 1

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
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SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Without using mathematical table of calculator, evaluate: **(3mks)**

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

2. Work out the following, giving your answer as a mixed number in its simplest form. **(3mks)**

$$\frac{2}{5} \div \frac{1}{2} \text{ of } \frac{4}{9} - \frac{11}{10}$$

$$1 - \frac{1}{8} \times \frac{3}{16}$$

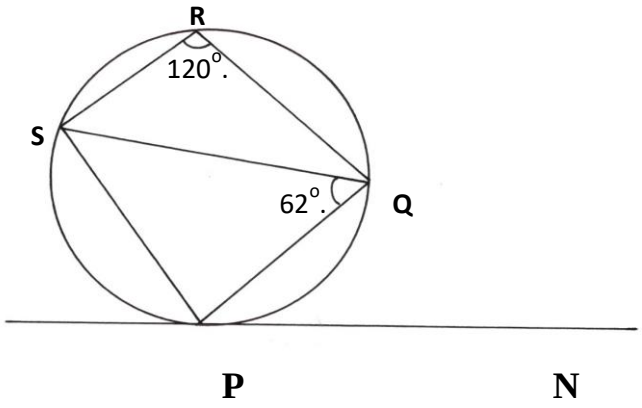
3. Simplify the expression $\frac{3x^2 - 4xy + y^2}{9x^2 - y^2}$ **(3mks)**

4. A prism of length 15cm has a uniform triangular cross section of sides measuring 8cm, 7cm and 5cm. determine the volume of the prism. **(4mks)**

5. The line passing through the points P(5, b), Q(2,3) is parallel to the line $2y=-x+2$. determine the value of b. **(3mks)**

6. The sum of two numbers is 15. The difference between five times the first number and three times the second number is 19. Find the two numbers. **(4mks)**

7. In the figure below MPN is a tangent to the circle at P. Find ∠SPQ and ∠NPQ, stating your reasons. ∠SRQ=120° and ∠PQR=62°. **(4mks)**



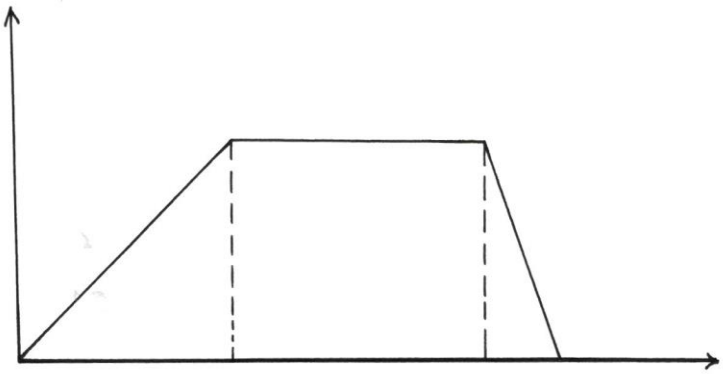
8. A sector of a circle of radius 10cm has an arc that subtends an angle of 270° at the centre.

Calculate the vertical height of the cone formed by the sector. **(3mks)**

9. Find the integral values of x which satisfy the simultaneous inequalities.

$3x-2<10+x<10+x$ **(4mks)**

10. The figure below shows the graph of velocity Vm/s against time t seconds of a car. If the car traveled a distance of 32 metres, in the first four seconds, calculate the average velocity for the whole journey. **(3mks)**



11. Show that the points P(3,4,7); Q(4,3,9) and R(1,6,3) are collinear. **(3mks)**

12. A milk vendor bought 20 litres of milk at Ksh.15 per litre and added 5 litres of water to the milk. If he sold the mixture at Ksh.18 per litre, what was the percentage profit. **(3mks)**

13. Each interior angle of n-sided polygon is 350^{o}.

(a) Find n. **(2mks)**

(b) What is the name of the polygon? **(1mk)**

14. Solve the following equation for x without using tables or calculators. **(3mks)**

$$\left(\frac{6}{5}\right)^{x+1} \quad \left(\frac{125}{216}\right)^{2x+3}$$

15. Rono left Kenya for Ethiopia with Ksh. 16, 742, which he changed at the airport to Ethiopian Birr currency at the rate of Kshs.1=7.772 Birr. He spent 71,502.40 Birr and returned to Kenya with the balance that he changed back to Kenya shillings, at a new rate of Ksh. 1=8.211Birr. How much, to the nearest cents, in Kenya shillings did Rono get? **(2mks)**

16. The sides of a rectangle are increased by 10%. By what percentage is the area increased. **(2mks)**

SECTION II (50 MARKS)

17. A racing cyclist completes the uphill section of mountainous course of 75km at an average speed of vkm/hr. He then returns downhill along the same route at an average speed of (V+20) km/hr.

(a) Write down in terms of v the time taken for;

(i) Uphill section **(1mk)**

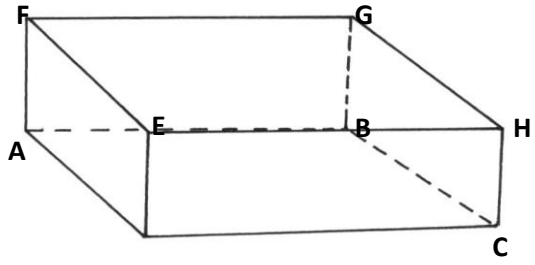
(ii) Return journey **(1mk)**

(b) Given that the difference between the time taken uphill is one hour, form an equation in V. **(1mk)**

(c) (i) Solve the above formed equation in (b) and calculate time taken to complete the uphill section of the course. **(4mks)**

(ii) Calculate the cyclist's average speed over 150km. **(3mks)**

18. Determine the distance between the following on the cuboid in the figure below.



D

(a) A and E **(2mks)**

(b) B and E over edge CD. **(4mks)**

(c) H and F over both edges BC and AB. **(2mks)**

(d) H and F over edges BC and AD. **(2mks)**

19. Five towns A,B,C,D and E are such that B is on a bearing of 040° and 6km from E. D is due west of E on a bearing of 340° from E. A is due North of E on a bearing of 045° from D. C is on a bearing of 250° from B and due North of E.

(a) Make a scale drawing showing the positions of the five towns.(Use a scale of 1cm to represent 1km) **(5mks)**

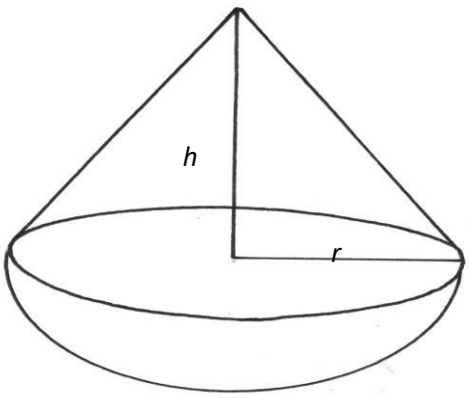
(b) Use your drawing to determine;

(i) the bearing and distance of B from A. **(2mks)**

(ii) the bearing and distance of C from D. **(2mks)**

(iii) the distance between A and E. **(1mk)**

20. (a) The figure below shows a metal solid consisting of a right cone mounted onto a hemisphere. The height h of the cone is twice the radius r. if the volume of the solid is $36cm^3$, find the radius of the hemisphere. **(4mks)**

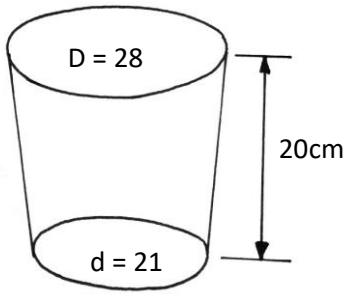


(b) The solid is totally immersed in water contained in a cylindrical tin of radius 9cm. through what height does the water level in the tin rise**.** **(2mks)**

(c) The solid is melted and recast into a right pyramid of vertical height 4.2cm. Find the base area of the pyramid. **(2mks)**

(d) If the solid is of mass 14.4g. Find its density in kg/m^3. **(2mks)**

21. The diagram below shows a frustrum made by cutting of a small cone on a plane parallel to the base of the original cone. The frustrum represents a bucket with the open-end diameter of 28cm and the bottom diameter of 21. The bucket is 20cm deep. Calculate to 1 decimal place, the capacity of the bucket in litres**.** **(10mks)**



22. (a) On a squared paper draw the graph of $y=(1-2x)(x+4)$ for the range $-6<x<3$ **(4mks)**

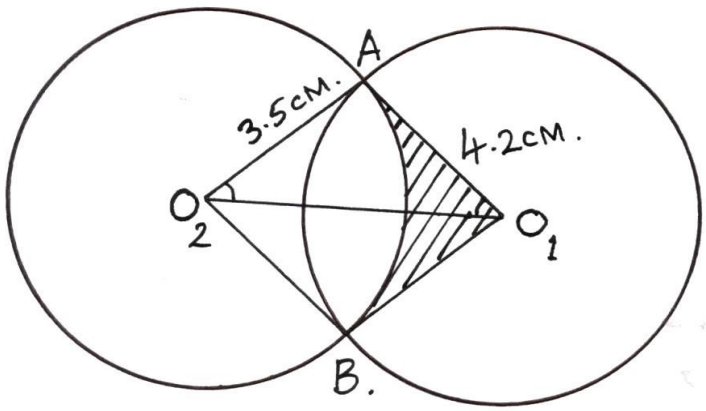
(b) On the same grid draw the line $y=2-3x$. **(2mks)**

(c) Use your graphs to solve the equations

(i) $(1-2x)(x+4)=-5$ **(2mks)**

(ii) $2-4x-2x^2=0$ **(2mks)**

23. Two circles of radii 3.5cm and 4.2cm with centres O_1 and O_2 respectively intersect at points A and B as shown in the figure below. The distance of the centres is 6cm.



Calculate

(a) $\angle AO_1B$ to the nearest degree **(3mks)**

(b) $\angle AO_2B$ to the nearest degree **(3mks)**

(c) Area of the quadrilateral O_1AO_2B, correct to 2 decimal places. **(2mks)**

(d) The shaded area correct to two significant figures.(Take $\pi = 22/7$)

24. A country bus left Nairobi at 10.45 and traveled towards Mombasa at an average speed of 60km/hr. A matatu left Nairobi at 1.15p.m on the same road at an average speed of 100km/hr. The distance between Nairobi and Mombasa is 500km.

(a) Determine the time of day when the matatu overtook the bus. **(6mks)**

(b) Both vehicles continue towards at their original speeds. Find how long the matatu had to wait in Mombasa before the bus arrived.

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 6 PAPER 2

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
- ***d)*** *All your workings must be clearly shown as must be awarded for correct working even if the answer is wrong.*
- ***e)*** *Non programmable silent scientific calculators and KNEC mathematical tables may be used.*

FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Give that x= 4 is a root of $x^2+kx-20=0$. Find the value of k and thus other roots. **(4mks)**

2. If θ is an acute angle find the value of Cos θ in the panating:

$4\ Sin^2\theta-5\ Cos\ \theta+2=0$ **(3mks)**

3. Rationalize the following leaving your answer in the simplified surd form.

$$\frac{1+\ Tan120}{1+\ Tan\ 60}$$

4. Find the matrix of transformation that would map triangle ABC with vertices at A(-5,2), B(-3,2) and C(-3,5) onto triangle A1B1C1 with vertices at A1(-5,-2), B1(-3,-2) and C1(-3,-5). **(4mks)**

5. Solve the equation;

$Log\ (x^2-8x+20) = Log\ 4 + Log\ (x-4)$ **(3mks)**

6. shows the marks obtained by Form 3 students of Rehema Secondary School in Mathematics Exam. The total numbers of students were 100.

Marks %	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
No. of Students	5	7	10	10	19	20	20	6	2	1

Find the standard deviation of the distribution. **(4mks)**

7. Find the expansion of $(1+1/2\ x)^3$ **(1mk)**

Hence use your expansion to obtain the value of $(1.05)^3$. Correct to 4s.f. (3mks)

8. Find the distance in kilometers between places R(40oS,25oW) and S(40oS,120oE) along the parallel of latitude(Take radius of the earth to be 6370km and π = 22/7) correct to 2 d.p.

9. A coffee trader buys two grades of coffee at sh. 80 and sh. 100 per parket . Find the ratio at which she should mix them so that by selling the mixture at a sh. 120, a profit of 25% is realized. **(3mks)**

10. Find the exact area enclosed by the curve y=3x2,the x-axis and the line x=2 and x=4. **(3mks)**

11. The equation of a circle is x2+y2-25y=-14x+38. Determine the centre and the radius of the circle. **(3mks)**

12. The figure below represents a cuboid in which AB=6cm, BC=8cm and CF=4cm.

(a) Name the projection of line AE in the vertical plane EFCD. **(1mk)**

(b) Hence calculate the size of the angle between line AE and the plane EFCD correct to 2 d.p. **(2mks)**

13. In the figure below, O is the centre of the circle and OD bisects angle EDF. Given that angle DFO=50°. Find angle DEF. **(2mks)**

14. The displacement 3 metres of a particle from a fixed point O after time t seconds is given by $S = 4t^3\ 3t^2+2$. find its velocity when t = 25 **(3mks)**

15. The sum of the first 14 of an AP is 595. Given that the sum of the first 8 terms of the same AP is 220

Find the (i) the first term **(2mks)**

(ii) the common difference. **(1mk)**

16. Three quantities P,Q,and R are such that P varies jointly with Q and the square of R . if P = 900 when Q = 20 and R = 3

Find (i) an equation connecting P, Q and R **(2mks)**

(ii) the value of R when Q = 10 and P = 800 **(2mks)**

SECTION B (55 MARKS)

Answer all any five questions in this section

17. (a) Complete the table below giving the values to 2 decimal places.

X^o	0	30	60	90	120	50	180	210	240
Sin x	0		0.87	1			0	-0.5	-0.87
Sin (x+30)	0			1.73	1	0	-1		-2
X^o	270	300	300	360					
Sin x	-1		-0.5						
2 sin (x +30)	-1.73			1					

(b) On the same axis plot the graph of y sin x and y 2 sin (x +30) for the domain $0 \leq x \leq 360^o$. Take a scale of 1 cm to represent 60^o on the x –axis, and 1 cm to represent 0.25 units on the y axis. **(4mks)**

(c) Use your graph to solve the equations 2 sin (x +30) - sin x =0 **(2mks)**

(d) State the amplitude and period of the curve for the curve y = sin x

18. Mr. Korir bought a tractor valued at Ksh. 800,00. the value of the tractor is depreciating at 20% p.a

(a) Calculate the value of the tractor after 4 years. **(3mks)**

(b) Find the time it would take for its value to be Ksh. 400,000. give you're answer correct to 2 decimal places. **(5mks)**

(c) If after 4 years the tractor is sold through a broker who charge 5% commission find the amount received by Mr. Korir from the **sale** **(2mks)**

19.(a) Construct a parallelogram PQRS in which PQ = 8 cm and PS = 4cm and angle QPS = 60^o

(b) Measure the length of PR **(1mk)**

(c) show the locus of a point T which moves so that it is equidistant from P and R. **(1mk)**

(d) The locus of a point V which moves so that angle QVS = 90° **(2mks)**

(e) The position of a point X so that PX ≥ Xr and QXS = 90°

20. The relationship between two variables S and T is given by the equation $S = KT^n$ where K and n are constants.

T	2	3	4	5	6	7
S	12.8	28.8	51.2	80.0	115.2	156.8

(a) Write down the linear equation relating to S and T **(1mk)**

(b) Hence complete the table above for the linear equation relating to S and T. **(4mks)**

(c) Draw a suitable straight line graph to represent the data. **(2mks)**

(d) use your graph to determine the values of K and n. **(2mks)**

(e) find the value of S when T = 3.5 **(1mk)**

21. The diagram shows triangle OBC in which CN: NB = 1: 2. OS:SN= 3:2 and M is the midpoint of OC

(a) Given that OB = b and OC=c, express the following vectors in terms of b and C

(i) BC **(1mk)**

(ii) ON **(2mks)**

(iii) BS **(2mks)**

(b) (i)show the points B,S and M are collinear. **(3mks)**

(ii) hence determine the radio MS: SB **(2mks)**

22. The transformation M1 and M2 are given by the matrices.

$M_1 = \begin{pmatrix} 2 & 0 \\ -1 & 0 \end{pmatrix}$ and $M1 = \begin{pmatrix} -1 & 2 \\ 0 & 2 \end{pmatrix}$

(i) Find the co-ordinates of ABC of A(2,2)B (1,5) and C (0,1) under combined transformation $M_1 M_2$

(ii) Plot the triangles ABC and ABC on the grid triangle ABC onto triangle ABC **(2mks)**

(iv)find the inverse of t. **(2mks)**

(v) Find the co-ordinates of triangle ABC under transformation M_1 **(2mks)**

23. The curve y 3x2 = 6x + 6 passes through the point s (2,3)

(a)Determine the gradient function of the curve. **(1mk)**

(b) Find the co-ordinates of the turning point of the curve. **(2mks)**

(c) Determine whether the point is a minima or a maxima. **(2mks)**

(d) Find the equation of the

(i) Tangent to the curve at S. **(2mks)**

(ii) Normal to the curve at S. **(3mks)**

24. A bag contains 5 red 6 blue and 3 green marble of similar shape and size. A marble is picked at random with out replacement and the colour noted A second marble is the picked.

(i) Draw a tree diagram to represent the information above. (**3mks)**

Hence find the probability that

(ii) The first two marbles are both Red. **(1mk)**

(iii) Only one of the first two marbles picked is blue. **(3mks)**

(iv) At least one of the first two marbles picked is given. **(3mks)**

(v) (the first picked is either green or blue. **(1mk)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 7 PAPER 1

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
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FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1) Simplify the expression below without using mathematical tables or a calculator **(4 marks)**

$$\frac{36^{\frac{7}{4}} \times 0.5^{2} \times \sqrt{\frac{3}{8}}}{\sqrt{2.4} \times \left(\frac{3}{5}\right)^{\frac{3}{2}}}$$

2) Simplify completely **(3marks)**

$$\frac{(a+2b)^2-(2a-b)^2}{9b^2-a^2}$$

3) Find the number such that $\frac{1}{4}$ of it added to $4\frac{1}{3}$, the result is the same as when $\frac{1}{3}$ of it is subtracted from $20\frac{2}{3}$ **(3 marks)**

4) Determine the equation of the mirror line which reflects P(-7.4) onto $P^1(3, 10)$ giving our answer in the form ax + by + = 0 **(3 marks)**

5) Two of the interior angles of a polygon are 95^0 and 115^0. The rest are 150^0 each. How many sides does this polygon have? **(3 marks)**

6) Find the range values that satisfy the inequality **(2 marks)**

$$x-4 \leq 3x+ < 2\ 2(x+5)$$

7) The cost of a car outside Kenya is US$ 4,800. you intend to buy one such car through an gent who deals in Japanese yen. The agent will charge 15% commission on the price of the car and further 72,220 Japanese yen for shipment of the car. How much Kenya shilling will you need to send to the agent to obtain the car, given that

1 US$ = 117.2 Japanese yen

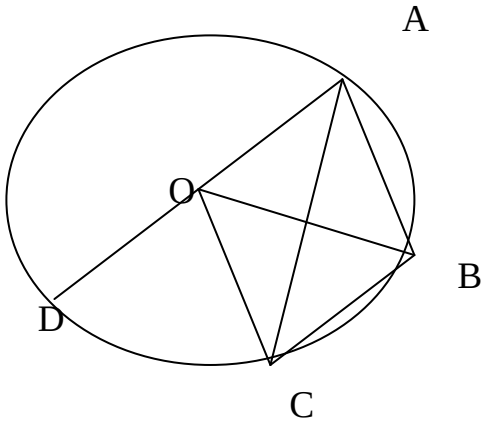
1 US$ = KSH 72.34 **(3 marks)**

8) Solve the simultaneous equations **(3 marks)**

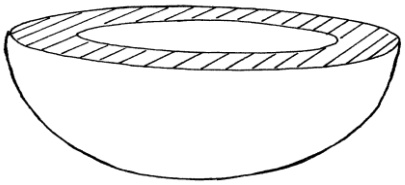
$$\frac{x}{\_\_\_} + = 0 \quad y-1\ 8$$

$$\frac{x+2y\ 2}{x+3\quad 7} = -$$

9) In the figure below O is the centre of the circle ABCD and AOD is a straight line. If AB= BC and the angle DAC = 40^0 calculate angle BAC



10) The figure below shows a hemispherical bowl of thickness 1.5 cm. given that the external curved surface are is 509 cm^2, find the volume of the bowl. (take $\pi = 3.142$)
(4 marks)



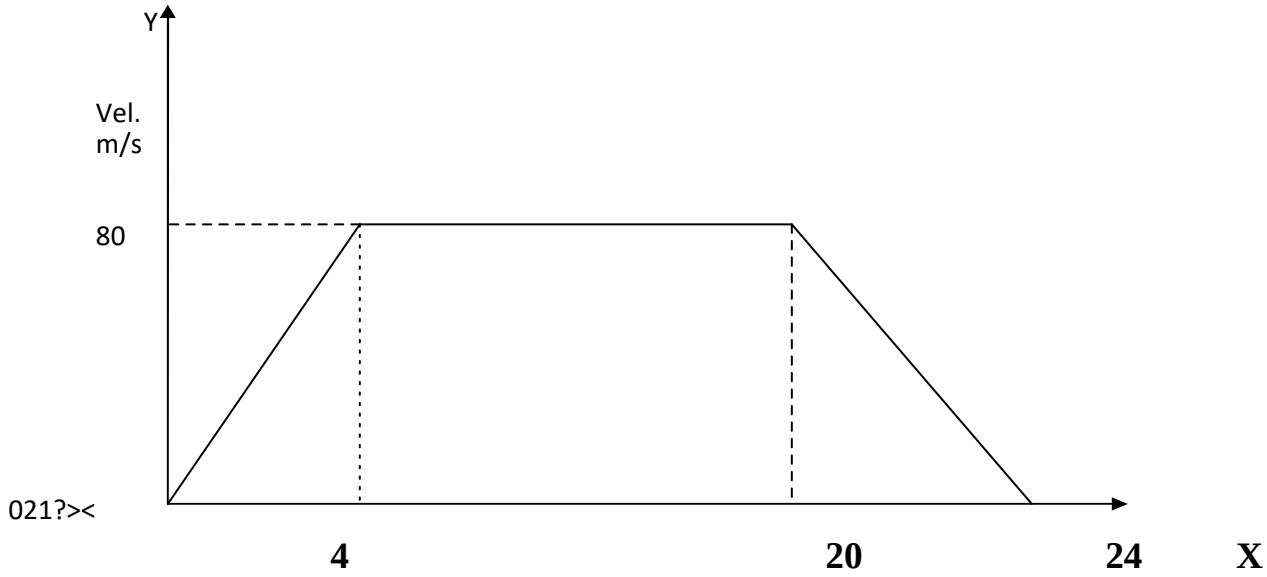
11) A container of height 90 cm had a capacity of 4.5 litres. What is the height of a similar container of volume 90 m^3 **(3 marks)**

12) Solve for X

$$25+5^{2\,1X-} \times \frac{1}{2}\ X = 25\ 26$$
(3 marks)

13) The gradient of a line L through points A(2x, 4) and B(-1, x) is $\frac{1}{7}$. Find the equation of the line perpendicular to L passing through B **(3 marks)**

14) The figure below is a velocity time graph of a car



a) Find the total distance traveled by the car **(1 mark)**

b) Calculate the deceleration of the car **(2 marks)**

15) The ratio of boys' to girls in a certain school is 6:5 in form one. In form two the boys are $\frac{1}{3}$ more than in form one and girls are a $\frac{1}{4}$ more than in form one. The number of form two is 78 more than form one. Find the number of students in form **one** **(3 marks)**

16) A contractor was to finish a piece of work in 80 days. He employed 150 workers to work 6 hours a day. After 30 days he found out that only a quarter of the work had been done. How many more workers did he require to finish the work I time? **(3 marks)**

SECTION II (50 MARKS)

17) A cold water tap can fill a bath in 3 minutes while a hot tap can fill in 5 minutes. The drain pipe can empty the bath in $3\frac{3}{4}$ minutes. The two taps and the drain pipe are fully open for 2 minutes, after which the drain pipe is closed.

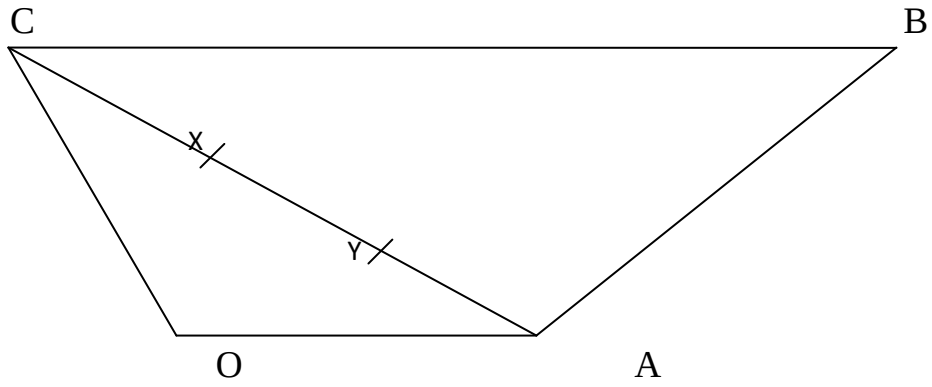
a) What fraction of the bath is filled after the first two minutes **(3 marks)**

b) How many more seconds are required for the bath to be completely filled? (3 minutes)

c) Given that the cold water tap delivers water at the rate of 200 cm^3/s Determine:

- **I.** The capacity of the bath in litres **(2 marks)**
- **II.** The late of flow of the hot water tap **(2 marks)**

18) The figure below shows a trapezium OABC **OA** = **a** , **OC** = **c** and **CB** = 3**a**



a) X and Y are point on AC such that AX: XC = 1:2 and 4AY = AC. Find the following vectors in terms of **a** and **c**

- **I.** **AY**
- **II.** **OY**
- **III.** **OX**

b) Show that O, Y and B are collinear

19)A passenger train traveling at 25 km/hr is moving in the same direction as the truck traveling at 30 km/hr . The railway line runs parallel to the road and the track takes $1\frac{1}{2}$ to overtake the train completely

a) Given that the truck is 5 metres long determine the length of the train in metres **(6 marks)**

b) The track and the train continue moving parallel to each other at the original speeds. Calculate the distance between them after 4 minutes and 48 seconds after the track overtake the train **(2 marks)**

c) The track stopped 45 minutes after overtaking the train. How long did the train take to catch up with the truck: **(2 marks)**

20) Three points A, B and C are on the same horizontal ground. A is 40 m due north of Band C IS 60 m due east of B . A vertical post stand 10 m tall at D on a bearing of 45^0 from B. if the angle of elevation of the top of the post from point B is 30^0

Find

a) The distance of the post from B **(2 marks)**

b) The distance of the post from

I. A **(3 marks)**

II. C **(3 marks)**

c) The angle of elevation of the top of the post from A **(2 marks)**

21) Given that x-y = 3 and 3x + y = 17 find without solving for x and y

I. $x^2 - 2xy\ y + ^2$ **(2 marks)**

II. $9x^2 + 6xy\ y + ^2$ **(2 marks)**

III. $3x^2 - 2xy\ y - ^2$ **(3 marks)**

b) Solve the simultaneous equations

x- y = 2

$x^2 - = y^2 10$ **(3 marks)**

22) Chege went to buy tiles for his floor which is more than 15m long and more than 8 m wide. He found that square tiles of length 16 cm or 18cm or 20 cm could fit exactly on his floor.

Determine:

a) The least dimension of his floor **(5 marks)**

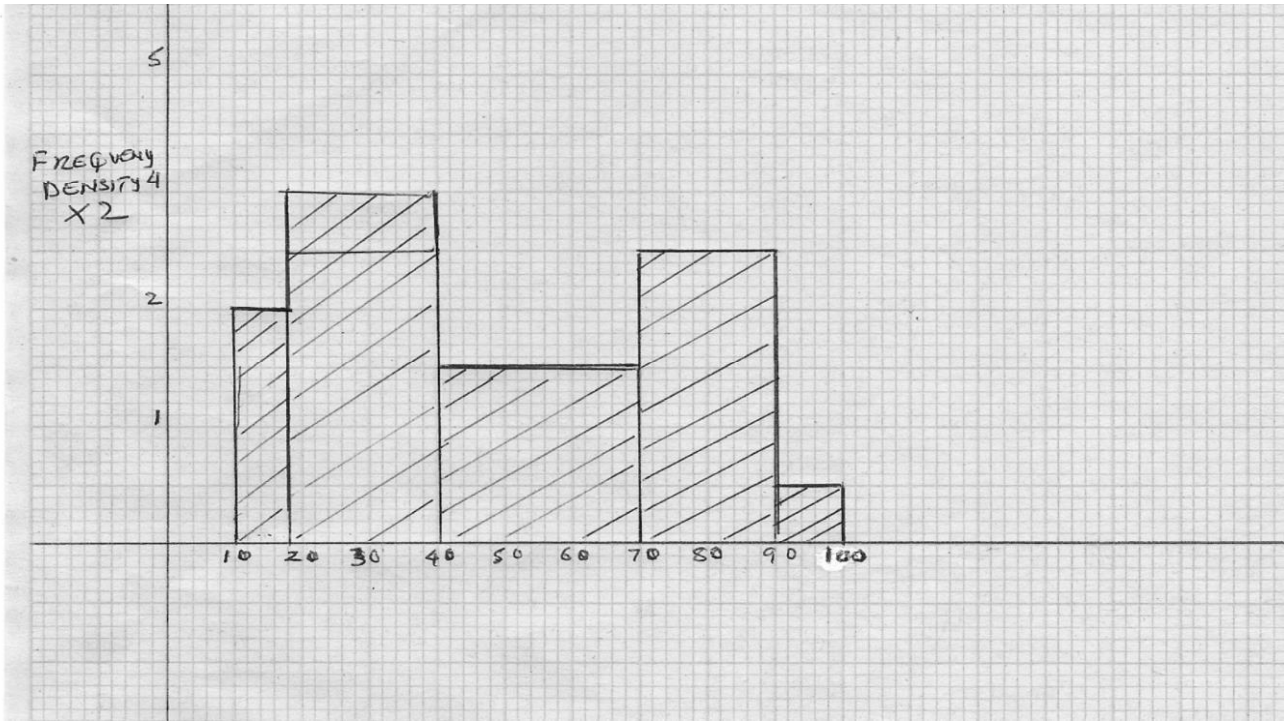
b) The least number of tiles of each length he can use for his floor **(3 marks)**

c) The cost of fitting the 20cm tiles on the floor above given that the formula for calculating the cost is

$$c = 2000 + \frac{4000n}{l^2}$$

Where n is the number of tiles and L is the length **(2 marks)**

23) The histogram represent marks obtained by candidates in an examination



a) Fill the table below for the **frequency** **(4 marks)**

class	frequency
$10 \leq x < 20$	
$20 \leq x < 40$	
$40 \leq x < 70$	15
$70 \leq x < 90$	
$90 \leq x < 100$	

b) Estimate the median **(3 marks)**

c) Find the range of marks for the middle 38 candidates **(3 marks)**

24) A rectangular tank whose internal dimensions are 2.4m by 2.5m by 3.7 m is two thirds full of juice

a) Calculate the volume of the juice in litres **(3 marks)**

b) The juice is parked in small packets in a shape of right pyramid with equilateral triangles sides of 20 cm.

The height of each packet is 15 cm. full packet are sold at ksh 50 per packet:
calculate

I. The volume of juice in cm^3 of each packet to the nearest whole number **(3 marks)**

II. The number of full packet of juice **(2 marks)**

III. The amount of money realized from the sale of juice **(2 marks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 7 PAPER 2

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
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SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1) Use logarithms to evaluate **(4 marks)**

$$\sqrt{\frac{\log 9\times 0.954}{0.301\times 4.3}}^{-2}$$

2) Make h the subject of the formula **(2 marks)**

$$f = d\sqrt{\frac{a^2 - k^2}{h}}$$

3) AB is the diameter of the circle. Given that A(2, -3) and B(4, -7). Find the equation of the circle in the form $x^2 + -y^2 \quad 2ax + 2by + = c0$ **(3 marks)**

4) A quantity P varies partly as the cube of Q and partly varies inversely as the square of Q. When Q = 2, P = 108 and when Q =3, P = 259. find the value of P when Q = 6 **(4 marks)**

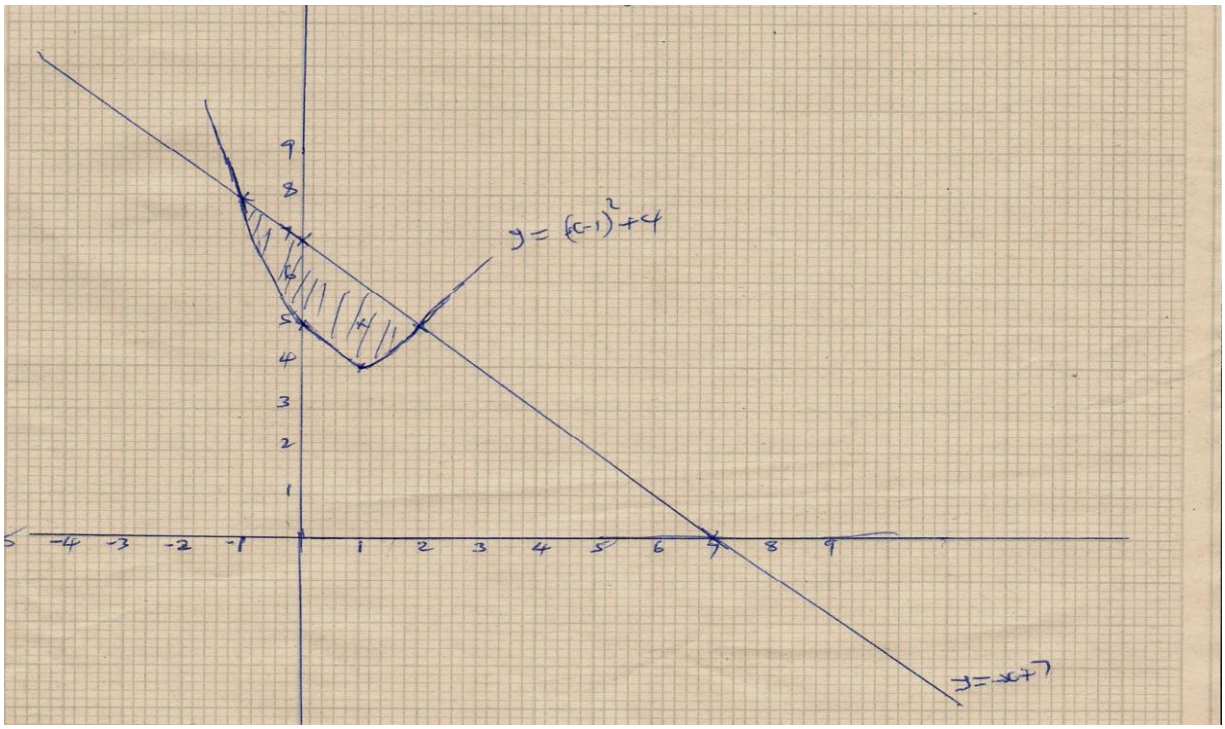
5) Simplify giving your answer in the form $a + b\sqrt{c}$ **(3marks)**

$$\frac{\sqrt{3} - \frac{\sqrt{3}}{8}}{\sqrt{\frac{3}{4}} + \sqrt{\frac{2}{3}}}$$

6) Solve for $0^0 \leq \theta \leq 180^0$ the equation **(3 marks)**

$12\cos^2\theta - 7\cos\theta + = 10$

7) The diagram below shows a straight line y = -x +7 intersecting line the curve $y = - + (x\ 1)^2 4$ at the point A and B



a) Find the coordinates of A and B **(2 marks)**

b) Calculate the area of the shaded region **(3 marks)**

8) PQR is a triangle of area 9 cm^2. if PQ is the fixed base of the triangle and is 6 cm long. Draw it and describe the locus of point R **(2 marks)**

9) The position of two towns A and B on the earth's surface are (36^0N, 49^0E) and (36^0N, 131^0W) respectively.

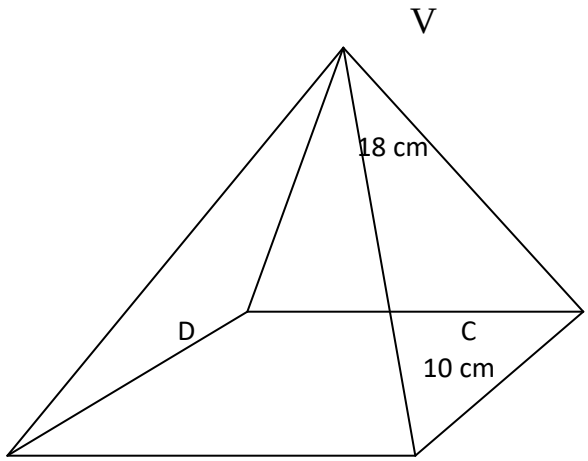
a) Find the local time at A if the time at B is 12.35 pm on Sunday. **(1 marks)**

b) Using 6370 km as the radius of the earth , calculate the distance between town A and B **(2 marks)**

10) (a) expand $(a\ b-)^5$ **(1 marks)**

(b) Use the first three terms of the expansion in (a) the above to find the value of 1.97^5 to two decimal place **(2 marks)**

11) Figure below shows a square based pyramid ABCD .AV=BV=CV=DV=18 cm. AB= 10 cm. Calculate the angle between the plane BVC and AVD. **(3 marks)**



12)

A coffee blender mixes 6 parts of type A and 4 parts of types B. If type A cost sh. 72 per kg and type B cost sh. 66 per kg respectively. At what price should he sell the mixture in order to make 5% profit? Give your answer correct to the nearest cents **(3 marks)**

13) The volume of a cuboid is 40.3 cm^3 to one decimal place and the base area is 8.71 cm^2 correct to 2 decimal places.

a) Find the limit of error in calculating the height of the cuboid

b) Find the percentage % error **(3 marks)**

14) Determine the value of x for which the matrix below is a singular

$$\begin{pmatrix} x & 4 \\ 1 & x-3 \end{pmatrix}$$ **(3 marks)**

15) Solve for x if $\log_4 x + \frac{1}{2}\log_2 x = 3$ **(3 marks)**

16) A colony of bees was found to have 250 bees at the beginning. There after the number doubled every two days. Find how many bees there after 16 days **(3 marks)**

Section II (50 marks)

17) Nyawira is a civil servant in a ministry. She earns a monthly salary of sh. N and allowances of sh. 1271, all taxable. She is entitled to a monthly relief of sh 1056 The table below shows the rates of taxation

K£ P.a	Rate%
1 -5808	10
5809 - 11280	15
11281- 16752	20
16753 - 22224	25
22225 and above	30

When her salary was increased by 50%, the net tax increased by 66.25% to sh.9036 per month.

a) What was her net tax in K£ per p.a. before the salary increase **(2 marks)**

b) Calculate her salary before the increase **(5 marks)**

c) Calculate the percentage increase in her net pay after the salary increase **(3 marks)**

18) Given the transformation matrices $T_1 = \begin{pmatrix} 2 & 1 \end{pmatrix}$ and $T_2 = \begin{pmatrix} 3 & 1 \\ 1 & 2 \end{pmatrix}$ and that

$$\begin{pmatrix} -1 & 2 \end{pmatrix} \qquad \begin{pmatrix} 1 & 3 \end{pmatrix}$$

transformation T_1 followed by T_2 can be replaced by a single transformation T,

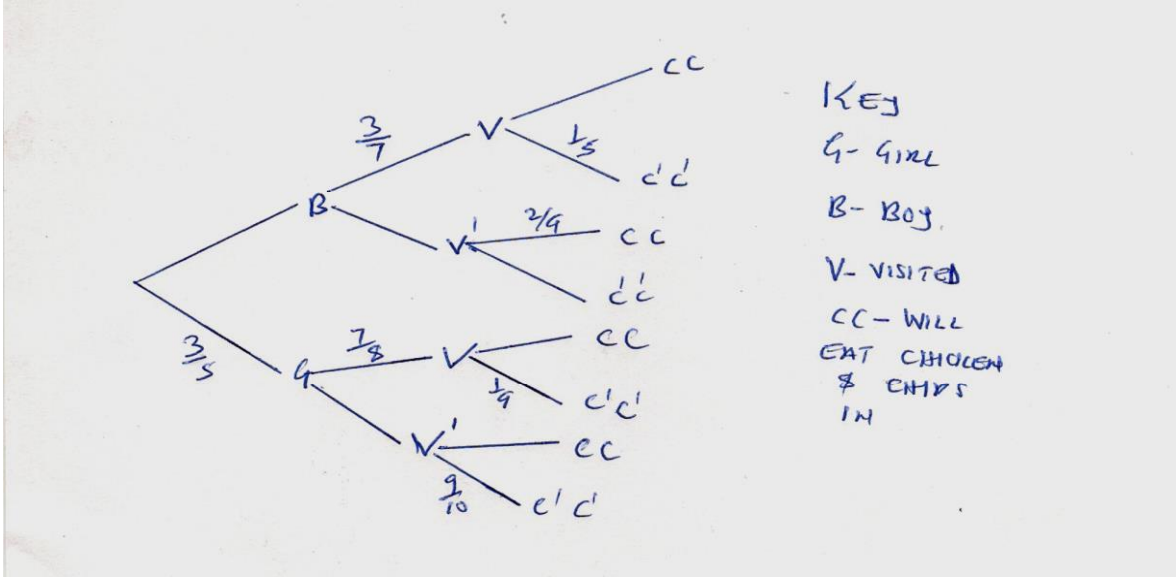
a) write down the matrix for T (2 marks)

b) Find the inverse of matrix T (2 marks)

c) The point $A^{11}(7, -11)$, $B^{11}(-7,-13)$, $C^{11}(-8,16)$ and $D^{11}(8,8)$ are the images of points A, B, C and D respectively under transformation T_1 followed by T_2. write down the coordinates of A, B, C and D (4 marks)

d) Find the coordinates of A^1, B^1, C^1 and D^1 of the images of A, B, C, and D respectively under transformation T_2 (2 marks)

19) A survey was conducted on 200 students during a visiting day. Some of the probabilities calculated from the result are shown in the tree diagram



KEY : G= girl, B= boy, V = Visited , CC= will eat chicken and chips that evening

a) Copy and complete the tree diagram **(3 marks)**

b) How many students in the survey were boys? **(2 marks)**

c) One of the student is selected at random. Find the probability that the student selected

I. Is visited girl and will not eat chicken and chips **(2 marks)**

II. Is not visited and will eat chicken and chips **(3marks)**

20)

Complete the table below by filling in the bland spaces for the functions $y = \sin(x + 30)$ and $y = \cos\frac{1}{2}x$ and draw their graphs on the same set of axes

(7 marks)

x	0	30	60	90	120	150	180	210
$Y=\sin(x+30^0)$	0.5		1		0.5			-0.87
$Y = \cos\frac{1}{2}x$	1.00			0.71			-0.50	

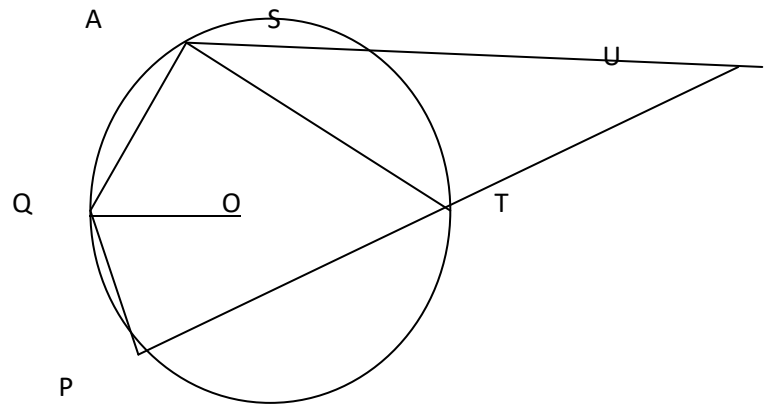
a) Use your graph to solve

i. $\sin(x + 30) - \cos\frac{1}{2}x = \mathbf{0}$ **(1 mark)**

ii. $\sin(x + 30) = \mathbf{0}$ **(1 mark)**

iii. $\cos\frac{1}{2}x = -0.\mathbf{25}$ **(1 mark)**

21) the figure below QOT is a diameter, $\angle QTP = 42^0$ $\angle TQR = 74^0$ and $\angle SRT = 39^0$. RSU and PTU are secants



Determine giving reasons

a) ∠ RST (2 marks)
b) ∠ SUT (2 marks)
c) Obtuse angle ∠ ROT (2 marks)
d) ∠ PST (2 marks)
e) ∠ QPS (2 marks)

22) The table below shows the analysis of examination marks scored by 160 candidates

Marks (%)	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
No of candidates	2	6	15	22	36	34	20	15	6	4

a) Using an assumed mean of 45.5. calculate

I. The mean **(3 marks)**
II. The standard deviation **(4 marks)**

b) Calculate the minimum mark for grade A if 40 student got grade A **(3 marks)**

23) The resistance R newtons encountered by an object flying at V m/s obeys a law of the form $R = PV + QV^2$

Below are corresponding values of R and V

V(cm/s)	0.20	0.40	0.60	0.80	1.00
R(N)	0.36	0.64	0.84	0.96	1.0

a) Draw the graph of $\frac{R}{}$ against V **(4 marks)**

b) Find the value of the constants P and Q **(3 marks)**

c) Find the resistance at 0.5m/s **(1 mark)**

d) At what velocity is the resistance 0.51 N **(2 marks0**

24) The velocity of a particle, t second after passing a fixed point is given by $v = 2t^2 - +13t \quad k$ where k is a constant.

The particle has a maximum displacement of 13m from the fixed point when $t = \frac{1}{2}$ second

a) Calculate the value of k **(3 marks)**

b) Find the equation of the displacement of the particle from the fixed point after t seconds **(4 marks)**

c) Calculate the distance moved by the particle during the fourth second **(3 marks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 8 PAPER 1

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
- ***d)*** *All your workings must be clearly shown as must be awarded for correct working even if the answer is wrong.*
- ***e)*** *Non programmable silent scientific calculators and KNEC mathematical tables may be used.*

FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

Answers all questions in this section

1. Without using a calculator evaluate **(3 Marks)**

$$\frac{\left(3\frac{1}{3}+1\frac{1}{9}\right)\div 1\frac{1}{3}}{\left(4\frac{2}{9}-2\frac{5}{9}\right)x\ \frac{2}{3}}$$

2. 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)**

3. 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)**

4. Simplify: $\frac{9x^2-1}{3x^2+2x-1}$ **(3 Marks)**

5. compounded quarterly. Find the amount in the account after 1 ½ years**.** **(3 Marks)**

6. 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) **(3 marks)**

9. The position vectors of A and B are given as **a** = 2**i** – 3**j** + 4**k**and **b** = -2**i** – **j** + 2**k**respectively.

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

10. A regular polygon has internal angle of 150^0 and side of length 10cm.

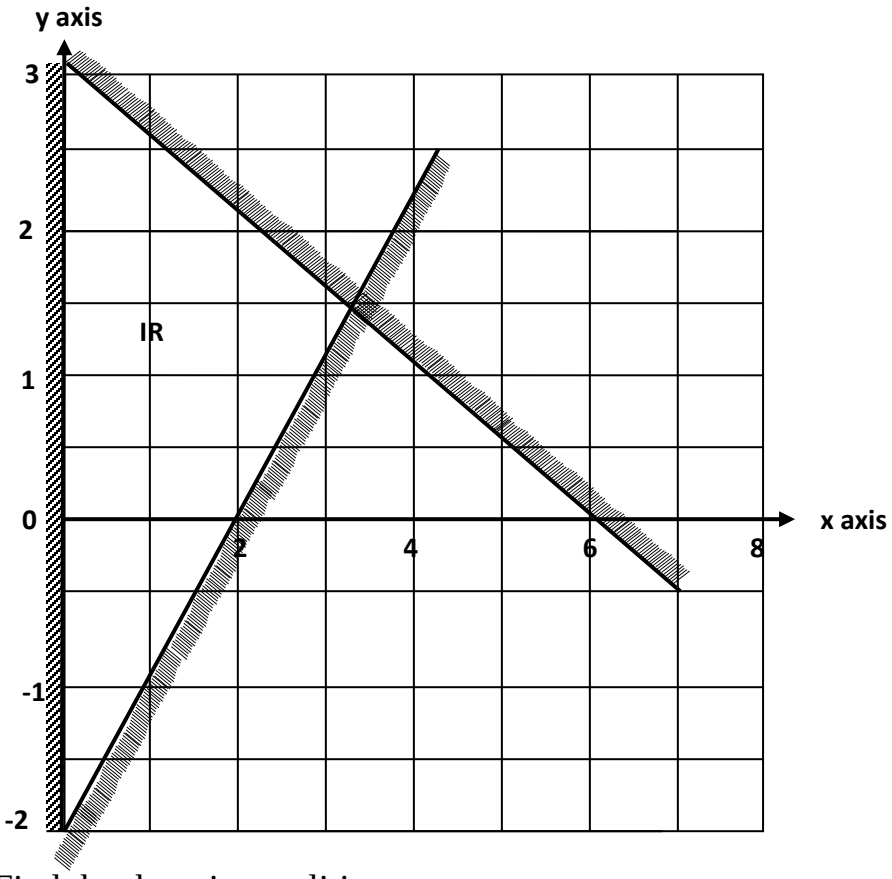
(a) Find the number of sides of the polygon. **(2 Marks)**

(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.



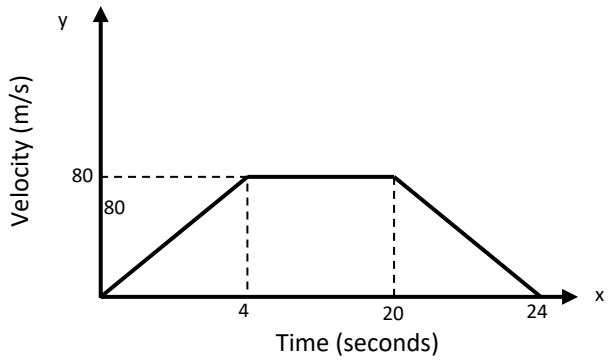
Find the three inequalities **(3 Marks)**

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? **(2Mk s)**

(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≤X<9	9≤X<11	11≤X<13	13≤X<16	16≤X<20	20≤X<21
No. of contents y	2	6	8	3	2	1

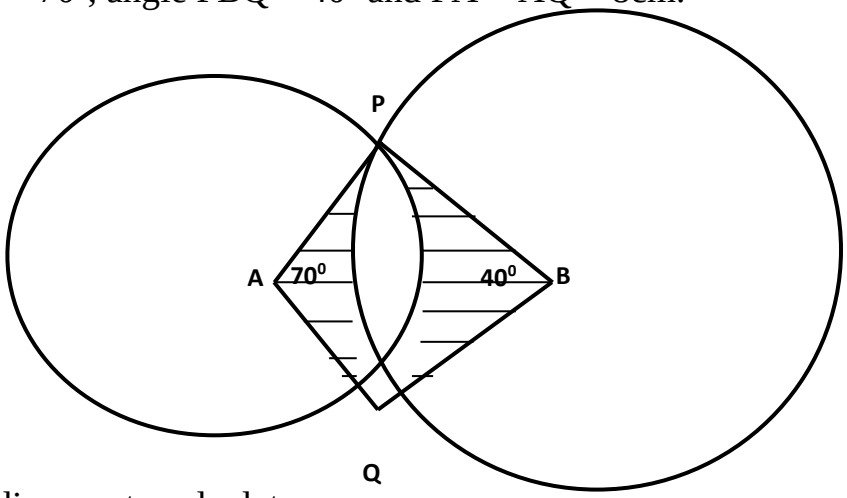
Use the table to represent the information on a histogram. **(3 Marks)**

SECTION II (50 MARKS):

Answer any five questions in this section.

17. The diagram below shows two circles, centres A and B which intersect at points P and Q.

Angle PAQ = 70^0, angle PBQ = 40^0 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. The 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)**

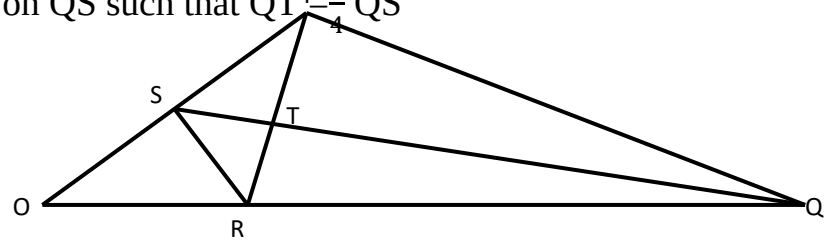
20. A bus and a Nissan left Nairobi for Eldoret, a distance of 340 km at 7.00 a.m. The bus travelled at 100km/h while the Nissan travelled at 120km/h. After 30 minutes, the Nissan had a puncture which took 30 minutes to mend.

(a) Find how far from Nairobi the Nissan caught up with the bus **(5Marks)**

(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) $\underset{\sim}{SR}$ **(1 Mark)**

(ii) $\underset{\sim}{QS}$ **(2 Marks)**

(iii) $\underset{\sim}{PT}$ **(2 Marks)**

(iv) $\underset{\sim}{TR}$ **(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 ½ 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 ½ 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 Marks)**

(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)**

(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)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 8 PAPER 2

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
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FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

ANSWER ALL QUESTIONS IN THE SECTION.

1. Use logarithms to evaluate **(4 Marks)**

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

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

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

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

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

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

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

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

8. By rounding each number to the nearest tens, approximate the value of $\frac{2454\ x\ 396}{66}$

Hence, calculate the percentage error arising from this approximation to 4 significant figures. **(3 Marks)**

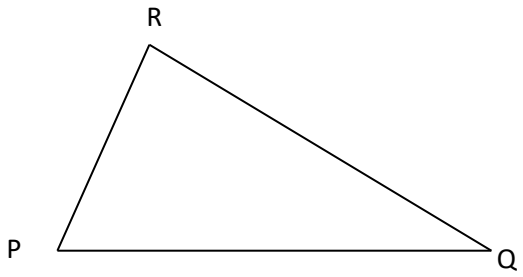
9. Without using a calculator or mathematical tables, express $\frac{\sqrt{3}}{1 - Cos\ 30^0}$ in surd form and simplify **(3 Marks)**

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

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

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

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



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

15. Solve for x in the equation

$2\sin^2 x - 1 = \cos^2 x + \sin x$, where $0^0 \leq x \leq 360^0$. **(4 Marks**

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

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

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

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

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

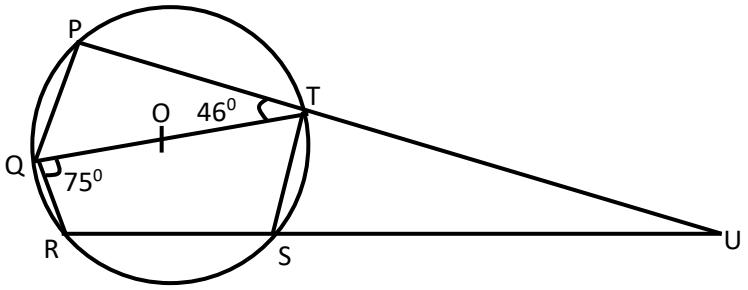
(b) Find the probability that

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

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

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

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



Determine the following, giving reasons in each case:

(a) angle RST **(2 Marks)**

(b) angle SUT **(2 Marks)**

(c) angle PST **(2 Marks)**

(d) obtuse angle ROT **(2 Marks)**

(e) angle SQT **(2 Marks**

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

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

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

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

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

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

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

(a) Using an assumed mean of 42, calculate

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

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

(b) Calculate the quartile deviation **(3 Marks)**

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

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

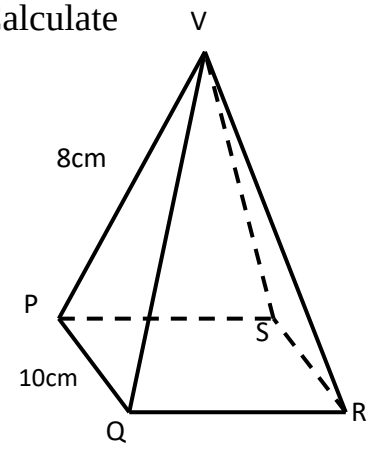
(b) The plane turns and flies at the same speed due west. It reaches longitude Q, 12^0W.

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

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

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

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



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

(b) The angle between

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

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

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

(c) Volume of the pyramid **(2 Marks)**

23. Complete the table below for the functions $y = \sin 3\theta$ and $y = 2\cos(\theta + 40^0)$ **(2 Marks)**

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

(a) On the grid provided, draw the graphs of $Y = 3\sin 3\theta$ and $y = 2\cos(\theta + 40^0)$ on the same axis.

Take 1 cm to represent 10^0 on the x-axis and 4 cm to represent 2 unit on the y – axis. **(5 marks)**

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

(i) $\frac{3}{4}\sin 3\theta = \frac{1}{2}\cos(\theta + 40^0)$ **(2 Marks)**

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

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

(a) Find:

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

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

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

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 9 PAPER 1

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
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FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Evaluate;

$$\frac{18 \div 3 \, of \, (-2) \times 8 \div 24}{-4 \div 6 \times 2}$$

(3mks)

2. Solve for x in the equation.

$27^{x-1} \times 3^{x+1} = 243$ **(3mks)**

3. Solve the following quadratic equation by completing the square.

$2x^2 = 1.5 - 7x$ **(3mks)**

4. Mutua had a tank which had two taps A and B. Tap A takes 5 minutes to fill the tank and tap B takes 10 minutes to empty the tank. Starting with a tank ¾ full, how long will it take to fill the tank if both taps are opened at the same time?

(4mks)

5. Use reciprocal tables to work out the following correct to 4s.f. **(3mk)**

$$\frac{16}{2.674} \quad \frac{24}{0.1396} +$$

6. Solve the simultaneous equation below. (2mks) $2a + 3b = \begin{pmatrix} 4 \\ 11 \end{pmatrix}$ $b - a = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$

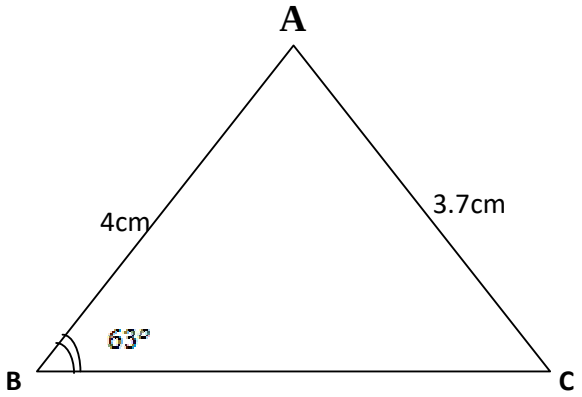
7. An open rectangular box measures externally 32cm long, 27cm wide and 15cm deep. If the box is made of wood 1cm thick, what volume of wood is used?

(3mks)

8. A security guard observes that the angle of elevation to the top of an observation tower is 36°, if he walks 65m towards the base of the tower, the angle becomes 57.5°. What is the height of the tower? **(3mks)**

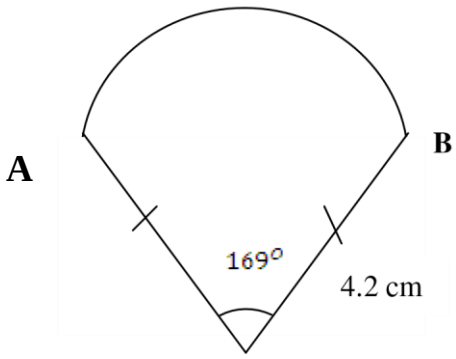
9. Find the length BC of the following triangle if AC = 3.7cm, AB = 4cm and <ABC = 63°.

(4mks)



10. Find the perimeter of the figure below. Give your answer correct to four significant figures.

(3mk) (3mk)



11. A shirt whose marked price is sh.800 is sold to a customer after allowing him a discount of 13%. If the trader makes a profit of 20%. Find how much the trader paid for the shirt. **(3mks)**

12. A transformation whose matrix is $\begin{pmatrix} 2x-1 & -3 \\ 2 & x \end{pmatrix}$ maps a triangle with an area of $4cm^2$ onto another triangle with area of $36cm^2$. Calculate the value of x. **(3mks)**

13. Find an estimate of the area enclosed by the curve of $y = 3x^3 - 5$, the x-axis and the lines x = 4 and x = 6 using the mid-ordinate rule with 4 rectangles. **(3mks)**

14. Solve for θ in the equation $\sin(3\theta + 120°) = \frac{\sqrt{3}}{2}$ in the range $0 \leq \theta \leq 180°$ **(4mks)**

15. Solve for P given that, **(3mks)**

$\log_2(2p+3) - 2 = \log_2(p-2)$

16. Two similar cylinders have the ratio of the areas as 9 : 25. Given that the bigger cylinder has a volume of $750cm^3$, calculate the volume of the smaller cylinder. **(3mks)**

SECTION II

17. a)Using a ruler and a pair of compasses only construct a rhombus A B C D such that AB = 6cm and <ABC = 135°. **(4mks)**

b) Drop a perpendicular from C to AB extended to meet AB at N. measure BN and CN. **(3mks)**

c) Bisect <ABC and <DAB, let the two bisectors meet at M. Measure MA. **(1mk)**

d) Determine the area o f triangle ABM. **(2mks)**

18. a) Mr. Mulei operates two passenger service vehicles along the Nyeri-Nairobi route. One is a 16-seater matatu and the other a 8 – seater Peugeot 504. Each vehicle makes one route trip per day, and the charges are ksh.250 and ksh.300 per passenger respectively (one way). The matatu uses diesel which cost ksh.48 per litre and the

Peugeot 504 uses regular petrol which costs ksh.52 per litre. The fuel consumption of the two vehicles is in the ratio 4 : 3 respectively.

a) If the matatu uses 80litres for the round trip, determine the fuel consumption of the Peugeot 504 for the round trip**.** **(2mks)**

b) Calculate the daily collection for each vehicle. **(2mks)**

c) Determine which vehicle is more profitable (on a daily basis) and by how much. (other factors being constant**).** **(3mks)**

d) If the prices of both types of fuel go up by 20%, determine the percentage change in the daily collection**.** **(3mks)**

19. Four towns K, L, M and N are such that L is 94km directly to the North of K and M is on a bearing of 295° from K at a distance of 60km. N is on a bearing of 310° from M and at a distance of 42km, using a scale 1 : 1000000.

a) Make an accurate scale drawing to show the relative scale positions of the towns. **(4mk)**

Find;

b) The distance and the bearing of L from M. **(2mks)**

c) The distance and bearing of N from L. **(2mks)**

d) The distance and bearing of K from N. **(2mks)**

20. The co-ordinates of the vertices of rectangle P Q R S are P(1,1) Q(6,1) R(6,4) and S(1,4)

a) i) Find the co-ordinates of the vertices of its image $P^1Q^1R^1S^1$ under the transformation defined by

$$\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}$$ **(2mks)**

ii) Draw the object and its image on the graph paper. **(3mks)**

iii) On the same grid draw the image $P^{11}Q^{11}R^{11}S^{11}$ of $P^1Q^1R^1S^1$ under the matrix given by

$$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$ **(3mks)**

b) Find a single matrix which will map P Q R S to $P^{11}Q^{11}R^{11}S^{11}$ **(2mks)**

21. Aspire stands directly across the street from a building. The angle of depression of the top of the building from the top of the spire is 25.8° and the angle of elevation of the top of the spire from the foot of the building is 43.5°. Given that the distance between the spire and the building is 40m, calculate to2dp.

a) The height of the spire **(2mks)**

b) The difference in height between the spire and the building **(3mks)**

c) The height of the building **(2mks)**

d) The angle of elevation of the top of the building from the foot of the spire **(3mks)**

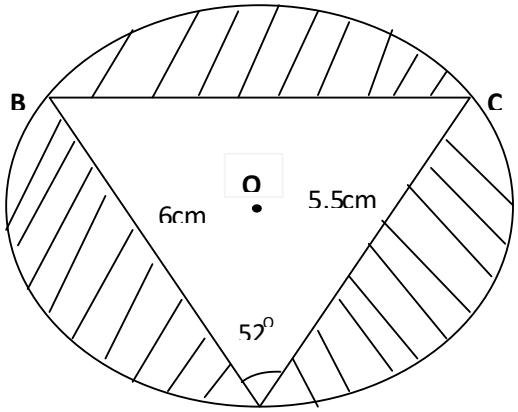
22. A Nissan matatu left nakuru at 9.10am at an average speed of 56km/h towards eldoret. A bus left Eldoret towards Nakuru at 10:10am travelling at an average speed of 70km/h. Given that the distance between Eldoret and Nakuru is 148km.

a) The time at which the matatu will meet the bus. **(3mks)**

b) The distance from Eldoret to the meeting point **(3mks)**

c) Another saloon car left Eldoret at 10.30am on the same day travelling towards Nakuru. If the car travelled at an average speed of 90km/hr. How long did it take the car to catch up with the bus? **(4mks)**

23. The figure shown below is a circumscribed circle with the chord AB = 6cm and chord AC = 5.5 cm. angle BAC = 52° and O is the centre of the circle.



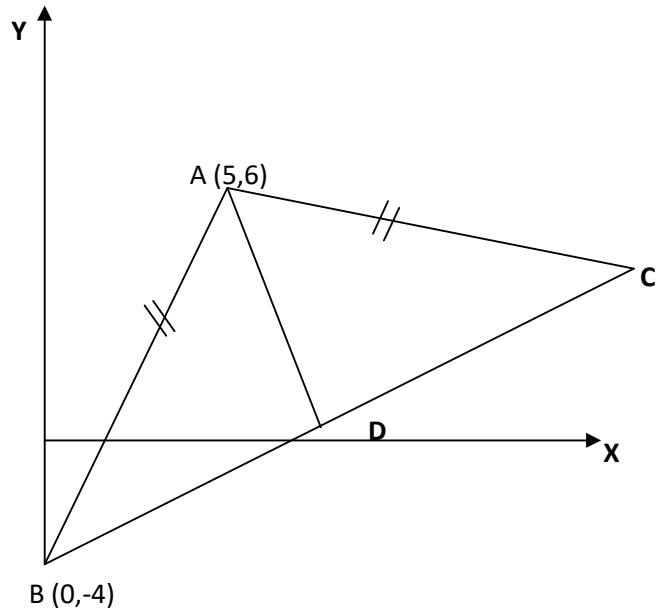
Calculate;

a) The length of the chord BC. **(3mk)**

b) The radius of the circle centre O. **(3mk)**

c) The area of the shaded region. **(4mks)**

24. The diagram, which is not drawn to scale, shows an isosceles triangle ABC in which AB = AC. The co-ordinates of A and B are (5, 6) and 0,-4) respectively.



Given that the equation of line BC is $y = \frac{3}{4}x - 4$ and that the perpendicular from A to BC meet BC at D, find;

i) The equation of AD **(2mk)**

ii) The co-ordinate of D **(2mks)**

iii) The co-ordinate of C **(2mks)**

iv) The area of the triangle ABC **(4mks)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 9 PAPER 2

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
- ***d)*** *All your workings must be clearly shown as must be awarded for correct working even if the answer is wrong.*
- ***e)*** *Non programmable silent scientific calculators and KNEC mathematical tables may be used.*

FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. By use of logarithms evaluate;

$$\sqrt[3]{\frac{0.01369\,X\,396.5}{64.11-0.001912}}$$

(4 Marks)

2. a) Write down the first five terms of the expansion of $\left(1-\frac{x}{3}\right)^5$. **(2 Marks)**

b) Using the first three terms of the expansion. Find the values of $(1.01)^5$ to 4dp.**(2 Mks)**

3. Write in the simplest form using a rational denominator. **(2 Marks)**

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

4. The data below shows marks scored by 8 form four students in Ikutha district mathematics content 44, 32, 67, 52, 28, 39, 46, 64.Calculate the mean absolute deviation. **(4 Marks)**

5. Make P the subject of the formula given,

$d = \sqrt[3]{\frac{P}{Q-P}}$ **(3 Marks)**

6. The equation of a circle is $x^2 + y^2 + 6x - 10y - 2 = 0$. Determine the co-ordinates of the centre of the circle and its radius. **(3 Marks)**

7. Find the equation of the tangent at point (3,1) to the curve $y = x^2 - 4x + 4$. **(3 Marks)**

8. Kitheka deposited ksh.50,000 in a financial institution in which interest is compounded quarterly. If at the end of second year he received a total amount of ksh79,692.40. Calculate the rate of interest p.a **(3 Marks)**

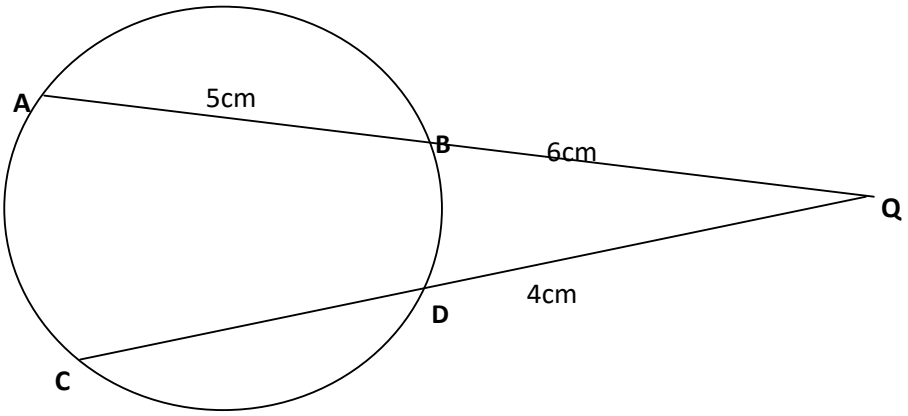
9. A contractor employs 40 men to do a piece of work in 60 days each man working 9 hours a day. He is then requested to do the job in 48days. How many more men working 10 hours a day does he need to employ. **(3 Marks)**

10. $3cm^3$ of water is added to $2cm^3$ of a certain medicine which cost sh.12 per cm^3. The chemist sells the diluted medicine at sh.4.50 per cm^3. Calculate the percentage profit. **(3 Marks)**

11. A(50°S 20°E) and B(50°S 160°W) are two points on the earth's surface. Calculate the distance between A and B in kilometer along the great circle. (take radius of the earth to be 6370km). **(4 Marks)**

12. Evaluate $\int_{-1}^{2} \frac{(1-x^2)}{x+1}\,dx$. **(3 Marks)**

13. Chords AB and CD in the figure below intersect externally at Q. if AB = 5cm BQ = 6cm and DQ = 4cm, calculate the length of chord CD. **(3 Marks)**



14. Find the sum of the following GP.

2 + 10 + 50 ……..1250 **(3 Marks)**

15. Given that a = 7.6cm, b=2.4cm and c = 4.0cm find the maximum value of;

$\frac{1}{ab-bc}$ **(3 Marks)**

16. Two bags A and B each contain a mixture of red and blue balls. Bag A contains 9 red balls and 11 blue balls while bag B contains 15 red balls while and 10 blue balls. A bag is selected at random and a ball is picked at random from it

a) Draw a probability tree diagram to illustrate this information. **(1 Mark)**

b) Find the probability that the ball picked is blue. **(2 Marks)**

SECTION II (50 MARKS)

17. a)Income tax is charged on an annual income at the following rate

Taxable income k£ pa	Rates Ksh per pound
1 – 2100	2
2101 – 4200	3
4201 – 6300	5
6301 – 8400	7
8401 and above	9

Mrs Mwangi earns a basic salary of ksh.24000 per month. She is housed and pays a nominal rent of ksh800 per month pays insurance premium of ksh.800 per month for which she gets a tax relief of 10% on the total premium paid and her family relief is k£ 320 per year.

Calculate her;

a) Total taxable pay per year (ksh). **(2 Marks)**

b) Total relief per year (ksh). **(2 Marks)**

c) Tax deduction per month (ksh). **(4 Marks)**

d) Net salary per month. **(2 Marks)**

18. The table below shows some values of the function $y = x^3 - 2x^2 - 2x + 2$ for $-2 \leq x \leq 3$

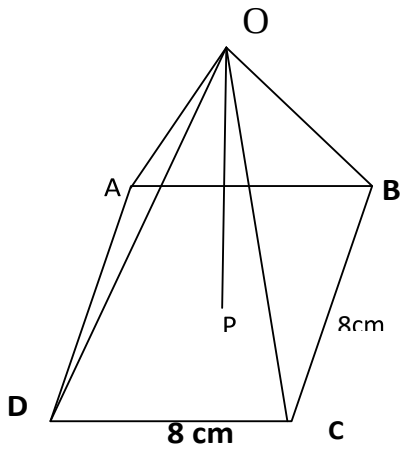
x	-2	-1	0	1	2	3
x^3	-8		0			
$-2x^2$	-8		0			
-2x	4		0			
2	2		2			
y	-10		2			

a) Complete the table. **(2 Marks)**

b) Use the completed table to draw the graph of the function $y = x^3 - 2x^2 - 2x + 2$ **(3 Marks)**

c) Use integration method to find the area bounded by the curve. **(5 Marks)**

19. A pyramid with a vertex O and edge OA, OB, OC and OD each of 17cm long stands on a square base ABCD of side 8cm as shown below.



Calculate;

a) The height OP of the pyramid. **(3 Marks)**

b) The angle between an edge and the base. **(3 Marks)**

c) The angle between a sloping face and the base. **(4 Marks)**

20. A particle moves along a straight line such that its displacement S metres from a given point is $S = t^3 - 5t^2 + 3t + 4$. Where t is time in seconds find;

a) The displacement of the particle at t = 5. **(2 Marks)**

b) The velocity of the particle when t = 5. **(2 Marks)**

c) The values of t when the particle is momentarily at rest. **(3 Marks)**

d) The acceleration of the particle when t = 2. **(3 Marks)**

21. A baker bakes two types of cookies, a marmalade cake and sweat loaves of bread. Each day he bakes x cakes and y sweat loaves of bread. The conditions of the cookies are subject to the following conditions. $x \geq 20$ $y > 10$ $4x + 3y \leq 240$

$5x + 9y \geq 450$

He makes a profit of ksh 5 on each cake and ksh 6 on each loaf of bread.

a) Draw a graph to represent the above information. **(6 Marks)**

b) From the graph, determine how many cookies of each type he should bake to maximize his daily profit. **(2 Marks)**

c) Calculate the maximum profit. **(2 Marks)**

22. Three quantities P Q and R are such that P varies directly as the square of Q and inversely as the square root of R.

a) Given that P=20 when Q=5 and R=9, find P when Q=7 and R=25. **(4 Marks)**

b) If Q increased by 20% and R decreases by 36%, find the percentage change in P. **(6 Marks)**

23. Complete the table below by filling in the blank spaces.

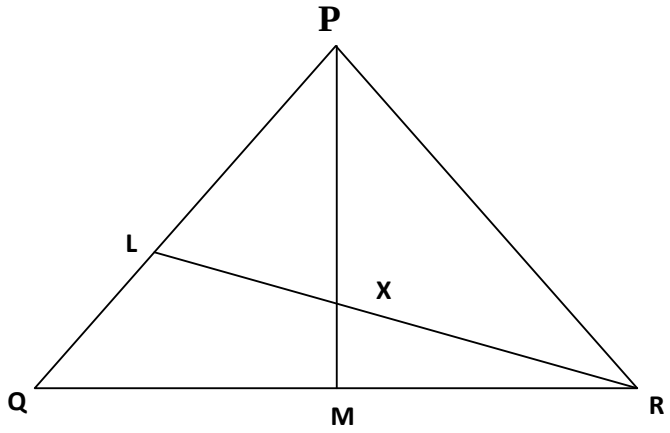
a) **(3 Marks)**

x	0	30	60	90	120	150	180	210
$Y_1 = 3\text{Sin}x^o - 1$	-1	0.5						
$Y_2 = \text{Cos } x$	1	0.87	0.5			-0.87		

On the same axis draw the graph of $y = 3\sin x^o - 1$ and $y = \text{Cos } x^o$ for $0^o \leq x \leq 210^o$. **(4 Marks)**

Use the graph to solve the equation $3 \sin x^o - \text{Cos } x = 1$ **(3 Marks)**

24. In the triangle PQR below L and M are points on PQ and QR respectively such that PL : LQ = 1:3 and QM:MR = 1:2. PM and RL intersect at X. Given that PQ = b and PR =c.



a) Express the following vectors in terms of b and c.

i) QR **(1 Mark)**

ii) PM **(1 Mark)**

iii) RL **(1 Mark)**

b) By taking Px = hPm and Rx = kRl where h and k are constants find two expressions of Px in terms of h , k, b and c. Hence determine the values of the constant h and k. **(6 Marks)**

c) Determine the ratio Lx : XR **(1 Mark)**

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 10 PAPER 1

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
- ***d)*** *All your workings must be clearly shown as must be awarded for correct working even if the answer is wrong.*
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FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

Answer all questions in this spaces provided.

1. Use mathematical tables to evaluate

$$\frac{0.3}{0.0351} + \sqrt{0.498}$$ **(3mks)**

2. Express y in terms of x given that:-

$10x^2 - 9xy + 2y^2 = 0$ **(3mks)**

3. A circle of radius 4.9cm fits exactly inside a square. Find the area of the space between the circle and the square**.** **(2mks)**

4. Solve the simultaneous equations $xy = 4$

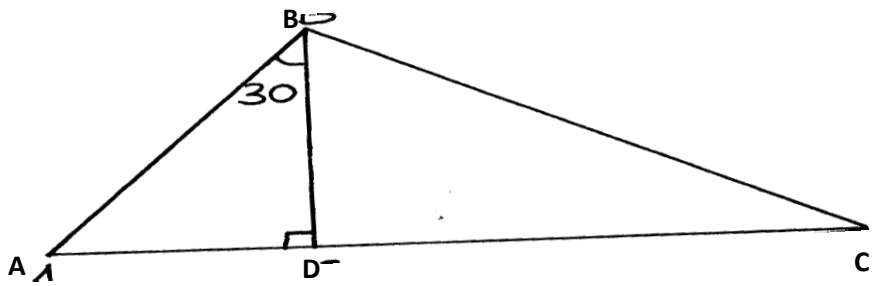
$x + y = 5$ **(4mks)**

5. The table below shows the number of goals scored in 40 soccer matches during a certain season.

No. of goals	0	1	2	3	4	5	6	7
No. of matches	3	9	6	8	5	5	2	1

Calculate the mean number of goals scored per match. **(3mks)**

6. Find the length of AC in the fig. below. **(3mks)**



7. Given 2.421=2a/b. determine the values of a and b. **(3mks)**

8. The interior angles of a hexagon are 2x + 5, 4x - 5, 4x + 5, 3x, 4x - 20 and 2x. Find the value of x. **(3mks)**

9. Solve the following inequality and show your solution on a number line. **(5mks)**

$4x - 3 \leq \frac{1}{2}(x + 8) < x + 5$

10. Express the number 935 and 19845 as a product of their prime factors hence evaluate $\frac{935}{19845}$ leaving our answer in prime factor form. **(3mks)**

11. A surveyor finds that she needs 28 beacons placed 40m apart when she surveys the length of a road. If she were to place the beacons 30m apart, how many beacons would she need? **(2mks)**

12. A line passes through the point (-1, 2) and has gradient -½. Write down its equation in the form $ax + by = c$ **(3mks)**

14. Last year Kulundu was four times as old as his daughter Amina. In four years time the sum of their ages will be 53. Determine their present ages. **(4mks)**

15. Solve the pair of simultaneous equations using elimination method.

$4x+9y=5$

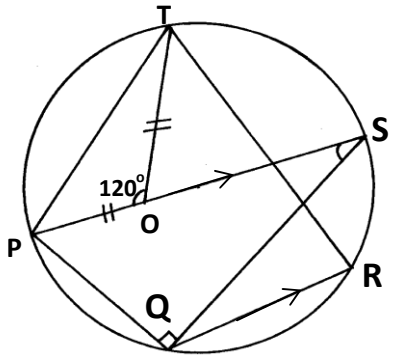
$3x+3y=2$ **(4mks)**

16. Agnes paid rent which was 1/10 of her net salary. She used ½ of the remaining amount to make a down payment for a plot. She gave her mother Kshs. 2,500 and did shopping worth Kshs. 7,500 for herself. She saved the remainder which was Ksh. 12,500. How much was the down payment that she made. **(5mks)**

SECTION II (50 MARKS)

Answer only <u>five</u> questions.

17. In the figure below**, O** is the centre of the circle and PS is a diameter of the circle. **QR** is parallel to **PS**. If angle **PSQ**=25° and angle **POT**=120°. Find the sizes of the given angles giving reasons for each.



(a) angle **QRT** **(3mks)**

(b) angle **QPT** **(3mks)**

(c) angle **POR** **(3mks)**

(d) angle **PTR** **(2mks)**

18. A bus left Nairobi at 7.00 am and traveled towards Eldoret at an average speed of 80Km/hr. At 7.45 a.m a car left Eldoret towards Nairobi at an average speed of 120Km/hr. The distance between Nairobi and Eldoret is 300 km. Calculate:

(a) The time the bus arrived at Eldoret. **(2mks)**

(b) The time of the day the two met. **(4mks)**

(c) The distance of the bus from Eldoret when the car arrived in Nairobi. **(2mks)**

(d) The distance from Nairobi when the two met. **(2mks)**

19. A number of people are asked to cut 20cm lengths of string without measuring. Later 100 pieces are collected and measured correct to the nearest 1/10cm. the data below was collected.

Length, L(cm)	18.0-18.4	18.5-18.9	19.0-19.4	19.5-19.9	20.0-20.4	20.5-20.9	21.0-21.4	21.5-21.9
Frequency	5	8	30	13	10	20	10	4

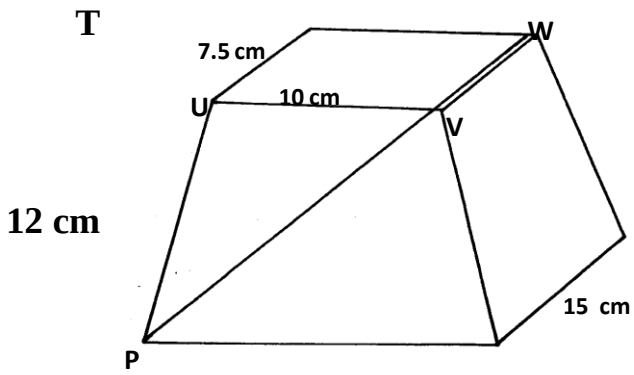
Using 19.7 as a working mean calculate:

(a) Mean **(4mks)**

(b) Standard deviation **(5mks)**

(c) State the modal class **(1mk)**

20. The figure below shows a frustrum **PQRSTUVW** of a right pyramid. **PQ** = 20cm, **QR** = 15cm, **UV** = 10cm, **UT** = 7.5cm and **PU** = **QV** = **RW** = **ST** = 12cm.



Leave all your answer to 4 s.f.

(a) Find the altitude of the pyramid from which the frustrum was cut. **(3mks)**

(b) Find the angle between

(i) PW and base PQRS

(ii) PQVU and the base PQRS **(3mks)**

21. Four points **B, C, Q** and **D** lie on the same plane. Point B is 42km due southwest point **Q**. Point **C** is 50 km on a bearing of S60°E from **Q**. Point **D** is equidistant from **B, Q** and **C**.

(a) Using the scale: 1cm represents 10km, construct a diagram showing the positions of **B, C, Q** and **D.**

(b) Determine the

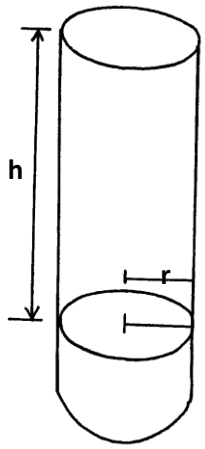
(i) distance between **B** and **C** **(1mk)**

(ii) bearing of **D** from **B** **(2mks)**

(c) Find the distance and bearing of **D** from **C**. **(2mks)**

22. (a) A test-tube consist of a cylinder and a hemisphere of the same radius; 282 cm^3 of water is required to fill the whole tube and 262cm^3 is required to fill it at a level of 1 cm^3 below the top of the tube.

Find the radius of the tube and the length of the cylindrical part. **(6mks)**



(b) A tank holding 1m^3 of water is filled in 10minutes by a circular pipe of diameter 2cm. Find the speed of water in the pipe. **(4mks)**

23. Three business partners: Asha, Nangila and Cherop contributed Kshs. 60,000, Kshs. 85,000 and Kshs. 105,000 respectively. They agreed to put 25% of the profit back into business each year. They also agreed to put aside 40% of the remaining profit to carter for taxes and insurance. The rest of the profit would be shared among the partners in the ratio of their contributions. At the end of the first year, the business realized a gross profit of Kshs. 225,000.

(a) Calculate the amount of money Cherop received more than Asha at the end of the first year. **(5mks)**

(b) Nangila further invested Kshs. 25,000 into the business at the beginning of the second year. Given that the gross profit at the end of the second year increased in the ratio 10:9, calculate Nangila's share of the profit at the end of the second year. **(5mks)**

24. Complete the table below. (2mks) $y = 5 + 3x - 2x^2$

x	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2	2.5	3
y											

(a) Use the values in the table to draw the graph $y = 5 + 3x - 2x^2$.
(2mks)

(b) Use suitable straight lines to graphically solve the equations.

(i) $0 = 2x^2 - 2x - 3$

(3mks)

(ii) $2x^2 = 2x$

(2mks)

(c) Identify the line of symmetry.

KCSE FINAL PREDICTION

MATHEMATICS

TRIAL 10 PAPER 2

TIME: 2½ HRS

NAME…… INDEX NO……..…

SCHOOL…….. SIGN……

DATE……

INSTRUCTIONS TO CANDIDATES.

- ***a)*** *Write your name and index number in the spaces provided above.*
- ***b)*** *Sign and write the date of examination in the spaces provided above.*
- ***c)*** *Answer **ALL** questions in section A and B.*
- ***d)*** *All your workings must be clearly shown as must be awarded for correct working even if the answer is wrong.*
- ***e)*** *Non programmable silent scientific calculators and KNEC mathematical tables may be used.*

FOR EXAMINERS'S USE ONLY

SECTION 1

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Total**
Marks																	

SECTION II

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

GRAND TOTAL

SECTION A (50 MARKS)

1. Using logarithms, evaluate correct to 4d.p.

$$\left(\frac{25.48 \times 0.0212}{6.159}\right)^{0.8}$$ **(4mks)**

2. Solve the equation below. $7^{2x} - 8 \times 7^{x} + 7 = 0$ **(3mks)**

3. The expression $1 + x/2$ is taken as an approximation for $\sqrt{1 + x}$. Find the percentage error in doing so if $x = 0.44$. **(3mks)**

4. The initial salary of Mr. Lutta is sh. 42, 000 per annum. His salary increases by 13% each year.
Determine his total earnings after 15 years. Give your answer to the nearest thousands**.** **(3mks)**

5. Mrs. Musundi bought a television set on hire purchase by paying a down payment of Kshs. 5,000 and monthly installments of Kshs. 1, 250 for 2 years. If the interest rate charged was 12% p.a, what is the carrying charge to the nearest hundreds? **(3mks)**

6. A ball is dropped from the top of a building and its height h, metres above the ground at any time t, seconds is given by $h = 350 + 65t - t^2$.
(i) Find the velocity of the ball when t= 2seconds. **(2mks)**
(ii) State the time when the ball hits the ground. **(2mks)**

7. Atieno is now four times as old as her daughter and six times as old as her son. Twelve years from now, the sum of the ages of her daughter and son will differ from her age by 9 years. What is Atieno's present age? **(3mks)**

8. Solve for θ in the equation $\sin(3\theta + 120)^{o} = \frac{\sqrt{3}}{2}$ for $0^{o} \leq \theta^{o} \leq 180^{o}$. **(3mks)**

9. T is a transformation represented by the matrix $\begin{pmatrix} 5x & 2 \\ -3 & x \end{pmatrix}$. Under T, a square of area $10cm^3$ is
mapped onto a square of area $110cm^2$ find the value of x. **(3mks)**

10. Make x the subject of the formula:

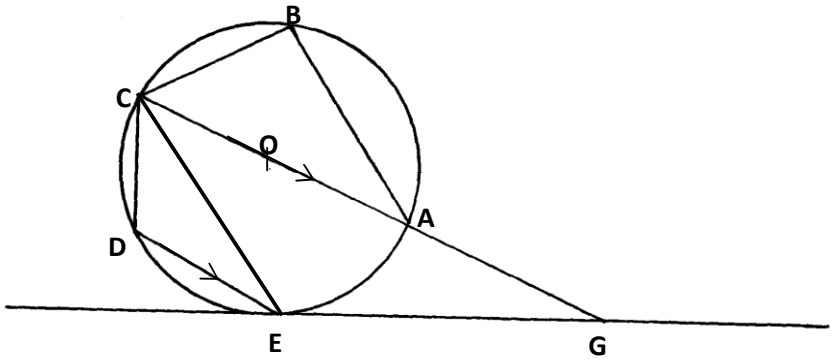
$$h = \sqrt[3]{\frac{c - x^2}{b}}$$ **(3mks)**

11. The following distribution shows the masses to the nearest kilogram of 50 pupils in standard 8.

Mass (Kg)	26-30	31-35	36-40	41-45	46-50	51-55
frequency	4	12	18	11	4	1

Calculate the standard deviation. **(3mks)**

12. The diagram below shows a circle **ABCDE**. The line **FEG** is a tangent to the circle at point E. Line DE is parallel to **CG**, ∠**DEC** = 28° and ∠**AEG** = 32 °.



Calculate:

(a) ∠AEG **(1mk)**

(b) ∠ABC **(1mk)**

13. A two digit number is such that the square of the unit digit is equal to one less than the tens digit and that the unit digit raised to power four and add three times the tens digit is equal to seven. Find the number. **3mks)**

14. (i) Expand $\left(5 + \frac{x}{2}\right)^6$ up to the term in x^3. **(2mks)**

(ii) Use your expansion to estimate the value of $(11)^6$. Correct to one decimal place. (2mks)

15. A line segment joining two points P (0, 7) and S (2, 3.8) is divided externally by point Q in the ratio

7:3. Find the co-ordinates of point Q. **(3mks)**

16. A dam containing 4158m^3 of water is to be drained. A pump is connected to a pipe of radius 3.5cm and the machine operates for 8 hours per day. Water flows through the pipe at the rate of 1.5m per

second. Find the number of days it takes to drain the dam.

(3mks)

SECTION II (50 MARKS)

Answer only <u>five</u> questions from this section.

17. (a) (i) Taking the radius of the earth, R= 6370km and $\pi = {}^{22}/_{7}$, calculate the shortest distance between the two cities P(60°N, 29°W) and Q(60°N, 31°E) along the parallel of latitude. **(3mks)**

(ii) If it is 1200hrs at **P**, what is the local time at **Q**. **(3mks)**

(b) An aeroplane flew due south from a point A (60°N, 45°E) to a point B. the distance covered by the aeroplane was 800km. determine the position of B. **(4mks)**

18. (a) Complete the table for y = Sin x + 2cos x.
(2mks)

x	0	30	60	90	120	150	180	210	240	270	300
Sin x	0			1.0		0.5		-0.5			-0.87
2cos x	2			0		-1.73		-1.73			1.0
y	2			1.0		-1.23		-2.23			0.13

(b) Draw the graph of y= sin x + 2 Cos x using a scale of 1cm to represent 30° on x-axis and 2cm to represent 1 unit on y-axis. **(3mks)**

(c) Solve sin x + 2 cos x = 0 using the graph. **(2mks)**

(d) Find the range of valves of x for which y≤-0.5. **(3mks)**

19. (a) Using a ruler and pair of compasses only, construct triangle **ABC** in which **AB**=9cm, **BC**=8.5cm and ∠**BAC**=60°. **(3mks)**

(b) On the same side of **AB** as **C**:

(i) Determine the locus of a point P such that ∠**APB** = 60°. **(3mks)**

(ii) Construct the locus of **R** such that **AR**>4cm. (2mks)

(iii) Determine the region **T** such that ∠**ACT** ≥∠**BCT**. **(2mks)**

20. (a) A figure whose co-ordinates are **A**(-2, -2), **B**(-4, -1), **C**(-4, -3) and **D**(-2, -3) undergoes successive transformation ERS; where E, R and S are transformations represented by the matrices, **E**= $\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$, **S** = $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ and **R**= $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

On the grid provided, show the figure ABCD and its image under the successive transformations **ERS**. **(6mks)**

(b) Find the matrix representing the single transformation mapping the image found in (a) above back to the object figure **ABCD**. **(2mks)**

(c) Triangle **PQR** has vertices at **P** (2, 2), **Q** (4, 1) and **R** (6, 4). On the same grid, show the image of triangle **PQR** under a shear with line y = 2 invariant and point **R** (6,4) is mapped onto $\mathbf{R^1}$ (2,4).

(2mks)

21. Rates of tax in operation in 2010 are given in the table below:-

K£ p.a	Rate of tax %
1-5208	10
5209-9744	25
9745-14292	20
14293-18840	15
Over 18840	30

(a) Mr. Lukandu pays sh. 5,400 as P.A.Y.E monthly. He was entitled to house allowances of Ksh. 9,000p.m and getting a monthly tax relief of sh. 1093. Calculate his monthly basic salary.

(7mks)

(b) Mr. Lukandu other deductions per month were;

Co-operative society contribution sh. 2,000

Loan payment sh. 2,500

Calculate his net salary per month. **(3mks)**

22. The table below shows marks scored by 100 form four students in a mathematics examination.

Marks	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
No. of students	2	10	13	17	18	14	10	6	6	4

(

a) Draw an ogive to represent the above information. **(5mks)**

(b) Using your graph, estimate:

(i) the median **(1mk)**

(ii) the quartile deviation **(3mks)**

(c) If the pass mark is 45%, how many students passed? **(1mk)**

23. The velocity V metres per second of a particle at time, t seconds is given by the equation below: $V = 2t^2 - 4t + 15$.

t	0	1	2	3	4	5	6	7	8

V	15								111

(a) Complete the table below for values of V and t. **(2mks)**

(b) On the grid below, draw the graph of V against t. **(3mks)**

(c)(i) Using the mid-ordinate rule with seven ordinates, estimate the distance covered by the particle between t=1sec and t=8secs. **(2mks)**

(ii) Determine the exact distance covered by the particle between t=1 sec and t=8sec. **(2mks)**

(iii) Find the percentage error in the distance covered by the particle when the mid-ordinate rule is used. **(1mk)**

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

	Machine **A**	Machine **B**
Floor space	$2m^3$	$3\ m^3$
No. of men required to operate	4	3

He has a maximum of $24m^2$ 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. **(3mks)**

(b) Represent the inequalities on the grid and shade the unwanted region. **(3mks)**

(c) If the profit from machine A is sh. 4 per hour and that from using B is shs.8 per hour. What number of machine of each type should the manager choose to give the maximum profit**?** **(4mks)**

THE END

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KILA LA HERI

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