

TOP STUDENT KCSE

MATHEMATICS PREDICTIONS

(SERIES 1)

FOR MARKING SCHEMES

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MARKING SCHEMES ARE NOT FREE OF

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QUESTIONS ARE FREE

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 1 MATHEMATICS PAPER 1

Kenya Certificate of Secondary Exams

TIME: 2 HOURS

INSTRUCTION TO STUDENTS:

1. Write your **name**, **admission number** and **class** in the spaces provided above.
2. Write the **date** of examination in spaces provided.
3. This paper consists of **two** Sections; **Section I** and **Section II**.
4. Answer **ALL** the questions in **Section I** and only **five** questions from **Section II**.
5. All answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculation, giving your answer at each stage in the spaces provided **below** each question.
7. Marks may be given for correct working even if the answer is wrong.
8. KNEC Mathematical tables **may be** used, except where stated otherwise.
9. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
10. Candidates should answer the questions in **English**.

FOR EXAMINER'S USE ONLY:

SECTION I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

SECTION II

17		18	19	20	21	22	23	24	TOTAL

GRAND TOTAL

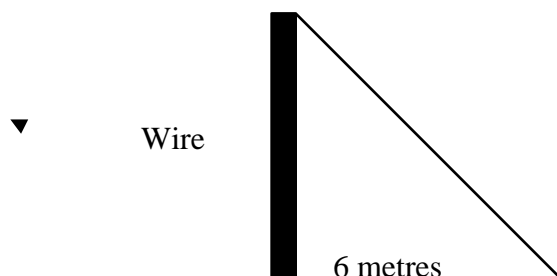
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SECTION 1(50 Marks)

Answer all Questions from this Section

1. Evaluate $\frac{\sqrt{\frac{1}{4} \text{ of } 3\frac{1}{2} + \frac{3}{2}(\frac{5}{2} - \frac{2}{3})}}{\frac{3}{4} \text{ of } 2\frac{1}{2} \div \frac{1}{4}}$ [3 Marks]
2. Mr. Owino spends $\frac{1}{4}$ his salary on school fees. He spends $\frac{2}{3}$ of the remainder on food and a fifth of what is left on transport. He saves the balance. In certain month he saved Sh. 3400. What was his salary?
(3 marks)
3. Simplify: $\frac{2y^2 - 3xy - 2x^2}{4y^2 - x^2}$ (3mks)
4. Find the integral values of x that satisfy the inequalities below [3 Marks]
 $3x + 1 \leq 4 + 7x \leq 3x + 11$
5. A salesman gets a commission of 2.4% on sales up to Sh. 100,000. He gets additional commission of 1.5% on sales above this. Calculate the commission he gets for sales worth Sh. 280,000. (3 Marks)
6. A minor arc of a circle subtends an angle of 105° at the centre of the circle. If the radius of the circle is 8.4cm, find the length of the major arc (take $\pi = \frac{22}{7}$) (3mks)
7. Given that the matrix is singular find the value of x [3Marks]
 $(3 \ 5 \ x + 2 \ x)$
8. State the amplitude, period and the phase angle of the curve $y = 2 \sin \sin \left(\frac{3}{2}x - 30^\circ \right)$ [3 marks]
9. Without using logarithm table or calculator evaluate $\frac{64^{-1/2} \times 27000^{2/3}}{2^{-4} \times 3^0 \times 5^2}$ [4marks]
10. A tourist arrived in the country with US \$ 2000 which he changed in Kenya shillings. He spent Kshs. 75,000 on hotel accommodation and Kshs. 40,000 on travel and other expenses. He changed the remaining money into sterling pounds. If he did all his transactions based on the bank rate shown below. How many £ did he remain with? Give your answer correct to 2 d.p. [3 Marks]
- | | US\$ | £ |
|----------------|-------|--------|
| Buying (Kshs) | 78.45 | 112.27 |
| Selling (Kshs) | 79.50 | 121.04 |
11. Evaluate without using tables or calculators [2 Marks]
 $\sqrt{\frac{0.38 \times 0.23 \times 2.7}{0.114 \times 0.0575}}$
12. Three men working 8hrs daily can complete a piece of work in 5 days. Find how long it will take 10 men working 6hrs a day can complete the same work. [3 Marks]

13. An electric pole is supported to stand vertically on a level ground by a tight wire. The wire is pegged at a distance of 6 metres from the foot of the pole as shown.



The angle which the wire makes with the ground is three times the angle it makes with the pole. Calculate the length of the wire to the nearest centimeter. **(3 Marks)**

14. (a) Using line AB given below, construct the locus of point P such that $\angle APB = 90^\circ$. **(1 marks)**

A _____ B

(b) On the same diagram locate two possible positions of point C such that point C is on the locus of P and is equidistant from A and B.

15. A watch which loses a half minutes every hour was set to reach the correct time at 05 45h on Monday. Determine the time in the 12 hour system, the watch will show on the following Friday at 1945h. **(3 marks)**
16. Given that $\mathbf{OA} = 2\mathbf{i} + 3\mathbf{j}$ and $\mathbf{OB} = 3\mathbf{i} - 2\mathbf{j}$. Find the magnitude of AB to one decimal place. **(3 Mark)**

SECTION II(50 Marks)

Answer any 5 questions from this section

17. Complete the table below for the function $y = 3x^2 - 2x - 1$ for $-3 \leq x \leq 4$ **[2 Marks]**

x	-3	-2	-1	0	1	2	3
y	32				0		20

- a. Draw the graph on $y = 3x^2 - 2x - 1$ on the grid provided. **[4 Marks]**

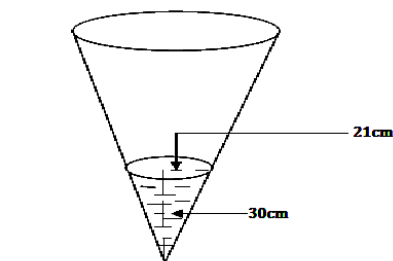
(GRAPH PAPER PROVIDED)

- b. Draw the line $y = 3x + 1$ on the same axis hence find the values of x for which $y = 3x + 1$ and $y = 3x^2 - 2x - 1$ **[4 Marks]**

18. A group of people agreed to raise Ksh. 7 200,000 to start a business. They were to share the amount equally. However 20 members were unable to contribute and withdrew from the group. The remaining members therefore had to contribute Kshs 6000 more each in order to raise the agreed target.

- a. Write down the expression of the amount each member would contribute originally **[1 Mark]**
- b. Write down an expression of the amount each member would contribute after the withdrawal of some members. **[1 Mark]**
- c. Calculate the original number of members of the group. **[6 marks]**
- d. Calculate the percentage increase in the amount of contribution per each number. **[2 Marks]**

19. Mtwapa Primary School is 30km on a bearing of 015° from a tourist hotel. The nearest town is 45km from the school on a bearing of 120° .
- Using a scale of 1cm to represent 6km, make a scale drawing of the positions of the school, the tourist hotel and the town. **[4 Marks]**
 - How far is the tourist hotel from the town? **[2 Marks]**
 - What is the bearing of
 - The town from the tourist hotel. **[2 Marks]**
 - The school from the town **[2 Marks]**
20. A line **L** passes through $(-2, 3)$ and $(-1, 6)$ and is perpendicular to a line **P** at $(-1, 6)$.
- Find the equation of **L** **(2mks)**
 - Find the equation of **P** in the form $ax + by = c$, where a , b and c are constants. **(2mks)**
 - Given that another line **Q** is parallel to **L** and passes through point $(1, 2)$ find the x and y intercepts of **Q** **(3mks)**
 - Find the point of the intersection of lines **P** and **Q** **(3mks)**
21. The diagram below represents a conical vessel which stands vertically which stands vertically. The vessels contains water to a depth of 30cm. The radius of the surface in the vessel is 21cm. (Take $\pi=22/7$).



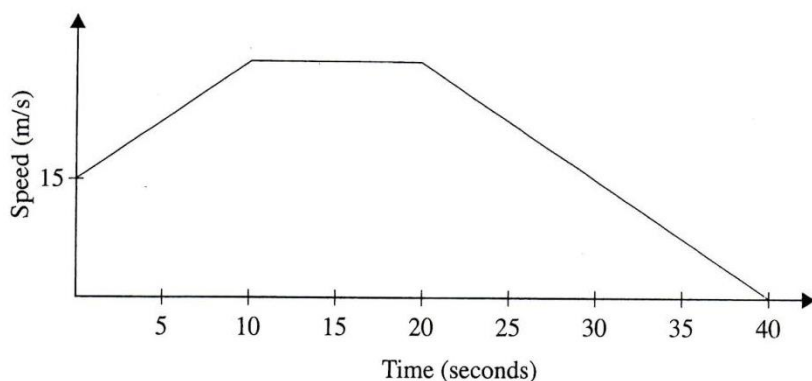
- Calculate the volume of the water in the vessels in cm^3 **(2 Marks)**
 - When a metal sphere is completely submerged in the water, the level of the water in the vessels rises by 6cm.
Calculate:
 - The radius of the new water surface in the vessel; **(2 marks)**
 - The volume of the metal sphere in cm^3 **(3 marks)**
 - The radius of the sphere. **(3 marks)**
22. On The vertices of quadrilateral OPQR are O $(0, 0)$, P $(2, 0)$, Q $(4, 2)$ and R $(0, 3)$. The vertices of its image under a rotation are O' $(1, -1)$, P' $(1, -3)$, Q' $(3, -5)$ and R' $(4, -1)$. **(GRAPH PAPER PROVIDED)**
- On the grid provided, draw OPQR and its image O'P'Q'R' **(2marks)**
 - By construction, determine the centre and angle of rotation. **(3marks)**
 - On the same grid as (a) (i) above, draw O''P''Q''R'', the image of O'P'Q'R' under a reflection in the line $y = x$ **(2marks)**
 - From the quadrilaterals drawn, state the pairs that are:
 - Directly congruent; **(2marks)**
 - Oppositely congruent **(2marks)**

23. The table below shows marks obtained by 100 candidates at East side high school in biology examination.

Marks	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85-94
Frequency	6	14	24	14	x	10	6	4

- Determine the value of x. (2marks)
- State the modal class (1 mark)
- Calculate the median mark. (3marks)
- Calculate the mean mark. (4marks)

24. The figure below represents a speed time graph for a cheetah which covered 825m in 40 seconds.



- State the speed of the cheetah when recording of its motion started (1 mk)
- Calculate the maximum speed attained by the cheetah (3mks)
- Calculate the acceleration of the cheetah in:
 - The first 10 seconds (2mks)
 - The last 20 seconds (1mk)
- Calculate the average speed of the cheetah in first 20 seconds (3mks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 1 MATHEMATICS PAPER 2

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

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- 10. Candidates should answer the questions in English.

FOR EXAMINER’S USE ONLY:

SECTION I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

SECTION II

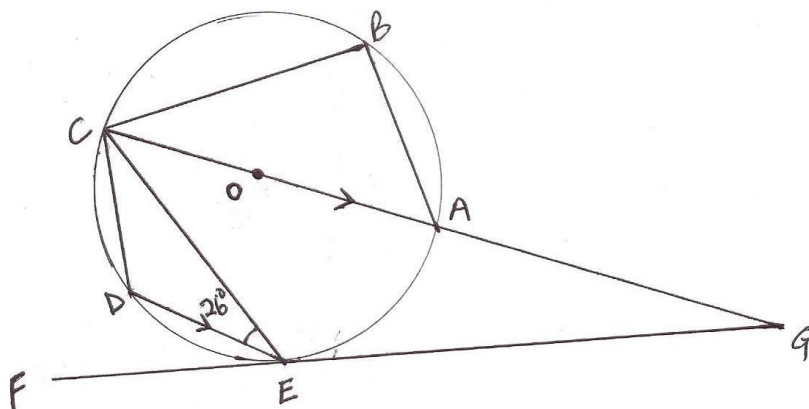
17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL

SECTION 1(50 Marks)
Answer all Questions from this Section

1. Use logarithms correct to 4 decimal places to evaluate. **4mks**

$$\frac{849.6 \times \sin \sin 63.2}{\sqrt[3]{3.941}}$$
2. A car was valued at ksh.500,000 in January 2017. Each year, its value depreciates at 12% p.a. Find after how long would the value depreciate to 350,000 . **3mks**
3. Simplify $\frac{\sqrt{3}}{\sqrt{13-\sqrt{5}}}$ **3mks**
4. Two fruits juices A and B are mixed together . Juice A cost sh.50 per litres. What is the ratio if the cost is sh.59 per litre of the mixture? **3mks**
5. Find the centre and radius of the circle whose equations is $x^2+y^2 - 2x + 4y +1=0$ **3mks**
6. Find the standard deviation for the following set of data. **3mks**
16,42,41,6,20,28,19,23,15
7. 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. **3mks**



State giving reasons the sizes of;

- a. $\angle AEG$ **2mks**
- b. $\angle ABC$ **2mks**
8. Find the value of x given that $\log(x-2) + 2 = \log(3x+1) + \log 25$. **3mks**
9. Find the percentage error in the calculation of the volume of a sphere whose radius is 4.9cm. **3mks**

10. In a right angled triangle, the two sides enclosing the right angle measure $(3x - 2)$ cm and $(x + 2)$ cm. If the area of the triangle is 36cm^2 . Find the length of these two sides. 3mks

11.(a) Expand $(a - b)^5$ 1mks

b) Use the first three terms of the expansion in (a) in ascending power to find the approximate value of $(1.98)^5$ 2mks

12. The first term of geometric sequence is 16, and the fifth term is 81. Find the sum of the first 10 terms. 3mks

13. Solve the equation $\sin \sin \left(\frac{1}{2}x - 30 \right) = \cos \cos x^0$ 2mks

14. The angle at vertex of a cone is 90^0 . If the slant height is $\sqrt{2}$ cm, find without using tables.

a. The diameter of the cone 2mks

b. The height of the cone. 2mks

15. Under a transformation whose matrix is $Q = \begin{pmatrix} x - 2 & -2 \\ x & x \end{pmatrix}$, a triangle whose area is 12cm^2 is mapped onto a triangle whose area is 50cm^2 . Find the two possible values of a .

3mk

16. Make L the subject of the formula below.

$$f = \frac{1}{2\pi\sqrt{LC}}$$

2mks

SECTION B(50MKS)

Answer only five questions from this section

17.(a) Complete the table given below by filling the blank spaces. 2mks

$2x$														
$2x + 30$														

b) On the grid provided draw the graph of $y = 4\cos 2x$ and $y = 2\sin (2x + 30)$ for $0^0 \leq x \leq 180^0$.
(GRAPH PAPER PROVIDED) 5mks

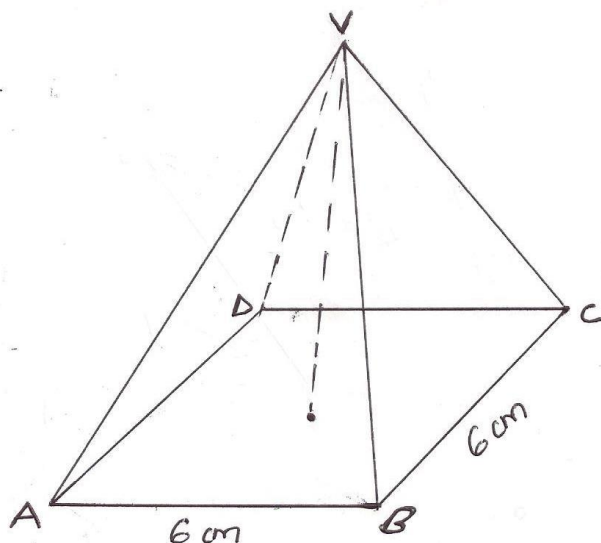
c)i) State the amplitude of $y = 4\cos 2x$. 1mk

ii) Find the period of $y = 2\sin (2x + 30)$

d) Use your graph to solve

$4\cos 2x - 2\sin (2x + 30) = 0$ 1mk

18. The figure below is a square based pyramid ABCDV with $AD=DC=6\text{cm}$ and height $VO=10\text{cm}$.



- a. State the projection of VA on the base ABCD

1mk

- b. Find

(i) The length of VA .

3mks

(ii) The angle between VA and ABCD .

2mks

(iii) The angle between VDC and ABCD

2mks

(iv) Volume of the pyramid.

2mks

19. The table below gives marks obtained in a mathematics test by 47 candidates.

Marks	31-35	36-40	41-45	46-50	51-55	56-60
No of candidates	4	6	12	15	8	2

- a. Calculate the mean score

3mks

- b. On the grid provided draw a cumulative frequency graph and use it to estimate

(GRAPH PAPER PROVIDED)

i. The median

2mk

ii. The semi-interquartile range.

3mks

- c. In order to pass the test a pupil had to score more than 40 marks. Calculate the percentage of pupils who passed.

2mks

20.a)In a form 4 Class there are 22 girls and 18 boys. The probability that a girl completes the secondary education course is $\frac{3}{5}$ whereas that of a boy is $\frac{2}{3}$. A student is picked at random from the class .Find the probability that the student picked

i. Is a boy and will complete the course. **2mks**

ii. Will complete the course. **2mk**

iii. Is a girl and will not complete the course. **2mks**

b)A bag contains 5 blue balls, 8 red balls and 3 green balls being similar in shape and size .A ball is picked out at random without replacement and its colour noted, use a tree diagram to determine the probability that at least one of the first two balls picked is green. **4mks**

21.Two quantities P and R are connected by the equation $P=Kr^n$ where k and n are constants. The table of values of P and r is given below.

		2.25	3.39	4.77		

a. State the linear equation connecting P and r. **1mk**

b. (i) Using a suitable scale draw a suitable line graph from the above data on the grid provided . **5mks**

(ii) Using your graph estimate the values of k and n. **3mks**

c. Find the equation connecting P and r. **1mk**

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

i. Given that $P=12$ when $Q=24$ and $R=36$,find P when $Q=27$ and $R=121$. **3mks**

ii. If Q increases by 10% and R decreases by 35% find the percentage increase in P. **4mks**

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

23.A community water tank is in the shape of a cuboid of base 6m by 5m and a height of 4m.A feeder pipe of diameter 14cm supplies water to this tank at the rate of 40cm /s

a. Calculate the;

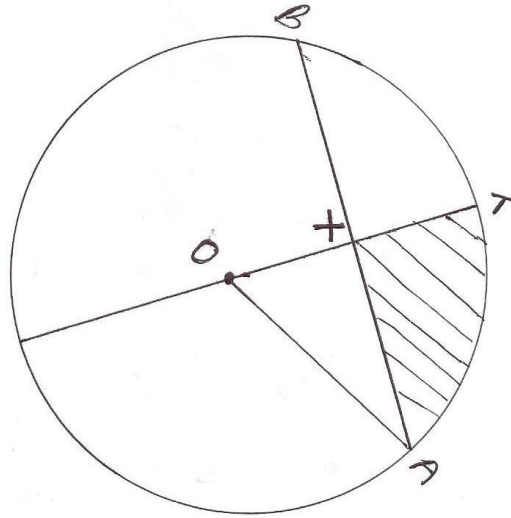
i. Capacity of the tank in litres. **2mks**

ii. Amount of water ,in litres delivered to this tank in one hour. **3mks**

iii. The time taken for the tank to fill . **2mks**

- b. The community consumes a full tank a day,with each family consuming an average of 150 litres per day.If each family pays a uniform rate of sh.350 per month,find the total amount of money due monthly. **2mks**

24.In the diagram O is the centre of a circle radius 11cm .OX=5cm and BX=12cm.



i. Find the length of XA. **3mks**

ii. Find the size of angle XOA . **3mks**

iii. Find the area of the shaded part. **4mks**

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 2 MATHEMATICS PAPER 1

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO THE CANDIDATES

- (a) Write your name and the index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided.
- (c) The paper contains **TWO** sections: Section **I** and **II**.
- (d) Answer **ALL** the questions in section **I** and **FIVE** questions in section **II** in the spaces provided below each question.
- (e) All answer and working must be written on the question paper in the spaces provided below each question.
- (f) Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
- (g) Marks may be given for correct working even if the answer is wrong.
- (h) Non-programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

FOR EXAMINERS USE ONLY. SECTION I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

SECTION II

17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL

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SECTION I 50 MARKS

ANSWER ALL THE QUESTIONS IN THIS SECTION.

1. Evaluate without using mathematical tables

$$\frac{1.9 \times 0.032}{20 \times 0.0038}$$

(3mks)

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

$$\frac{5}{0.0829} - \frac{14}{0.58}$$

(3mks)

3. You are given that $\cos \theta = \frac{8}{10}$. Without using mathematical tables express in fraction form the value of

(a) $\sin \theta$

(b) $\tan (90^\circ - \theta)$

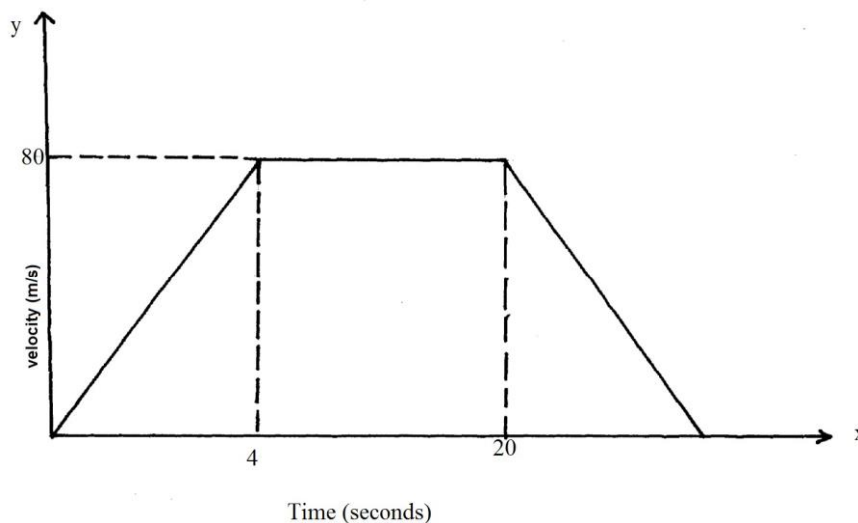
(3mks)

4. An open right circular cone has radius of 5cm and a perpendicular height of 12cm. Calculate the surface area of the cone. (Take π to be 3.14)

(3mks)

5. Nyongesa spends a total of sh.970 on buying 3 text books and 5 pens. If he had bought 2 text books and 5 pens he would have saved sh.90. Find the cost of one text book. (3mks)

6. The figure below is a velocity –time graph for a car



- (a) Find the total distance traveled by the car? (2mks)
- (b) Calculate the deceleration of the car. (2mks)
7. Three towns are situated in such a way that town B is 40km due south of town A and town C is 30 km due East of town B.
- (a) Draw a sketch diagram showing the position of town A, B and C. (1mk)
- (b) From your sketch, calculate:

(i) Distance AC (1mk)

(ii) To the nearest degree the bearing of town A from town C. (2mks)

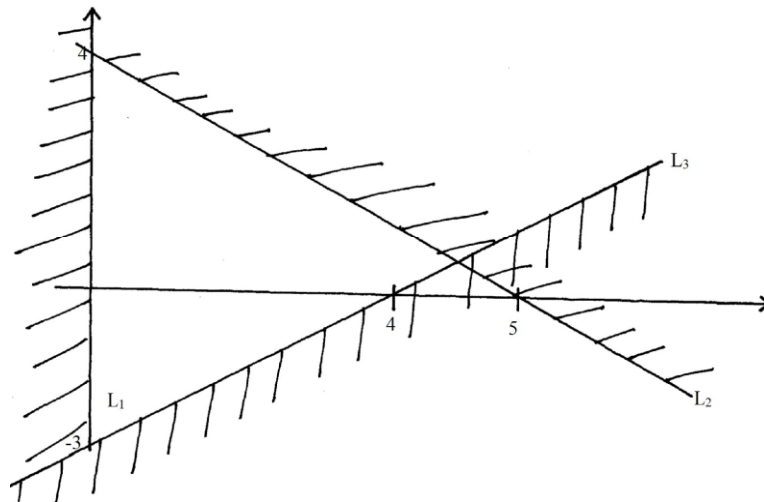
8. A Kenyan tourist left Germany for Kenya through Switzerland. While in Switzerland he bought a watch worth 52 Deutsche marts. Find the value of the watch in;

(a) Swiss Franca (2mks)

(b) Kenya shillings using the exchange rates below,

1 swiss Franc = 1.28 DM and 1 Swiss Franc = 45.21 Kenya shillings

9. Find the inequalities that defines the region R shown in the figure below (4mks)

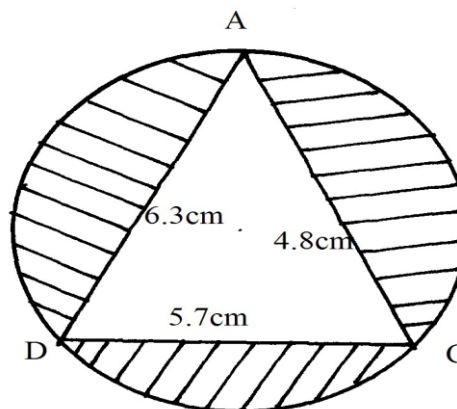


10. Form the quadratic equation whose roots are $x = -\frac{5}{3}$ and $x = 1$ (2mks)

11. ABCD is a circle quadrilateral and AB is a diameter. Angle ADC = 117° . Giving reasons for each step, calculate the value of angle BAC. (3mks)

12. The circle below whose area is 18.05cm^2 circumscribes a triangle ABC where AB = 6.3cm, BC

= 5.7cm and AC = 4.8cm. Find the area of the shaded part. (3mks)



13. Solve for x in the equation

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

14. A form IV maths teacher originally worked out the mean mark of her 30 students to be 41. After the correction of the test, she added some marks of the test, she added some marks to Njoki, Chelimo and Nafula in the ratio 2:3:4, if the new mean mark for the class is 42.5 determine how many more marks Nafula was added than Chelimo. (3mks)
15. The volumes of two similar solid cylinders are 4752 cm^3 and 1408 cm^3 . If the area of the curved surface of the smaller cylinder is 352 cm^2 , find the area of the curved surface of the larger cylinder (2mks)
16. The line which joins the point A (3, K) and B (-2, 5) is parallel to the line whose equation is $5y+2x-7=0$. Find the value of K. (3mks)

SECTION II (50 MARKS)

Attempt only FIVE questions in this section

17. A newly built classroom measuring 6m long 4.5m wide and 3.2 m high is to be cemented on the floor and all inside walls. The classroom has one door measuring 1.85m by 80cm by 80cm and four windows measuring 1.5m by 70cm each. Cementing materials cost 500 per square meter while labour costs 20% of the cost of cementing materials. Calculate:
- (a) To one decimal place, the total surface area to be cemented (5mks)
 - (b) The cost of cementing materials (2mks)
 - (c) The total cost of cementing the classroom (3mks)
18. If $x^2+y^2=29$ and $x+y=3$
- (a) Determine the values of
 - (i). $x^2+2xy+y^2$ (2mk)
 - (ii). $2xy$ (2mks)
 - (iii). $x^2-2xy+y^2$ (2mks)
 - (iv). $x-y$ (2mks)
 - (b) Find the value of x and y (2mks)
19. A country bus left town A at 11.45 am and traveled towards town B at an average speed of 60km/h. A matatu left town B at 1.15 pm. On the same day and traveled towards town A along the same road at an average speed of 90km/h. the distance between the two towns is 540km. Determine
- (a) The time of day when the two vehicles met (4mks)
 - (b) How far from town A they met (2mks)
 - (c) How far outside town B the bus was when the matatu reached town A (4mks)
20. The table below shows the names of 200 persons measured to the nearest kg

Mass (kg)	40-49	50-59	60-69	70-79	80-89	90-99	100-109
No. of persons	9	27	70	50	26	12	6

(a) Calculate the mean mass (5mks)

(b) Calculate the median mass (5mks)

21. (a) Complete the table below by filling in the blank spaces

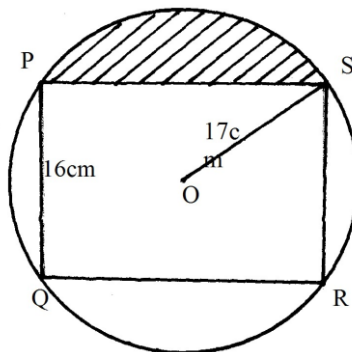
X°	0	30	60	90	120	150	180	210	240	270	300	330	360
$\cos x$	1.00		0.5			-0.87		-0.87					
$2 \cos \frac{1}{2} x$	2.00	1.93				0.52			-1.00				-2.00

Using the scale km to represent 300 on the horizontal axis and 4cm represent 1 unit on the vertical axis, draw on the grid provided the graphs of $y=\cos x$ and $y=2 \cos \frac{1}{2} x$ (4mks)

(b) Find the period and amplitude of $y=2 \cos \frac{1}{2} x$ (2mks)

(c) Describe the transformation that maps the graph of $y=\cos x$ on the graph of $y=2 \cos \frac{1}{2} x$ (2mks)

22. The figure below represent a rectangle PQRS inscribed in a circle centre O and radius 17cm. PQ = 16cm.



Calculate

(a) The length PS of the rectangle (2mks)

(b) The angle ROS (4mks)

(c) The area of the shaded region (4mks)

23. (a) (i) Complete the table below for the function

$$Y=x^3+x^2-2x \quad (2mks)$$

X	-3	-2	-1	0	1	2	2.5
-2x	6	4	2	0	-2	-4	-5
X ²	9	4	1	0	1	4	6.25
X ³	-27	-8	-1	0	1	8	15.625
Y=x ³ +x ² -2x							

(ii) On the grid provided, draw the graph of $y=x^3+x^2-2x$ for the values of x in the interval $-3 \leq x \leq 2.5$ **(4mks)**

(iii) State the range of negative value of x for which y is also negative **(1mk)**

(b) Find the coordinates of two points on the curve other than (0,0) at which x-coordinate and y-coordinate are equal. **(3mks)**

24. Use a ruler and a compass only for all constructions in this section.

(a) Construct a triangle XYZ in which XY = 6cm YZ = 5cm and angle XYZ = 120°.

(2mks)

(b) Measure XZ and angle YXZ.

(4mks)

(c) Construct the perpendicular bisector of XZ and let it meet XZ at M

(1mk)

(d) Locate a point W on the opposite side of XZ as Y and that XW = ZW and YW = 9cm and hence complete triangle XZW.

(3mks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 2 MATHEMATICS PAPER 2

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO CANDIDATES

- Write your Name and Index Number in the spaces provided at the top of this page.
- Sign and write the date of examination in the spaces provided above.
- This paper contains TWO sections: section I and section II
- Answer all the questions in section I and any FIVE questions from section II.
- All answers and working must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
- Marks may be given for correct working even if the answer is wrong.
- Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINER'S USE ONLY:

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

Section II

17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL

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SECTION I: (50 MARKS)

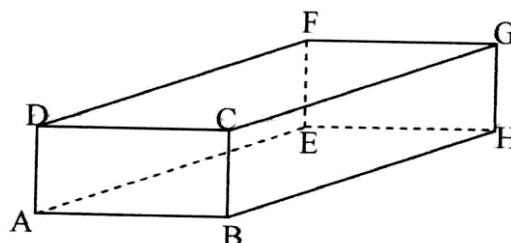
Answer ALL Questions in this section

1. Use logarithm table to evaluate:

(4mks)

$$\sqrt{\left(\frac{0.7493 \cos^2 16.335^\circ}{\text{Log } 559.3 + 10 \tan 3^\circ} \right)}$$

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



Find the length AM and determine the inclination of AM to EFGH.

(3mks)

6. Use square roots, reciprocals and square tables to evaluate the expression:

(3mks)

$$(0.00546667)^{1/2} + \left(\frac{3}{0.04327} \right)^2$$

7. A member of a county assembly sold his car for shs. 1,250,000 and deposited this money in a savings account in one of the banks in Kaiboi town. The banks paid 18% p.a compounded quarterly. After two years, the member of the county assembly withdrew a half of the amount from the account. He left the rest for a further two and a half years. Calculate the total interest he earned in the $4\frac{1}{2}$ year period. (4mks)
8. Given that x° is an angle in the third quadrant such that $16\sin^2 x^\circ + 4\cos x^\circ = 10$. Find $\tan x$. (3mks)
9. Two variables P and L are such that P varies partly as L and partly varies inversely as the square root of L .

SECTION II (50 MARKS)

Answer ONLY FIVE questions in this section in the spaces provided

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

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

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

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

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

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

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

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

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

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

NHIF – Kshs. 320

Co-op Loan – Kshs. 4,000

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

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

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

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

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

(3mks)

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

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

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

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

(GRAPH PAPER PROVIDED)

(4mks)

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

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

(2mks)

(ii) $3 \sin (2x + 30^\circ) + 1 = 0$

(1mk)

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

(1mk)

21. An aircraft takes off from the airport X (65°N , 36°E) and flies by the most direct route to another airport Y ($R^\circ\text{N}$, 144°W) covering a distance of 4800nm.

(a) Find R°

(1mk)

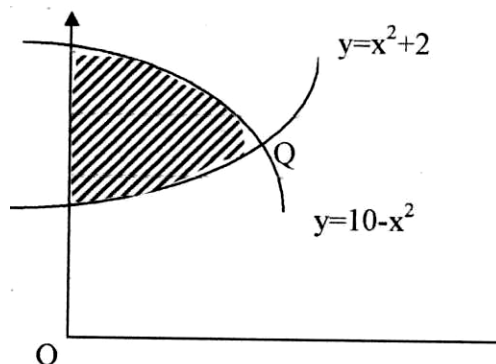
(b) If instead, the aircraft had flown along the meridian 144°W to point Y, find how much further it would have flown.

(5mks)

(c) Two aircrafts takes off from X to Y at the same time. Given that both fly at the same speed and one flies on the direct route and the other takes the route described in (b) above, state the position of the second aircraft when the first is landing at Y.

(2mks)

22. The diagram shown below represents the area between the curves $y = x^2 + 2$ and $y = 10 - x^2$ and y-axis.



Find:-

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

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

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

- (a) State the linear equation connecting p and r. **(1mk)**
- (b) Using the scale 2cm to represent 0.1 units on both axes, draw a suitable straight line graph on the grid provided;
Hence estimate the value of k and n. **(8mks)**
- (c) Write an equation connecting p and n. **(1mk)**

24. An aircraft leaves point A and flies on a bearing of 020^0 to a second point B, which is 600km from A. From B, the aircraft then flies on a bearing of 320^0 to a third point C which is 1000km from B. The aircraft then flies directly back to A from C at a speed of 200km/hr. By scale drawing, find:-

- (a) Time taken to fly directly from C to A. **(6mks)**
- (b) The bearing in which it would fly from C to A. **(1mk)**
- (c) Locate point D on a bearing 170^0 from C and 280^0 from A. Calculate BD in kilometers. **(2mks)**
- (d) What is the bearing of D from B? **(1mk)**

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 3 MATHEMATICS PAPER 1

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO CANDIDATES

- i. Write your name and Index number in the spaces provided above.
- ii. This paper consists of two sections: Section I and Section II.
- iii. Answer all questions in **Section I** and only Five questions from **Section II**.
- iv. Show all the steps in your calculations giving your answer at each stage in the spaces provided below each question.
- v. Non-programmable silent electronic calculators and KNEC mathematical tables may be used.

For Examiner's use only.

Section I

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

Section II

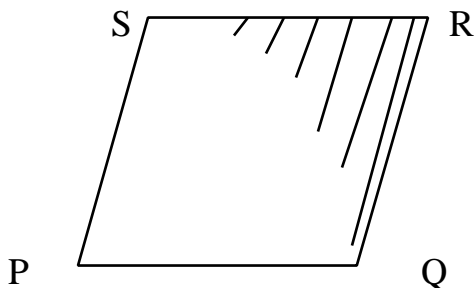
17	18	19	20	21	22	23	24	Total
								1

Grand Total

SECTION I (50 MKS)

ATTEMPT ALL QUESTIONS.

1. Use tables of reciprocal only to evaluate $\frac{1}{0.325}$ hence evaluate : $3 \sqrt{\frac{0.000125}{0.325}}$ (3 mks)
2. Two boys and a girl shared some money. The elder 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 girls share. (3mks)
3. Annette has some money in two denominations only. Fifty shillings notes and twenty shilling coins. She has three times as many fifty shilling notes as twenty shilling coins. If altogether she has sh. 3,400, find the number of fifty shilling notes and 20 shilling coin. (3mks)
4. The figure below shows a rhombus PQRS with PQ= 9cm and $\angle SPQ=60^\circ$. SXQ is a circular arc, centre P.



- Calculate the area of the shaded region correct to two decimal places (Take $\pi = \frac{22}{7}$) (4mks)
5. Solve the equation $2x^2 + 3x = 5$ by completing the square method (3mks)
6. Simplify the expression $\frac{3x^2 - 4xy^2 + y}{9x^2 - y^2}$ (3mks)
7. Solve the equation $8x^2 + 2x - 3 = 0$ hence solve the equation $8\cos^2 y + 2\cos y - 3 = 0$ For the range $0^\circ < y < 180^\circ$ (4mks)
8. Show that the points P(3,4), Q(4,3) and R(1,6) are collinear. (3mks)
9. Solve the inequalities $x \leq 2x + 7 \leq \frac{1}{3}x + 14$ hence represent the solution on a number line. (3mks)
10. The mean of five numbers is 20. The mean of the first three numbers is 16. The fifth number is greater than the fourth by 8. Find the fifth number. (3mks)
11. The volume of two similar solid spheres are 4752cm^3 and 1408cm^3 . If the surface area of the small sphere is 352cm^2 , find the surface area of the larger sphere. (3mks)
12. Solve for x in the equation $\frac{1}{2}\log_2 81 + \log_2(x - \frac{x}{3}) = 1$. (3mks)

13. A farmer has a piece of land measuring 840m by 396m. He divides it into square plots of equal size. Find the maximum area of one plot. (3mks)

14.a) find the inverse of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ (1mk)

b) Hence solve the simultaneous equation using the matrix method (2mks)

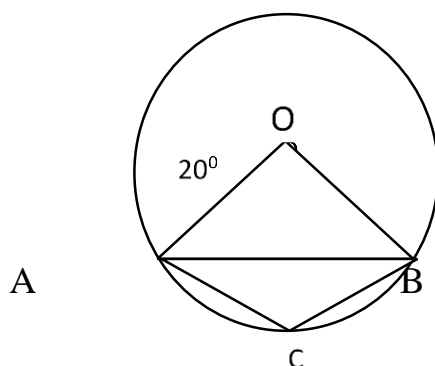
$$4x + 3y = 6$$

$$3x + 5y = 5$$

15. In the figure below O is the centre of the circle and $\angle OAB = 20^\circ$. Find;

a) $\angle AOB$ (1mk)

b) $\angle ACB$ (2mks)



16. Each interior angle of a regular polygon is 120° larger than the exterior angle. How many sides has the polygon? (3mks)

SECTION II (50MKS)

Choose any five questions

17. Three business partners, Bela, Joan, and Trinity contributed Kshs 112,000, Ksh, 128,000 and Ksh, 210,000 respectively to start a business. They agreed to share their profit as follows:

30% to be shared equally

30% to be shared in the ratio of their contributions

40% to be retained for running the business.

If at the end of the year, the business realized a profit of Ksh 1.35 Million. Calculate:

a) The amount of money retained for the running of the business at the end of the year. (1mk)

b) The difference between the amounts received by Trinity and Bela (6mks)

c) Express Joan's share as a percentage of the total amount of money shared between the three partners. (3mks)

18. Complete the table below for the function $y = x^3 + 6x^2 + 8x$ for $-5 \leq x \leq 1$ (3mks)

X	-5	-4	-3	-2	-1	0	1
X^3	-125	-64			-1	0	8
$6X^2$			54		6	0	
$8X$	-40		-24	-16		0	8
Y		0	3			0	15

- a) Draw the graph of the function $y=x^3 + 6x^2 + 8x$ for $-5 \leq x \leq 1$ (3mks)
(use a scale of 1cm to represent 1 unit on the x-axis . 1cm to represent 5 units on the y-axis)

- b) Hence use your graph to estimate the roots of the equation

$$X^3 + 5x^2 + 4x = -x^2 - 3x - 1 \quad (4mks)$$

19. Three islands P, Q, R and S are on an ocean such that island Q is 400Km on a bearing of 030° from island P. island R is 520Km and a bearing of 120° from island Q. A port S is sighted 750Km due South of island Q.

- a) Taking a scale of 1cm to represent 100Km, give a scale drawing showing the relative positions of P, Q, R and S. (4mks)

Use the scale drawing to:

- b) Find the bearing of:

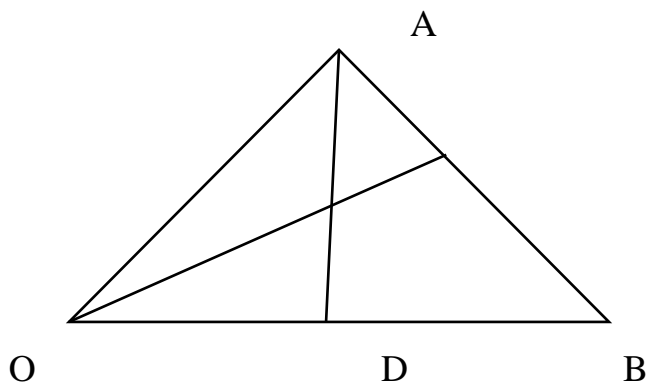
i. Island R from island P (1mk)

ii. Port S from island R (1mk)

- c) Find the distance between island P and R (2mks)

- d) A warship T is such that it is equidistant from the islands P, S and R. by construction locate the position of T. (2mks)

20. In the figure below, E is the midpoint of AB, $OD:DB = 1:3$ and f is the point of intersection of OE and AD.



Given $OA = a$ and $OB = B$

a) Express in terms of a and b

i. AD

(1mk)

ii. OE

(2 mks)

b) Given that $AF = sAD$ and $OF = tOE$ find the values of s and t

(5mks)

c) Show that E, F and O are collinear.

(2mks)

21. A bag contains 5 red, 4 white and 3 blue beads. Two beads are selected at random one after another.

a) Draw a tree diagram and show the probability space.

(2mks)

b) From the tree diagram, find the probability that;

i. The last bead selected is red

(3mks)

ii. The beads selected were of the same colour

(2mks)

iii. At least one of the selected beads is blue.

(3mks)

22. The table below shows how income tax was charged on income earned in a certain year.

Taxable income per year (Kenyan pounds)	Rate shilling per K£
1-3630	2
3631- 7260	3
7261 -10890	4
10891 - 14520	5

Mr. Gideon is an employee of a certain company and earns a salary of Ksh. 15,200 per month. He is housed by the company and pays a nominal rent of Ksh. 1050 per month. He is married and is entitled to a family relief of Ksh. 450 per month.

i. Calculate his taxable income in K£ p.a

(2mks)

ii. Calculate his gross tax per month.

(4mks)

iii. Calculate his net tax per month

(2mks)

iv. Calculate his net salary per month.

(2mks)

23. The table below shows the distribution of mathematics marks of form 4 candidates in Mavoko Secondary school.

Marks	0-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
F	4	7	12	9	15	23	21	5	4

Use the above data to calculate:

a) Mean using assumed mean of 65

(3mks)

b) Median

(3mks)

c) Standard deviation (4mks)

24. Coast bus left Nairobi at 8.00am and travelled towards Mombasa at an average speed of 80Km/hr. At 8.30am, Lamu bus left Mombasa towards Nairobi at an average speed of 120 km per hour. Given that the distance between Nairobi and Mombasa is 400Km.: determine:

- i. The time Lamu bus arrived in Nairobi. (2mks)
- ii. The time the two buses met. (4mks)
- iii. The distance from Nairobi to the point where the two buses met. (2mks)
- iv. How far coast bus is from Mombasa when Lamu bus arrives in Nairobi (3mks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 3 MATHEMATICS PAPER 2

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

Instructions to candidates

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

For Examiner's use only.

Section I

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

Section II

17	18	19	20	21	22	23	24	Total

Grand Total

--

SECTION A (50 MARKS)

Answer all the questions in this section

1. Use logarithm table to evaluate.

4 mks

$$\sqrt[3]{\frac{0.52 \times 0.312}{2.12^2}}$$

2. 200 cm³ of acid is mixed with 300 cm³ of alcohol. If the densities of acid and alcohol are 1.08g/cm³ and 0.8 g/cm³ respectively, calculate the density of the mixture. **3 mks**
3. The coordinates of P and Q are P(5, 1) and Q(11, 4) point M divides line PQ in the ratio 2 : 1. Find the magnitude of vector OM. **(3 marks)**
4. The table below shows income tax rates in a certain year.

Monthly income in Ksh	Tax rate in each Ksh
1 – 9680	10%
9681 – 18800	15%
18801 – 27920	20%
27921 – 37040	25%
Over 37040	30%

In that year, a monthly personal tax relief of Ksh. 1056 was allowed. Calculate the monthly income tax paid by an employee who earned a monthly salary of Ksh 32500. **(4 mks)**

5. Make w the subject of the formulae.

(3mks)

$$2x = \sqrt{\frac{2w + 8}{3w - 5}}$$

6. A line passes through points (2, 5) and has a gradient of 2.
(a) Determine its equation in the form $y = mx + c$. **(2mks)**
(b) Find the angle it makes with x-axis. **(1mk)**
7. A quantity **P** is partly constant and partly varies as the cube of **Q**. When **Q**=1, **P**=23 and when **Q** =2, **P**= 44. Find the value of **P** when **Q** = 5. **(3mks)**
8. The vertices of a triangle are A(1, 2) , B(3, 5) and C(4, 1). The co-ordinates of C' the image of C under a translation vector T are (6, -2).

(a) Determine the translation vector T. (1mk)

(b) Find the co-ordinates of A' and B' under the translation vector T. (2mks)

9. (a) Expand $(1 - x)^4$ using the binomial expansion. (1mk)

(b) Use the first three terms of the expansion in (a) above to find the value of $(0.98)^4$ correct to nearest hundredth. (2mks)

10. Find the centre and radius of a circle with equation:

$$x^2 + y^2 - 6x + 8y - 11 = 0 \quad (3mks)$$

11. Two grades of coffee one costing sh.42 per kilogram and the other costing sh.47 per kilogram are to be mixed in order to produce a blend worth sh.46 per kilogram in what proportion should they be mixed. (3mks)

12. Pipe A can fill an empty water tank in 3 hours while pipe B can fill the same tank in 5 hours. While the tank can be emptied by pipe C in 15 hours. Pipe A and B are opened at the same time when the tank is empty. If one hour later pipe C is also opened. Find the total time taken to fill the tank. (4 mks)

13. Simplify the expression: (3mks)

$$\frac{9t^2 - 25a^2}{6t^2 + 19at + 15a^2}$$

14. A business bought 300 kg of tomatoes at Ksh. 30 per kg. He lost 20% due to waste. If he has to make a profit 20%, at how much per kilogram should he sell the tomatoes. (3mks).

15. Evaluate without using a Mathematical table or a calculator.

$$\log_6 216 + [\log 42 - \log 6] \div \log 49 \quad (2mks)$$

16. Given that the ratio $x : y = 2 : 3$, find the ratio $(5x - 2y) : (x + y)$ (3 mk)

SECTION II (50mks)

Answer only five questions in this section in the spaces provide

17. Draw the graph of $y = x^3 + 2x^2 - 5x - 8$ for values of x in the range $-4 \leq x \leq 3$ (GRAPH PAPER PROVIDED) (5mks)

x	-4	-3	-2	-1	0	1	2	3
x^3	-64							27
$2x^2$								
$-5x$								
-8								

y	-20							
---	-----	--	--	--	--	--	--	--

(a) By drawing suitable straight line on the same axis, solve the equations.

i) $x^3 + 2x^2 - 5x - 8 = 0$ 1mks

ii) $x^3 + 2x^2 - 5x - 7 = 0$ 2mks

iii) $3 + 3x - 2x^2 - x^3 = 0$ 2mks

18. A transformation represented by the matrix $\begin{pmatrix} 2 & 1 \\ 1 & -2 \end{pmatrix}$ maps the points A(0, 0), B(2, 0), C(2, 3) and D(0, 3) of the quad ABCD onto A¹B¹C¹D¹ respectively.

a) Draw the quadrilateral ABCD and its image A¹B¹C¹D¹. (3mks)

(GRAPH PAPER PROVIDED)

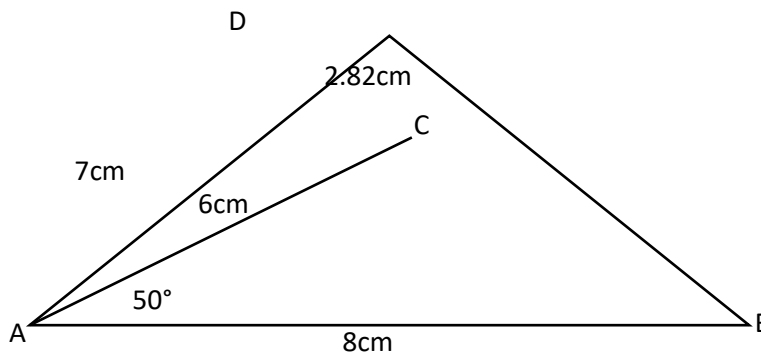
b) Hence or otherwise determine the area of A¹B¹C¹D¹. (2mks)

c) Another transformation $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ maps A¹B¹C¹D¹ onto A¹¹B¹¹C¹¹D¹¹.

Draw the image A¹¹B¹¹C¹¹D¹¹. (2mks)

d) Determine the single matrix which maps A¹¹B¹¹C¹¹D¹¹ back to ABCD. (3mks)

19. In the figure below (not drawn to scale) AB = 8cm, AC = 6cm, AD = 7cm, CD = 2.82cm and angle CAB = 50°.



Calculate (to 2d.p.)

(a) the length BC. (3 marks)

(b) the size of angle ABC. (3 marks)

(c) size of angle CAD. (3 marks)

(d) Calculate the area of triangle ACD. (2 marks)

20. Three variables P, Q and R are such that P varies directly as Q and inversely as the square of R.

a) When P = 18, Q = 24 and R = 4.

Find P when Q = 30 and R = 10. (3mks)

b) Express P in terms of Q and R. (1mk)

c) If Q is increased by 20% and R is decreased by 10% find:

(i) A simplified expression for the change in P in terms of Q and R. **(3mks)**

(ii) The percentage change in P. **(3mks)**

21. A surveyor recorded the following information in his field book after taking measurement in metres of a plot.

	To E	
	1000	
	880	320 to D
720 to F	640	
	480	600 to C
240 to G	400	
	200	400 to B
	From A	

(a) Sketch the layout of the plot. **4 mks.**

(b) Calculate the area of the plot in hectares. **6mks**

22. A line L passes through points $(-2, 3)$ and $(-1, 6)$ and is perpendicular to a line P at $(-1, 6)$.

a) Find the equation of L. **(2 mks)**

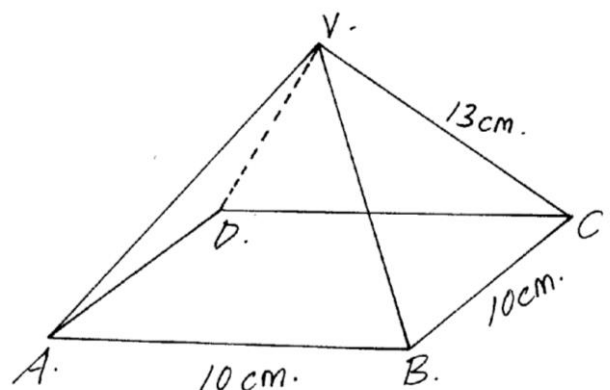
b) Find the equation of P in the form $ax + by = c$, where a, b and c are constant.

(2 mks)

c) Given that another line Q is parallel to L and passes through point $(1, 2)$ find the x and y intercepts of Q. **(3 mks)**

d) Find the point of intersection of lines P and Q. **(3 mks)**

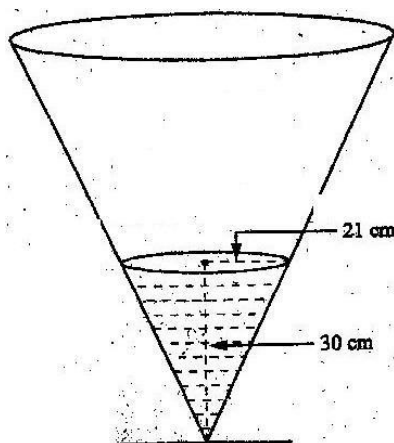
23. The figure below shows a square ABCD point V is vertically above middle of the base ABCD. $AB = 10\text{cm}$ and $VC = 13\text{cm}$.



Find;

- (a) the length of diagonal AC (2mks)
- (b) the height of the pyramid (2mks)
- (c) the acute angle between VB and base ABCD. (2mks)
- (d) the acute angle between BVA and ABCD. (2mks)
- (e) the angle between AVB and DVC. (2mks)

24. The diagram below represents a conical vessel which stands vertically. The vessel contains water to a depth of 30 cm. The radius of the surface in the vessel is 21 cm. (Take $\pi = 22/7$).



- a) Calculate the volume of the water in the vessels in cm^3 (3mks)
- b) When a metal sphere is completely submerged in the water, the level of the water in the vessels rises by 6 cm.

Calculate:

- (i) The radius of the new water surface in the vessel; (2mks)
- (ii) The volume of the metal sphere in cm^3 (3mks)
- (iii) The radius of the sphere. (3mks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 4 MATHEMATICS PAPER 1

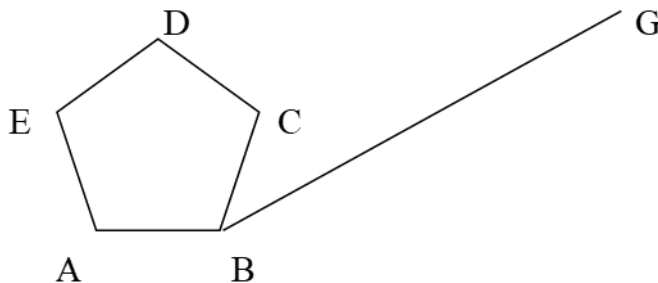
Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

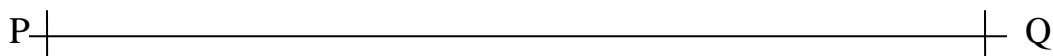
SECTION A (50MKS)

Answer ALL the questions in this section in the spaces provided.

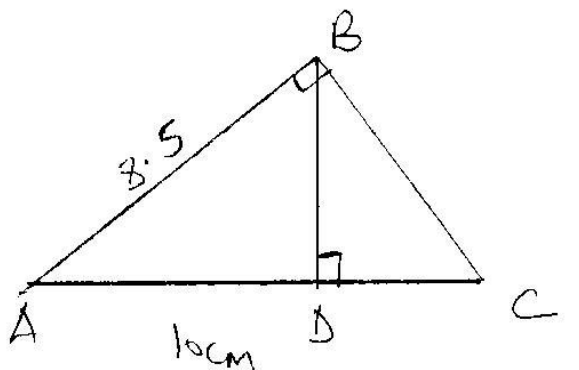
1. Without using a calculator, evaluate $\frac{2\frac{1}{4} + \frac{3}{5} \div \frac{5}{6} \text{ of } 2\frac{2}{5}}{1\frac{7}{10}}$ leaving the answer as a fraction in its simplest form (3mks)
2. Solve for x in the equation $\frac{81^{2x} \times 27^x}{9^x} = 729$ (3 marks)
3. The length of a solid prism is 10cm, its cross-section is an equilateral triangle of side 6cm. Find the total surface area of the prism. (3mks)
4. In the figure below ABCDE is a cross-sections of a solid. The solid has uniform cross-section. Given that BG is a base edge of the solid, complete the sketch, showing the hidden edges with broken lines (3mks)



5. A shopkeeper sell two types of pangas, type x and type y. Twelve type x pangas and five type y pangas cost sh. 1260, while nine type x pangas and fifteen type y pangas cost sh. 1620. Musembi bought nineteen type y pangas. How much did he pay for them? **(4mks)**
6. Ntutu had cows, sheep and goats in his farm. The number of cows was 32 and number of sheep was twelve times the number of cows. The number of goats was 1344 more than the number of sheep. If he sold $\frac{3}{4}$ of the goats, find the number of goats that remained. **(4mks)**
7. Given below is a line PQ. Without using a protractor construct another line through P making an angle of $37\frac{1}{2}^\circ$ with PQ. Using the constructed line subdivide BC into 7 equal parts **(4mks)**



8. Given that $OA = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$ and $OB = \begin{bmatrix} -3 \\ 8 \end{bmatrix}$ find the mid-point m of AB **(2mks)**
9. Simplify $\left(\frac{x^3 - xy^2}{x^4 - y^4}\right)^{-1}$ **(3 MKS)**
10. In the triangle, AB = 8.5cm, AC = 10cm and $\angle ABC = 90^\circ$



Calculate:-

- i) The length of BC **(1mk)**
- ii) The length of BD **(2mks)**

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

12. Two matrices A and B are such that $A = \begin{pmatrix} K & 4 \\ 3 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ Given that the determinant of

$AB = 4$, find the value of K. (3mks)

13. A minibus covered a distance of 200km at an average speed of 100km/h. it travelled at a speed of 80km/h for $\frac{3}{5}$ of its journey. At what speed did it travel the remaining part of the journey? (3mks)

14. The table below shows marks scored by 40 students in a mathematics test.

Marks	30-39	40-49	50-59	60-69	70-79
No of students	2	9	14	7	8

Calculate the median mark (2mks)

15. Juma paid sh. 180 for a book after getting a discount of 10%. the shopkeeper made a profit of 20% on the sale of the set book. What percentage profit would the shopkeeper have made if no discount was allowed.? (3mks)

16. A rectangular tank has a hole in it such that 11cm³ of water leaks out every 5 seconds. Using a π as 3.142, calculate

I) the capacity of the water lost from the tank every hour (2mks)

II) The time it takes to fill a cylindrical tank of radius 30cm and height 30cm into which the leaking water drains in hours to 4 significant figures (2mks)

SECTION II (50MARKS)

ANSWER ANY FIVE QUESTIONS FROM THIS SECTION IN THE SPACES PROVIDED.

17. A line L passes through points (-2, 3) and (-1, 6) and perpendicular to a line P at (-1,6)

a) Find the equation of L (2mks)

b) Find the equation of P in form $ax + by = c$ where a,b, and c are constants (2mks)

c) Given that another line Q is parallel to L and passes through point (1,2) find the x and y intercept of Q (3mks)

- 18). Two shopkeepers Juma and Wanjiku bought some items from a wholesaler. Juma bought 18 loaves of bread, 40 packets of milk and 5 bars of soap while Wanjiku bought 15 loaves of bread, 30 packets of milk and 6 bars of soap. The prices of loaf of bread, a packet of milk and a bar of soap were ksh, 45ksh 50 and ksh, 150 respectively.

a) Represent

I) the number of items bought by Juma and Wanjiku using a 2×3 matrix (1mk)

ii) The price of items bought using a 3×1 matrix (1mk)

b) Use the matrix I (a) above to determine the total expenditure incurred by each person and hence the difference in their expenditure. (3mks)

c) Juma and Wanjiku also bought rice and sugar. Juma bought 36kg of rice and 23kg of sugar and paid ksh, 8160. Wanjiku bought 50kg of rice and 32kg of sugar and paid ksh, 11,340. Use the matrix method to determine the price of one kilogram of rice and one kilogram of sugar. (5mks)

19. The table below shows how income tax was charged on income earned in a certain year.

Taxable income per year (Kenya Pounds)	Rate (shilling per Kenya Pound)
1 - 3630	2
3631 - 7260	3
7261 - 10890	4
10891 - 14520	5

Mr. Gideon is an employee of a company and earns a salary of Ksh. 15,200 per month. He is housed by the company and pays a nominal rent of Ksh. 1050 per month. He is married and is entitled to a family relief of Ksh. 450 per month

i) Calculate his taxable income in k£ p.a. (2mks)

ii) Calculate his gross tax per month. (4mks)

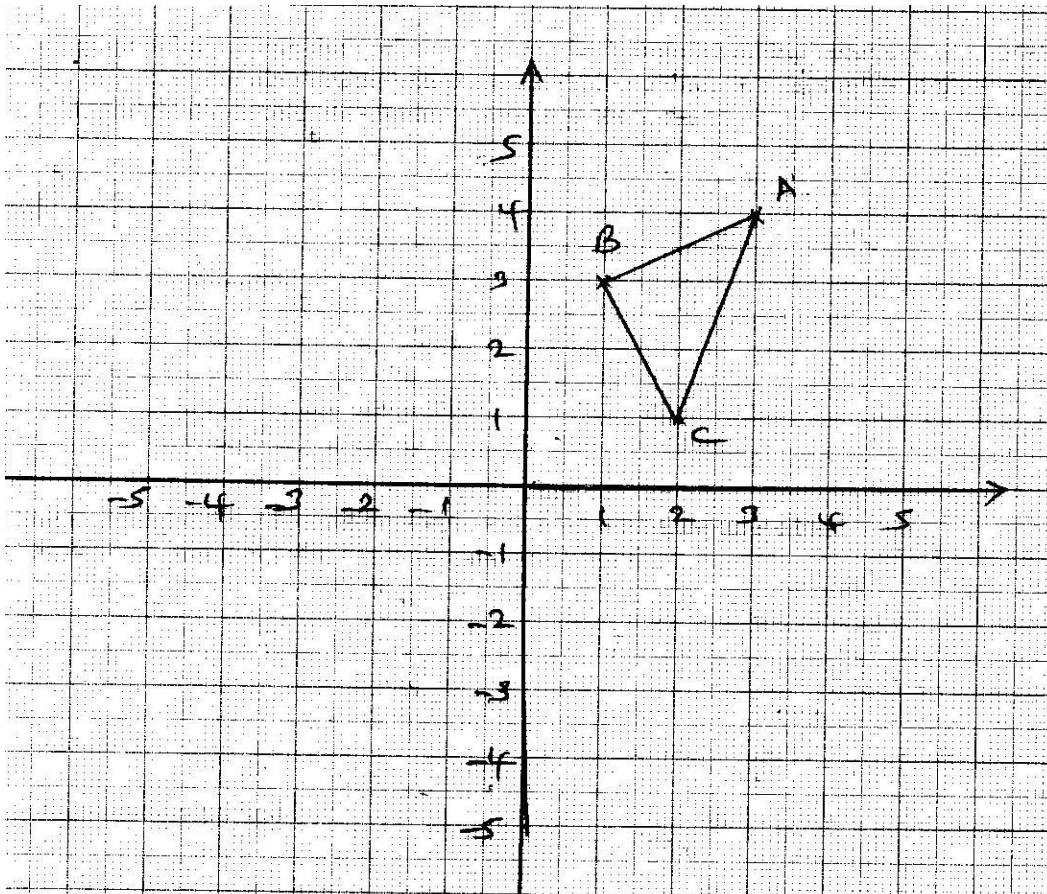
iii) Calculate his net tax per month (2mks)

iv) Calculate his net salary per month (2mks)

20. The diagram below shows a triangle ABC with A(3,4) B(1,3) and C(2,1)

a) Draw $\Delta A'B'C'$ the image of a ΔABC under a rotation of $+90^\circ$ about (0,0) (2mks)

b) Draw $\Delta A''B''C''$ the image of $\Delta A'B'C'$ under a reflection in the line $y = x$ (2mks)

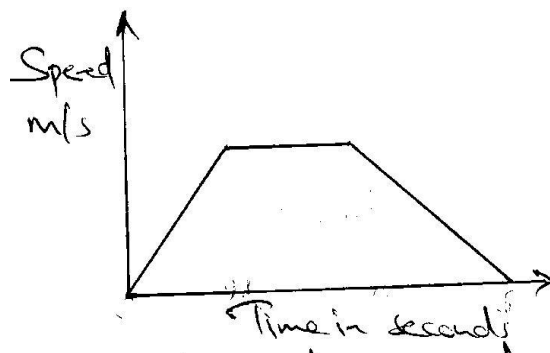


c) Draw $\triangle A''B''C''$ the image of $\triangle ABC$ under a rotation of -90° about $(0,0)$ (2mks)

d) Describe a single transformation that maps $\triangle ABC$ onto $\triangle A''B''C''$ (2mks)

e) Write down the equations of the lines of symmetry of the quadrilateral $BB''A''A'$ (2mks)

21. The diagram below shows the speed time graph for a train travelling between two stations. The train starts from rest and accelerates uniformly for 150 seconds. It then travels at a constant speed for 300 seconds and finally decelerates uniformly for 200 seconds



Given that the distance between the two stations is 10,450m, calculate the

a) Maximum speed in km/h the train attained (3mks)

- b) Acceleration (2mks)
 c) Distance the train travelled during the last 100 seconds (2mks)
 d) Time the train takes to travel the first half of the journey. (3mks)

22. The table shows the mark scored by students in a maths exams

Class	30-39	40-49	50-59	60-69	70-79	80-89
No of students	3	17	27	23	8	2

- a) Draw a cumulative frequency curve (3mks)
 b) Use your graph to determine
 i) The median (1mk)
 ii) The quartile deviation (1mk)
 iii) The number of students who scored above 67 (1mk)
 c) Use an assumed mean of 64.5 to calculate the standard deviation of the above data. (4mks)

23. A circular lawn is surrounded by a path of uniform width of 7M. the area of the path is 21% that of the lawn

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

24. The displacement, S metres of a moving particles after t seconds is given by

$$S = 2t^3 - 5t^2 + 4t + 2$$

Determine

- a) The velocity of the particle when $t = 3$ seconds (3mks)
 b) The value of t when the particle is momentarily at rest (3mks)
 c) The displacement when the particle is momentarily at rest (2mks)
 d) The acceleration of the particles when $t = 3$ seconds (2mks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 4 MATHEMATICS PAPER 2

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTION TO STUDENTS:

1. Write your **name**, **admission number** and **class** in the spaces provided above.
2. Write the **date** of examination in spaces provided.
3. This paper consists of **two** Sections; Section **I** and Section **II**.
4. Answer **ALL** the questions in Section **I** and only **five** questions from Section **II**.
5. All answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculation, giving your answer at each stage in the spaces provided **below** each question.
7. Marks may be given for correct working even if the answer is wrong.
8. KNEC Mathematical tables **may be** used, except where stated otherwise.
9. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
10. Candidates should answer the questions in English.

FOR EXAMINER'S USE ONLY:

SECTION I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

SECTION II

17	18	19	20	21	22	23	24	TOTAL

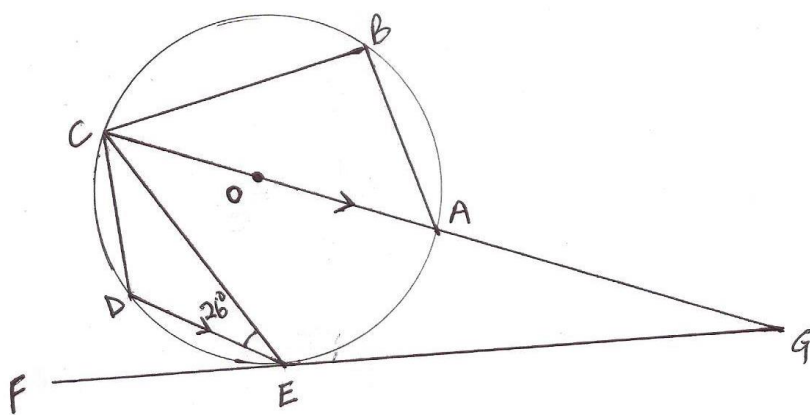
GRAND TOTAL

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SECTION 1(50 Marks)

Answer all Questions from this Section

1. Use logarithms correct to 4 decimal places to evaluate. **4mks**
$$\frac{849.6 \times \sin 63.2}{\sqrt[3]{3.941}}$$
2. A car was valued at ksh.500,000 in January 2017. Each year, its value depreciates at 12% p.a. Find after how long would the value depreciate to 350,000. **3mks**
3. Simplify $\frac{\sqrt{3}}{\sqrt{13}-\sqrt{5}}$ **3mks**
4. Two fruits juices A and B are mixed together. Juice A cost sh.50 per litres. What is the ratio if the cost is sh.59 per litre of the mixture? **3mks**
5. Find the centre and radius of the circle whose equations is $x^2+y^2 - 2x + 4y + 1=0$ **3mks**
6. Find the standard deviation for the following set of data **3mks**
16,42,41,6,20,28,19,23,15
7. 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.



State giving reasons the sizes of;

- a. $\angle AEG$ **2mks**
- b. $\angle ABC$ **2mks**
8. Find the value of x given that $\log(x-2) + 2 = \log(3x+1) + \log 25$. **3mks**
9. Find the percentage error in the calculation of the volume of a sphere whose radius is 4.9cm. **3mks**

10. In a right angled triangle, the two sides enclosing the right angle measure $(3x - 2)$ cm and $(x + 2)$ cm. If the area of the triangle is 36cm^2 . Find the length of these two sides. **3mks**

11.(a) Expand $(a - b)^5$ **1mks**

b) Use the first three terms of the expansion in (a) in ascending power to find the approximate value of $(1.98)^5$ **2mks**

12. The first term of geometric sequence is 16, and the fifth term is 81. Find the sum of the first 10 terms. **3mks**

13. Solve the equation $\sin \sin \left(\frac{1}{2}x - 30 \right) = \cos \cos x^0$ **2mks**

14. The angle at vertex of a cone is 90° . If the slant height is $\sqrt{2}$ cm, find without using tables.

a) The diameter of the cone **2mks**

b) The height of the cone. **2mks**

15. Under a transformation whose matrix is $Q = \begin{pmatrix} x - 2 & -2x \end{pmatrix}$, a triangle whose area is 12cm^2 is mapped onto a triangle whose area is 50cm^2 . Find the two possible values of a . **3mks**

16. Make L the subject of the formula below.

$$f = \frac{1}{2\pi\sqrt{LC}}$$
 2mks

SECTION B(50MKS)

Answer only five questions from this section

17.(a) Complete the table given below by filling the blank spaces. **2mks**

X	0	15	30	45	60	75	90	105	120	135	150		165	180
$4\cos 2x$	4.00		2.00	20				-3.46	-2.00	0	-2.00			4.00
$2\sin (2x + 30)$	1.00	1.73	2.00	1.73		0	-1.00	-1.73	-2.00	-1.73			0	1.00

b) On the grid provided draw the graph of $y = 4\cos 2x$ and $y = 2\sin (2x + 30)$ for $0^\circ \leq x \leq 180^\circ$.
(GRAPH PAPER PROVIDED) **5mks**

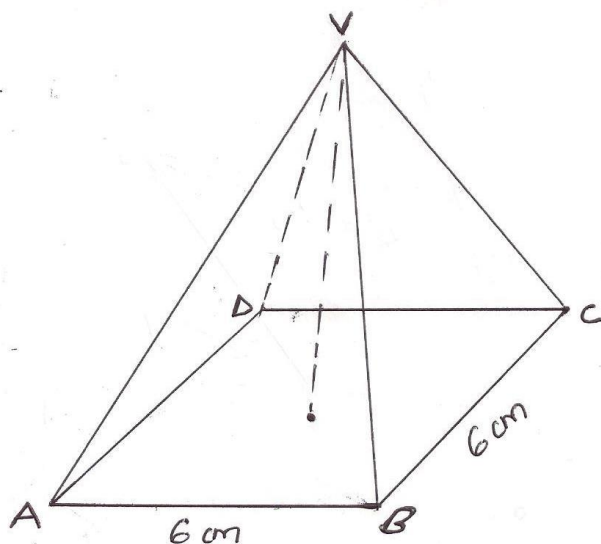
c)i) State the amplitude of $y = 4\cos 2x$. **1mk**

ii) Find the period of $y = 2\sin (2x + 30)$

d) Use your graph to solve

$$4\cos 2x - 2\sin (2x + 30) = 0$$
 (1mk)

18. The figure below is a square based pyramid ABCDV with $AD = DC = 6\text{cm}$ and height $VO = 10\text{cm}$.



a. State the projection of VA on the base ABCD

1mk

b. Find

(i) The length of VA .

3mks

(ii) The angle between VA and ABCD .

2mks

(iii) The angle between VDC and ABCD

2mks

(iv) Volume of the pyramid.

2mks

19. The table below gives marks obtained in a mathematics test by 47 candidates.

Marks	31-35	36-40	41-45	46-50	51-55	56-60
No of candidates	4	6	12	15	8	2

a. Calculate the mean score

3mks

b. On the grid provided draw a cumulative frequency graph and use it to estimate

(GRAPH PAPER PROVIDED)

i. The median

2mk

ii. The semi-interquartile range.

3mks

c. In order to pass the test a pupil had to score more than 40 marks. Calculate the percentage of pupils who passed.

2mks

20.a) In a form 4 Class there are 22 girls and 18 boys. The probability that a girl completes the secondary education course is $\frac{3}{5}$ whereas that of a boy is $\frac{2}{3}$. A student is picked at random from the class. Find the probability that the student picked

i. Is a boy and will complete the course.

2mks

ii. Will complete the course.

2mks

iii. Is a girl and will not complete the course. **2mk**

b) A bag contains 5 blue balls, 8 red balls and 3 green balls being similar in shape and size. A ball is picked out at random without replacement and its colour noted, use a tree diagram to determine the probability that at least one of the first two balls picked is green. **4mks**

21. Two quantities P and R are connected by the equation $P = Kr^n$ where k and n are constants. The table of values of P and r is given below.

		2.25	3.39	4.77		

a. State the linear equation connecting P and r. **1mk**

b. (i) Using a suitable scale draw a suitable line graph from the above data on the grid provided. (GRAPH PAPER PROVIDED) **5mk**

(ii) Using your graph estimate the values of k and n. **3mks**

c. Find the equation connecting P and r. **1mk**

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

i. Given that $P=12$ when $Q=24$ and $R=36$, find P when $Q=27$ and $R=121$. **3mks**

ii. If Q increases by 10% and R decreases by 35% find the percentage increase in P. **4mks**

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

23. A community water tank is in the shape of a cuboid of base 6m by 5m and a height of 4m. A feeder pipe of diameter 14cm supplies water to this tank at the rate of 40cm /s

a. Calculate the;

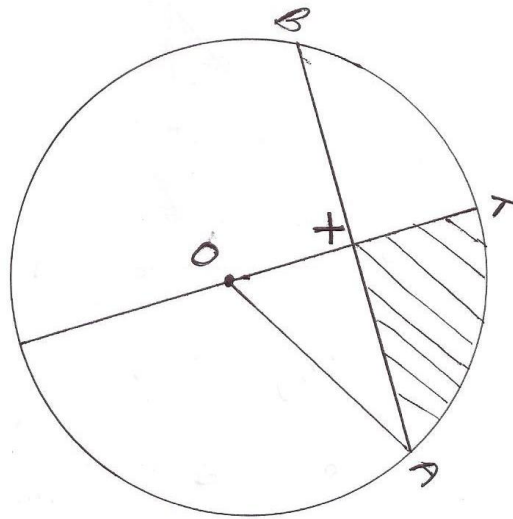
i. Capacity of the tank in litres. **2mks**

ii. Amount of water, in litres delivered to this tank in one hour. **3mks**

iii. The time taken for the tank to fill. **2mks**

b. The community consumes a full tank a day, with each family consuming an average of 150 litres per day. If each family pays a uniform rate of sh.350 per month, find the total amount of money due monthly. **2mks**

24. In the diagram O is the centre of a circle radius 11cm. $OX=5$ cm and $BX=12$ cm.



- i. Find the length of XA .
- ii. Find the size of angle XOA .
- iii. Find the area of the shaded part.

3mks

3mks

4mks

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 5 MATHEMATICS PAPER 1

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

Instructions toCandidates

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

For Examiner's use only

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

Section II

GRAND TOTAL

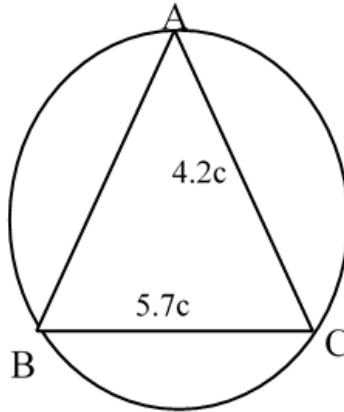
17	18	19	20	21	22	23	24	25	TOTAL

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Section I(50 Marks):

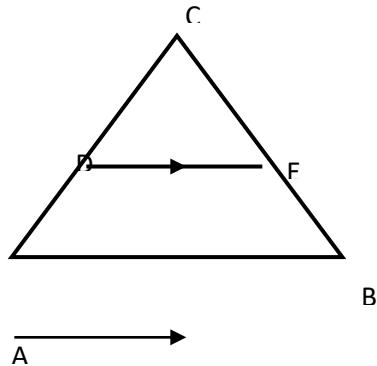
Answer ALL questions in the section in the space provided.

1. Evaluate $\frac{-12(-3) \times 4 - (-20)}{-6 \times 6 + (-6)}$ (2 Marks)
2. Mr. Owino spends $\frac{1}{4}$ of his salary on school fees. He spends $\frac{2}{3}$ of the remainder on food and a fifth of what is left on transport. He saves the balance. In certain month he saved Sh. 3400. What was his salary? (3 marks)
3. Simplify: (3 Marks)
$$\frac{2y^2 - 3xy - 2x^2}{4y^2 - x^2}$$
4. Find x if $3^{2x+3} + 1 = 28$ (2 Marks)
5. The circle below whose area is 18.05cm^2 circumscribes triangle ABC where $AB = 6.3\text{cm}$, $BC = 5.7\text{cm}$ and $AC = 4.2\text{cm}$. Find the area of the shaded part. (4 Marks)



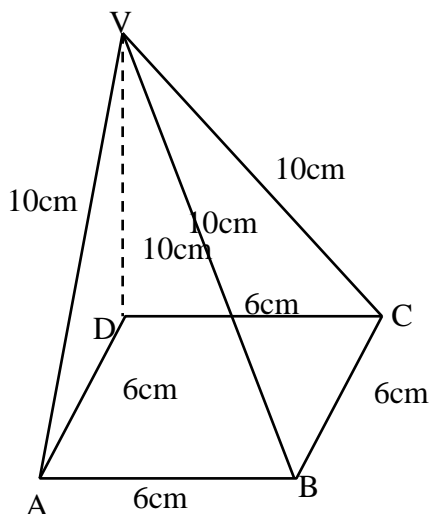
6. A salesman gets a commission of 2.4% on sales up to Sh. 100,000. He gets additional commission of 1.5% on sales above this. Calculate the commission he gets for sales worth Sh. 280,000. (3 Marks)
7. A rectangle whose area is 96m^2 is such that its length is 4metres longer than its width. Find
 - (a) Its dimensions (2 Marks)
 - (b) Its perimeter (1 Mark)
8. Give $\sin(90 - a) = \frac{1}{2}$ find without using trigonometric tables the value of $\cos a$. (2 Marks)

9. In triangle ABC below, $AC = BC$, AB is parallel to DE, $AB = 15\text{cm}$, $DE = 7.5\text{cm}$ and $BE = 6\text{cm}$.



Calculate

- (a) Length CE (2 Marks)
- (b) Area of quadrilateral ABED. (2 Marks)
10. A measuring cylinder of base radius 5cm contains water whose level reads 6cm high. A spherical object is immersed in the water and the new level reads 10cm. Calculate the radius of the spherical object (3 Marks)
11. Using a ruler and pair of compasses only, construct triangle ABC in which $AB = 6\text{cm}$, $BC = 8\text{cm}$ and angle $ABC = 45^\circ$. Drop a perpendicular from A to BC to meet line BC at M. Measure AM and AC. (4 Marks)
12. In a book store, books packed in cartons are arranged in rows such that there are 50 cartons in the first row, 48 cartons in the next row, 46 in the next and so on.
- (a) How many cartons will there be in the 8th row? (2 Marks)
- (b) If there are 20 rows in total, find the total number of cartons in the book store. (2 Marks)
13. Draw the net of the solid below and calculate the total surface area of its faces. (3 Marks)

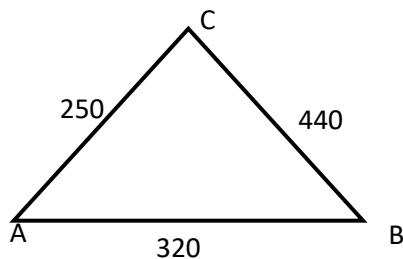


14. Town X is 20km in a bearing of 060° from Y, and Z is 30km in the direction 150° from Y.
Using the scale 1cm represents 5km, find by scale drawing:
- (a) the bearing of Y from Z. (2 Marks)
- (b) the distance of X from Z. (2 Marks)
15. Solve for x in $2^{2x} - 18 \times 2^x = 40$ (3 Marks)
16. Oketch sells his car to Jane and makes a profit of 20%. Jane sells the same to Issa at Sh.180,000, making a loss of 10%. Determine the price at which Oketch bought the car. (3 Marks)

Section II (50 Marks):

Answer ANY five questions in this section in the spaces provided.

17. The distance between towns A and B is 360km. A minibus left town A at 8.15 a.m. and traveled towards town B at an average speed of 90km/hr. A matatu left town B two and a third hours later on the same day and travelled towards A at average speed of 110km/hr.
- (a) (i) At what time did the two vehicles meet? (4 Marks)
- (ii) How far from A did the two vehicles meet? (2 Marks)
- (b) A motorist started from his home at 10.30 a.m. on the same day as the matatu and travelled at an average speed of 100km/h. He arrived at B at the same time as the minibus. Calculate the distance from A to his house. (4 Marks)
18. Karis owns a farm that is triangular in shape as shown below.



- (a) Calculate the size of angle BAC (2 Marks)
- (b) Find the area of the farm in hectares (3 Marks)
- (c) Karis wishes to irrigate his farm using a sprinkler machine situated in the farm such that it is equidistant from points A, B and C.
- (i) Calculate the distance of the sprinkler from point C. (2 Marks)
- (ii) The sprinkler rotates in a circular motion so that the maximum point reached by the water jets is the vertices A, B and C. Calculate the area outside his farm that will be irrigated. (3 Marks)
19. A ship leaves port M and sails on a bearing of 050° heading towards island L. Two Navy destroyers sail from a naval base N to intercept the ship. Destroyer A sails such that it covers

the shortest distance possible. Destroyer B sails on a bearing of 20° to L. The bearing of N from M is 100° and distance

NM = 300KM. Using a scale of 1cm to represent 50km, determine:

- (i) the positions of M, N and L. (3 Marks)
- (ii) the distance travelled by destroyer A (3 Marks)
- (iii) the distance travelled by destroyer B. (2 Marks)
- (iv) the bearing of N from L. (2 Marks)

20. A number of people agreed to contribute equally to buy books worth KSh. 1200 for a school library. Five people pulled out and so the others agreed to contribute an extra Shs. 10 each. Their contributions enabled them to buy books worth Shs. 200 more than they originally expected.

- (a) If the original numbers of people was x , write an expression of how much each was originally to contribute. (1 Mark)
- (b) Write down two expressions of how much each contributed after the five people pulled out. (2 Mark)
- (c) Calculate the number of people who made the contribution. (5 Marks)
- (d) Calculate how much each contributed. (2 Marks)

21. Using a ruler and a pair of compasses only, draw a parallelogram ABCD, such that angle DAB = 75° . Length AB = 6.0cm and BC = 4.0cm. From point D, drop a perpendicular to meet line AB at N. (7 Marks)

- (i) Measure length DN (1 Mark)
- (ii) Find the area of the parallelogram. (2 Marks)

22. The following measurements were recorded in a field book of a farm in metres ($xy = 400m$)

	Y	
	400	
C60	340	
	300	120D
	240	100E
	220	160F
B100	140	
A120	80	
	x	

(a) Using a scale of 1cm representing 4000cm, draw an accurate map of the farm.

(3 Marks)

(b) If the farm is on sale at Kshs. 80,000.00 per hectare, find how much it costs. (7 Marks)

23. The table shows marks obtained by 100 candidates at Goseta Secondary School in Biology examination.

Marks	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85-94
Frequency	6	14	24	14	x	10	6	4

(a) Determine the value of x

(2 Marks)

(b) State the modal class

(1 Mark)

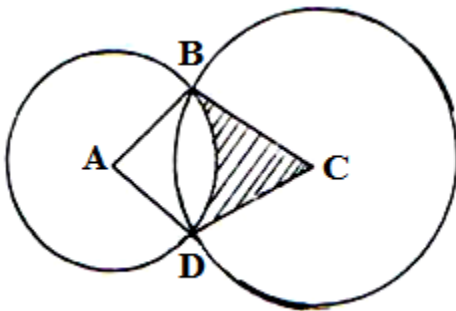
(c) Calculate the median mark

(2 Marks)

(d) Calculate the mean mark

(5 Marks)

24. In the diagram below, two circles, centres A and C and radii 7cm and 24cm respectively intersect at B and D. $AC = 25$ cm.



(a) Show that angle $ABC = 90^\circ$.

(3 Marks)

(b) Calculate

(i) the size of obtuse angle BAD

(3 Marks)

(ii) the area of the shaded part

(4 Marks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 5 MATHEMATICS PAPER 2

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

Instructions to candidates.

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of the examination in spaces provided above.
- (c) This paper consists of two sections: Section I and II.
- (d) Answer *all* the questions in section I and *only five* questions from section II.
- (e) Show *all* the steps in your calculations, giving your answer at each stage in the space provided.
- (f) Marks may be given for correct working even if the answer is wrong.
- (g) Non-programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.
- (h) *Candidates should check the question paper to ascertain that no questions are missing.*
- (i) *Candidates should answer the questions in English.*

For examiner’s use only

SECTION I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

SECTION II

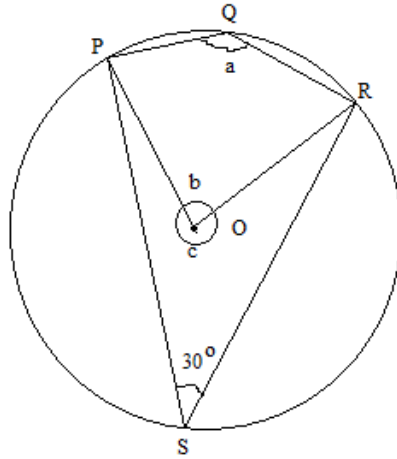
17	18	19	20		21	22	23	24	TOTAL

GRAND TOTAL

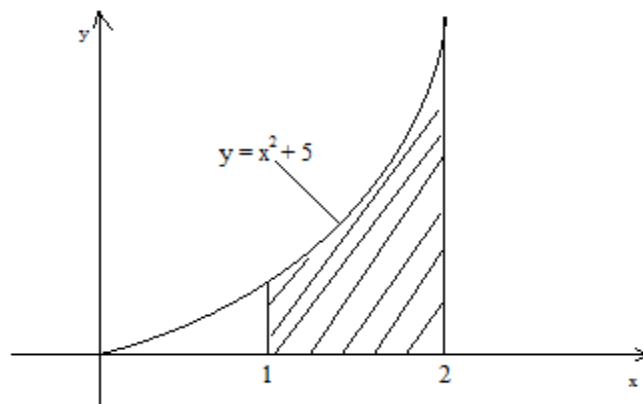
SECTION I (50 MARKS):

Answer all the questions in this section in the spaces provided.

1. Make P the subject of the formula in; $x = \sqrt{\frac{y(p-y)}{p-i}}$ (3 marks)
2. The length of a rectangle is 8.3cm and its width is 5.45cm. Calculate.
a) The relative error in the area of the rectangle. (3 marks)
b) The percentage error in the area. (1 mark)
3. The figure shown below is a circle centre O (not drawn to scale). Find the value of angles a, b and c given that $\angle PSR = 30^\circ$. (3 marks)



4. The first term of an arithmetic sequence is -5 and the common difference is 3.
a) List the first 5 terms of the sequence. (1 mark)
b) Determine the sum of the first 40 terms of the sequence. (2 marks)
5. a) Given the vectors $a = 3i - j + 2k$, $b = 4i + 2j - k$ and $p = 2a - b$. Express p in terms of i, j and k . (2 marks)
b) Hence calculate $|p|$ correct to 3 significant figures. (1 mark)
6. A quantity X varies directly as Y and the square of Z. when $Y = 2$ and $Z = 5$, $X = 150$.
Find:-
a) The law governing X, Y and Z (2 marks)
b) The value of X when $Y = 4$ and $Z = 3$ (1 mark)
7. Find accurately the shaded area. (3 marks)

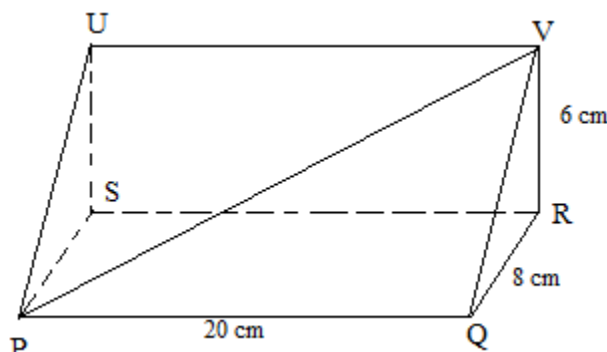


8. Simplify the following surd leaving answer in the form $a + b\sqrt{c}$ (3 marks)

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

9. Evaluate the following expression without using mathematical tables or a calculator.
 $3\log_{10}4 + \log_{10}125 - 3\log_{10}2$ (3 marks)

10. The diagram below represents a wedge whose cross – section is a right angle triangle.
 PQVU is a rectangle and the dimensions are as shown.



Calculate to 2 decimal places:-

- a) The length of PV (2 marks)
 b) The size of the angle between PV and plane PQRS. (2 marks)
11. a) Expand $(1 + x)^6$ upto the forth term. (1 mark)
 b) Using the binomial expansion in (a) above estimate the value of 1.9^6 (2 marks)
12. A transporter has two types of trucks to transport maize. Type A carries 2000bags whole type B carries 3000 bags per trip. The transporter has to transport 120,000 bags. He has to make not more than 50 trips. Type B trucks are to make atmost twice the number of trips made by type A. Taking x to be the number of trips made by type A truck and y to be the number of trips made by type 3. Write down all the inequalities representing this information. (3 marks)
13. The equation of a circle is $x^2 + y^2 - 4x + 8y = 5$. Find the centre and the radius of the circle. (3 marks)
14. Solve for x in the equation below using the completing the square method. (3 marks)
 $x^2 - 7x + 10 = 0$

15. Mr Sudan works for a company earning a basic salary of 30,000 and house allowance of 12,000. In a certain year the government charged tax on PAYE basis using the table below.

Income in Ksh per Month	Rate(% per Ksh)
1 – 10,000	5
10,001 – 20,000	10
20,001 – 30,000	20
Over 30,000	30

If Sudan is given a personal relief of sh. 3,000 per Month, find tax he pays in that month. **(3 marks)**

16. Triangle A'B'C' is the image of triangle ABC under a transformation matrix $T = \begin{pmatrix} 1 & 3 \\ 2 & 2 \end{pmatrix}$.
If the area of triangle A'B'C'D' is 25.6cm^2 , find the area of the object. **(3 marks)**

SECTION II(50 marks). Answer only five questions in this section in the spaces provided.

17. a)On the same diagram construct:-
 i)Triangle PQR such that $PQ = 9\text{cm}$, $PR = 7\text{cm}$ and triangle $RPQ = 60^\circ$ **(2 marks)**
 ii)The locus of a point M such that M is equidistant from P and Q. **(1mark)**
 iii)The locus of a point N such that $RN \leq 3.5\text{cm}$. **(1 mark)**
 b)On the diagram in part (a)
 i)Shade the region B, containing all the points enclosed by the locus on M and the locus of N such that $PM \geq QM$. **(2marks)**
 ii)Find the area of the region shaded in part (b) (i) above. **(4 marks)**
18. An examination involves a written test and a practical test. The probability That a candidate passes the written test is $\frac{6}{11}$. If the candidate passes the written test, then the probability of passing the practical test is $\frac{3}{5}$, otherwise it would be $\frac{2}{7}$.
 a)Illustrate this information in a tree diagram. **(2 marks)**
 b)Determine the probability that a candidate
 i) Passes both tests **(2 marks)**
 ii) passes the written test only **(2 mark)**
 iii) passes only one test **(2 marks)**
 v) fails both test **(2 marks)**
19. Mr Rao is a water supplier in a certain market. He has a tank which holds 20,000 litres.

The tank is being filled with water from two pipes P and Q. water flows at the rate of 150L/minute through pipe P and 100l/minute through pipe Q.

- a) If the tank is empty and the two pipes are opened at the same time, calculate the time taken to fill the tank. (3 marks)
- b) On a certain day Mr Rao started with an empty tank, opened pipes P and Q for 30 minutes, after which he opened pipe R to supply his customers. R supplies water at a rate of 20 litres per minute. Calculate the time it took to fill the tank. (7 marks)

20. Complete the table below by filling in the blank spaces. (2 marks)

x^0	0^0	30^0	60^0	90^0	120^0	150^0	180^0	210^0	240	270^0	300	330	360^0
$\cos x^0$	1.00		0.50			- 0.87		- 0.87					
$2 \cos \frac{1}{2} x$	2.00	1.93					0.00						

- a) On the grid provided using a scale of 1cm to represent 30^0 on the horizontal axis and 4 cm to represent 1 unit on the vertical axis draw the graph of $y = \cos x^0$ and $y = 2 \cos \frac{1}{2} x^0$ (4 marks)
- b) State the amplitude and period of $y = 2 \cos \frac{1}{2} x$ (2 marks)
- c) Use your graph to solve the equation $2 \cos \frac{1}{2} x - \cos x = 0$ (2 marks)

(GRAPH PAPER PROVIDED)

- 21.a) Taking the radius of the earth $R = 6371\text{km}$ and $\pi = \frac{22}{7}$, calculate correct to 2 d.p the distance between the two cities, A (60^0N , 29^0W) and B (60^0N , 31^0E) along the parallel of latitude. (3 marks)
- b) If it is 1200hrs at city A, what is the local time at city B? (3 marks)
- c) An aeroplane flew due South from a point P (60^0N , 45^0E) to point Q. The distance covered by the aeroplane was 800km. Determine the position of Q. (4 marks)
22. The marked price of a television set is 25,600. On cash payment a customer is given a discount of 5% on the marked price. The T.V can also be bought on hire purchase terms by paying a deposit of sh 12,640 and 16 equal Monthly installments of sh. 1450 each.
- a) Calculate
- Cash price of the machine (2 marks)
 - The hire purchase value (3 marks)
 - Calculate the rate of compound interest charged per Month for hire purchase terms. (4 marks)

IV) Find difference between cash price value and hire purchase value. (1 mark)

23. The table below shows masses of 100 form 4 students.

Mass Kg	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
No of students	4	6	10	14	22	24	14	6

Find:

a) Mean mass

(4 marks)

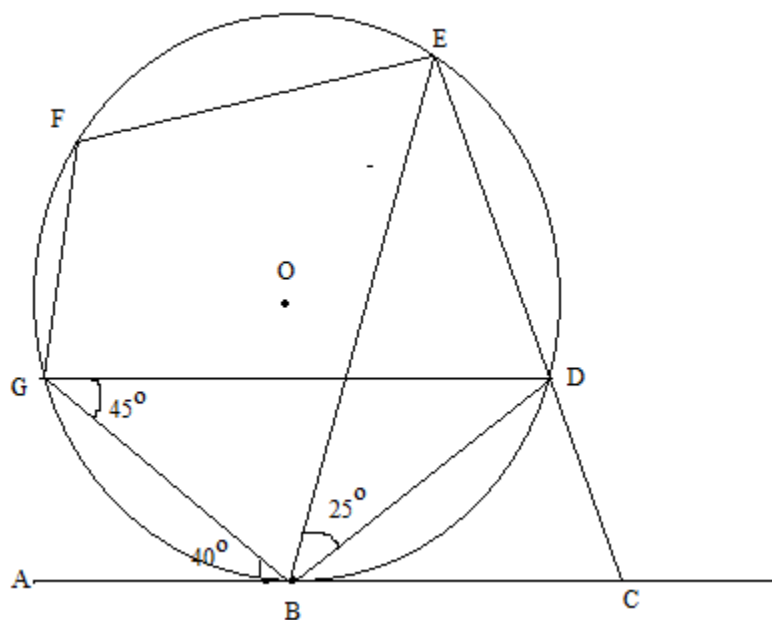
b) Variance

(5 marks)

c) Standard deviation

(1 mark)

24. In the figure below ABC is a tangent to the circle at B. Given that $\angle ABG = 40^\circ$, $\angle BGD = 45^\circ$ and $\angle DBE = 25^\circ$



Find the size of the following angles giving reasons in each case

a) $\angle BDG$

(2 marks)

b) $\angle DGE$

(2 marks)

c) $\angle EFG$

(2 marks)

d) $\angle CBD$

(2 marks)

e) $\angle BCD$

(2 marks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 6 MATHEMATICS PAPER 1

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO CANDIDATES

- a) Write your Name and Index Number in the spaces provided at the top of this page.
- b) Sign and write the date of examination in the spaces provided above.
- c) This paper contains TWO sections: section I and section II
- d) Answer all the questions in Section I and any FIVE questions from section II.
- e) All answers and working must be written on the question paper in the spaces provided below each question.
- f) Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
- g) Marks may be given for correct working even if the answer is wrong.
- h) Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINER'S USE ONLY:

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

Section II

17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL

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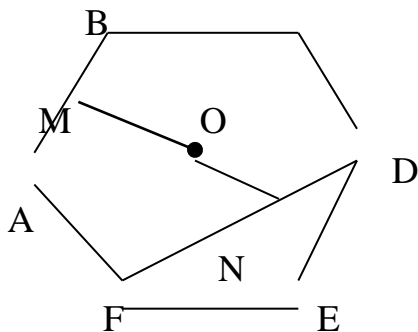
SECTION 1: (50 MARKS)

Attempt ALL Questions in this section

1. Evaluate: (3mks)

$$\frac{8 \times \frac{1}{3} \text{ of } 9 \div 2}{(12+2 \times 3) - \frac{2}{3} \text{ of } 144 \div 12}$$

2. The prime numbers less than 10 are multiplied to form a number.
(a) Write down the number formed. (2mks)
(b) State the total value of the first digit in the number formed in 2(a) above. (1mk)
3. A rhombus A B C D with its side 15cm and diagonal AC = 24cm. Find the other diagonal BD. (2mks)
4. The figure below is a regular hexagon. O is the centre and M is the mid point of AB.



Find angle: (i) EFD (1mk)
(ii) MNF (2mks)

5. Simplify the expression: (4mks)

$$\frac{4x^2 - xy - 3y^2}{32x^2 - 18y^2}$$

6. A pool of water with surface area of 0.8ha has a uniform depth of 4m. A pipe drains the pool at the rate of 400 litres per second. How many hours does it take to empty the pool? (2mks)
7. Evaluate, giving your answer to 1s.f figure: (3mks)

$$\frac{0.0065 \times 6.48}{\bullet \bullet}$$

0.27

8. In a class of boys and girls, the probability of selecting a girl at random is $\frac{2}{5}$. given that there are 18 boys in the class, calculate:-
(a) The number of students in the class. (1mk)
(b) The probability of choosing at random two students of the same sex. (2mks)

9. Solve the simultaneous inequality given below and represent the solutions on a number line.

$$2x + 3 \geq x - 4 > 3(x - 2)$$

(4mks)

10. The travel timetable below shows the departure and arrival time for a bus plying between two towns M and R, 300 kilometres apart.

TOWN	ARRIVAL	DEPARTURE
M		0830h
N	1000h	1020h
P	1310h	1340h
Q	1510h	1520h
R	1600h	

Calculate the average speed for the whole journey.

(3mks)

11. Simplify the following expression without using tables or calculator:

(3mks)

$$\frac{4 \cos 60^\circ + 16 \cos^2 45 + 2 \sin 30}{\sin^2 45}$$

12. Given that $PQ = \begin{bmatrix} 9 \\ 2 \end{bmatrix}$ and $OQ = \begin{bmatrix} 3 \\ -4 \end{bmatrix}$, determine:

OP and find the magnitude of OP giving your answer in surd form.

(3mks)

13. A tourist arrived from USA and changed his US \$1500 TO Ksh. He spent Ksh. 3000 per night in a hotel for 20 nights and a further Ksh. 9000 daily for the entire period. He left for South Africa having changed the balance to South African Rand.

Calculate the amount of South African Rands he left with, if the bank buys and sells currencies using the table below.

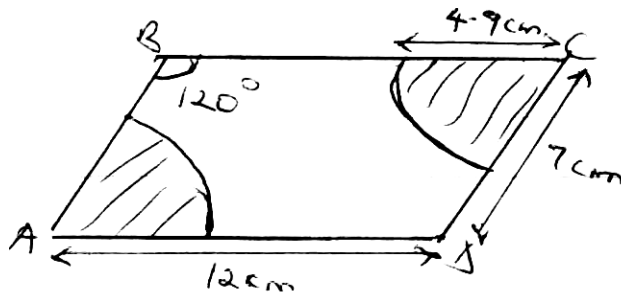
Currency	Buying	Selling
1 US Dollar (\$)	78.4133	78.4744
1 Sterling Pound (£)	114.1616	114.3043
1 South African Rand	7.8842	7.9141

14. Two similar containers can hold 1000ml and 8 litres of water respectively. The larger has a surface area of 800cm^2 . Find the surface area of the smaller container.

(3mks)

15. The diagram below represents a parallelogram. Calculate the area of the shaded region.

(2mks)



16. A flag post 10m long is fixed on top of a tower. From a point on horizontal ground, the angle of elevation of the top of flag post is 40° and the angle of depression from the bottom of the flag post is 33° . Taking 1cm represent 2m, determine by scale drawing the height of the tower.

(4mks)

SECTION II (50 MARKS)

Answer any five questions in this section

17. A group of choir members decided to raise 3600/= to buy a guitar. Each member was to contribute equal amount. In the preparation process five members transferred to another church, that meant the remaining contributors had to pay more to achieve the target.

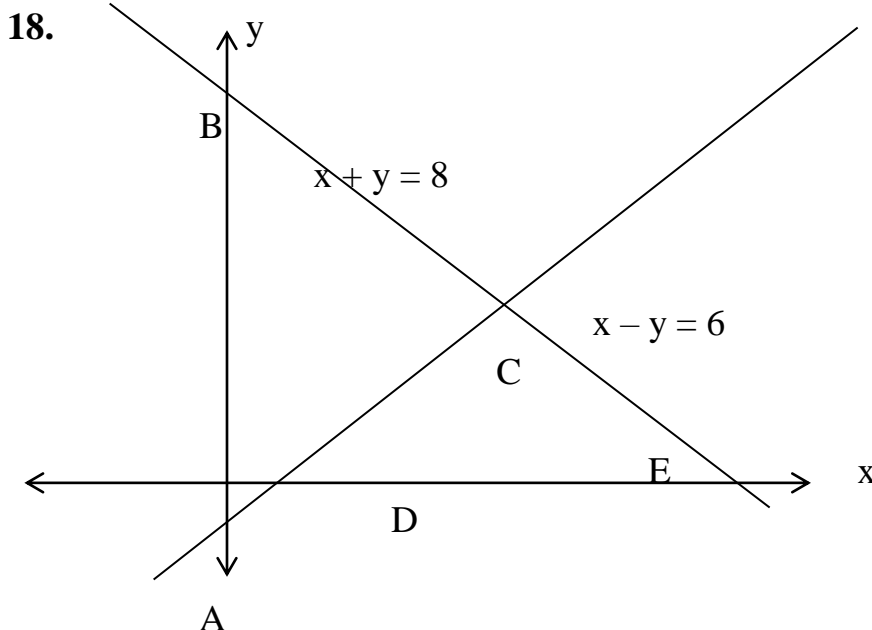
(a) Show that the increase in the contribution per member was:

Sh. 18,000 if n is the initial number of members.

$$n(n-5)$$

(b) If the increase in the contribution per member was sh. 24, what was the original contribution before the other members left?

(c) Calculate the percentage increase in the contribution before the others left.



The diagram above represent Cartesian plane.

Determine the:

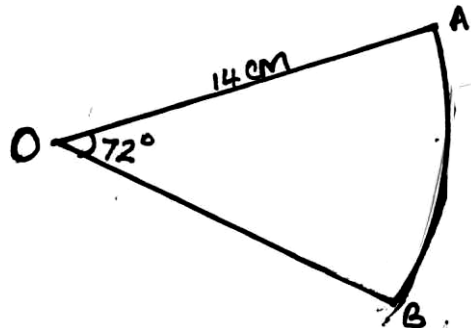
- (a) Coordinates of points A. (2mks)
- (b) Coordinates of points C. (3mks)
- (c) If a line passes through the point C and the origin, find the equation of the line. (3mks)
- (d) Coordinates of point D. (1mk)
- (e) Coordinates of point E. (1mk)

19. The table below shows the marks scored by form four students in a mathematical test.

Marks	$5 \leq \text{marks} \leq 14$	≤ 24	≤ 34	≤ 54	≤ 64	≤ 84	≤ 94
Frequency	3	10	22	72	87	98	100

- (a) State the modal class. (1mk)
- (b) Calculate the mean mark. (3mks)
- (c) Calculate the 70th mark. (3mks)
- (d) Draw a histogram to represent this information. (3mks)

20. The figure below shows a sector of a circle. If the radius $OA = 14\text{cm}$ and the angle $AOB = 72^\circ$.



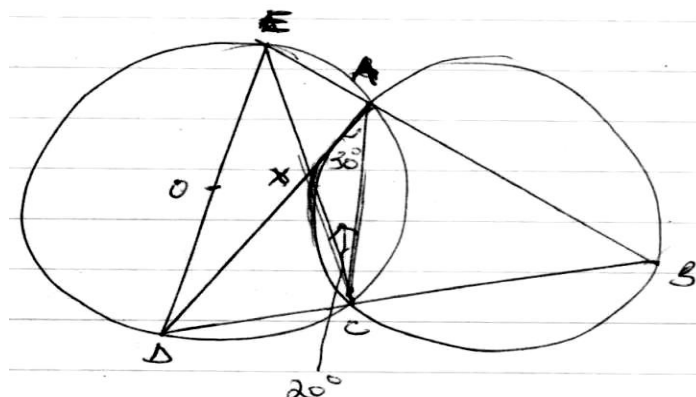
- (a) Calculate the area of the sector. (2mks)
 - (b) The sector is folded to form a cone. Calculate:-
 - (i) The radius of the cone formed. (2mks)
 - (ii) The volume of the solid formed. (3mks)
 - (c) A solid cone of same size in (b) above is melted down and casted into circular washers. Each washer has an external diameter of 4cm, internal diameter of $1\frac{1}{2}\text{ cm}$ and 0.3cm thick. Calculate number of washers made. (3mks)
21. A bus left Kisumu for Nairobi at an average speed of 60km/hr. After $1\frac{1}{2}$ hours another car left Kisumu for Nairobi along the same route at an average speed of 100km/h. If the distance between Kisumu and Nairobi is 500km, determine:-
- (a) (i) The distance of the bus from Nairobi when the car took off. (2mks)
 - (ii) The distance the car travelled to catch up with the bus. (4mks)

- (b) Immediately the car caught up with the bus, the car stopped for 25 minutes. Find the new average speed of which the car travelled in order to reach Nairobi at the same time as the bus. (to the nearest whole number). **(4mks)**

22. A metal R is an alloy of two metals X and Y. Metal X has a mass of 70g and a density of 16g/cm^3 . Metal Y has a mass of 19g and a density of 4g/cm^3 .

- (a) Calculate the density of the metal R. **(4mks)**
 (d) If metal R is divided into two equal parts and each half reinforced by adding metal X to get to initial volume. Find the density of the new alloy. **(4mks)**
 (e) The two metals are mixed in a ratio of 4:1 respectively. What is the density of the alloy? **(2mks)**

23.



The figure above A B C X and A C D E are cyclic quadrilaterals of two circles intersecting at A and C. D E O is a diameter of the circle, angle C A D = 30° and ACE = 20° .

Find the following angles, giving reasons for each answer.

- (i) $\angle BAC$ **(2mks)**
 (ii) $\angle ABC$ **(2mks)**
 (iii) $\angle CED$ **(2mks)**
 (iv) $\angle ADE$ **(2mks)**
 (v) $\angle AEC$ **(2mks)**

24.(a) Draw a regular pentagon PQRST of sides 7cm. On it draw a line AR such that it is a line of symmetry to the figure. **(4mks)**

(b) Locate a point M on AR such that M is equidistant from P and Q, hence measure the shortest distance of M from TS. **(2mks)**

(c) Shade the region within the figure such that a variable X must lie, given that X satisfies the following conditions: **(4mks)**

- (i) X is nearer to PT than to PQ.
 (ii) RX is not more than 7.5cm.
 (iii) Angle PXT is greater than 90° .

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 6 MATHEMATICS PAPER 2

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO CANDIDATES

- a) Write your Name and Index Number in the spaces provided at the top of this page.*
- b) Sign and write the date of examination in the spaces provided above.*
- c) This paper contains TWO sections: section I and section II*
- d) Answer all the questions in Section I and any FIVE questions from section II.*
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- f) Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
- g) Marks may be given for correct working even if the answer is wrong.*
- h) Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.*

FOR EXAMINER'S USE ONLY:

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

Section II

17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL

--

SECTION 1: (50 MARKS)

Answer ALL the Questions in this section in the spaces provided.

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

$$3 \sqrt[3]{\frac{(0.0246)^2 \times 142}{0.002 \times 1.14}}$$

2. Expand the expression: $(3\sqrt{2} + 5)(3\sqrt{2} - 5)$. Hence work out the following: (3mks)

$$\frac{4}{3\sqrt{2} + 5} - \frac{3}{3\sqrt{2} - 5}$$

3. Expand $(2 + \frac{1}{5}x)^8$ up to the term in x^3 . Use your expansion to evaluate $(2.04)^8$ correct to 4 decimal places. (4mks)

4. Evaluate without using mathematical tables or calculators: (2mks)

$$2 \log_{10} 5 - \frac{1}{2} \log_{10} 16 + 2 \log_{10} 40$$

5. Make r the subject in the formular: (3mks)

$$s = \frac{rt}{\sqrt{(r^2 - t)}}$$

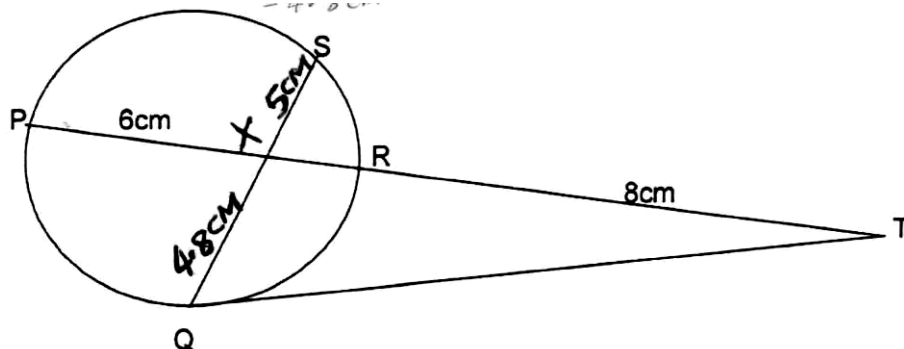
6. The n^{th} term of a sequence is $2n + 1$.

(i) State the first four terms of the sequence. (1mk)

(ii) Determine the sum of the first 40 terms of the series. (2mks)

7. If matrix $A = \begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix}$ Find B given that $A^2 = (A + B)$. (3mks)

8. In the figure below QT is a tangent to a circle at Q . $PXRT$ and QXS are straight lines. $PX = 6\text{cm}$, $RT = 8\text{cm}$, $QX = 4.8\text{cm}$ and $XS = 5\text{cm}$.



Find the length of:

(a) XR (2mks)

(b) QT (2mks)

9. A circle whose equation is $(x - 1)^2 + (y - k)^2 = 10$ passes through point $(2, 5)$. Find the coordinates of the two possible centres of the circle. (3mks)

10. A machine A can do a piece of work in 6 hours while machine B can do the same work in 9 hours. Machine A was set to do the work but after $3\frac{1}{2}$ hours it broke down and machine B did the rest of the work. Find how long machine B took to do the rest of the work. **(2mks)**
11. The marks of 80 students in a Mathematics test are shown in the table below.

Marks	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100
No. of students	8	10	15	14	11	8	7	5	2	0

Find the quartile deviation of the marks. **(4mks)**

(Give your answer to the nearest whole number)

12. Solve for x in the equation:

$$3\cos^2 x + \sin x + 1 = 0 \quad \text{For } 0 \leq x \leq 360 \quad \textbf{(3mks)}$$

13. A stone is thrown vertically upwards from Point O. After t seconds the stone is S metres from O. Given that $S = 29.4t - 4.9t^2$, find the maximum height reached by the stone. **(3mks)**

14. A blender mixes two brands of Juice A and B to obtain 70mls of the mixture worth Ksh. 165 per litre. If brand A is valued at Ksh. 168 per 1 litre bottle and brand B at Ksh. 153 per 1 litre bottle, calculate the ratio in which the brands A and B are mixed. **(2mks)**

15. A quantity y varies partly as the square of X and partly as X . When $y = 20$, $x = 2$ and when $y = 36$, $x = 3$. Determine the equation relating y and x . **(3mks)**

16. The image of a point $Q(1,2)$ after a translation is $Q^1(-1,2)$. What is the co-ordinate of the point R whose image is $R^1(-3, -3)$ after undergoing the same translation?

SECTION II (50 MARKS)

Answer any five questions in this section

17. The table below shows monthly income tax rates.

Monthly taxable pay K£	Rate of tax Kshs per K£
1 – 342	2
343 – 684	3
685 – 1026	4
1027 – 1368	5
1369 – 1710	6
Over 1710	7

A government employee earns a monthly salary of Ksh. 24,200 and is provided with a house at a nominal rent of Ksh. 700 per month.

(a) Calculate the employee's taxable pay in K£. **(2mks)**

(b) Calculate the total tax. **(4mks)**

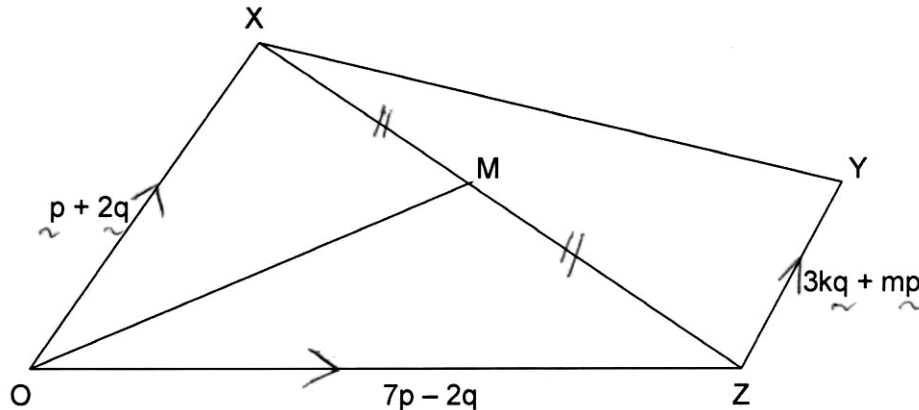
- (c) The employee is entitled to a personal relief of Kshs. 1056 per month; and a monthly insurance relief at the rate of 15% of the premium paid. Calculate the net tax paid by the employee if the monthly premium amounts to Kshs. 2,400 for life insurance cover.

(3mks)

- (d) Calculate his / her net pay that month.

(1mk)

18. In the diagram M is the midpoint of XZ. $OX = p + 2q$. $OZ = 7p - 2q$ and $ZY = 3kq + Mp$ where k, and m are constants.



- (a) Express the following in terms of p and q.

(i) XZ

(2mks)

(ii) XM

(1mk)

(iii) OM

(1mk)

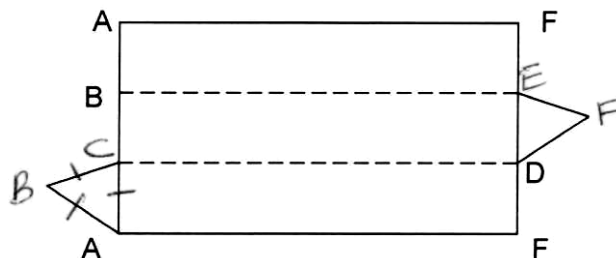
- (b) Express OY in terms of p, q, k and m.

(2mks)

- (c) If y lies on OM produced with $OY:OM = 3:2$. Find the values of k and m.

(4mks)

19. The figure below shows a net of solid. The dimensions $AC = CB = BA = 5\text{cm}$, $AF = 10\text{cm}$ and the triangles ABC and DEF are equilateral and equal.



- (a) Taking BCDE as the base of the solid, draw a proportionately well labelled solid that can be made from the net.

(2mks)

- (b) Name the solid formed.

(1mk)

- (c) Using the figure, calculate:-

(i) The angle between line CF and the plane BCDE.

(3mks)

(ii) The angle between lines BD and DF.

(3mks)

(iii) The angle between the planes BCDE and CDFA.

(1mk)

20. The position of two towns P and Q are given to the nearest degree as P(45°N , 20°W) and Q(45°N , 160°E).

Find:

(a) Shortest distance between the two towns in:-

(i) Kilometres (take radius of the earth as 6370km) (3mks)

(ii) Nautical miles. (Take $\pi = \frac{22}{7}$) and the earth's radius = 6370km. (2mks)

(b) A ship leaves town P and sails due east for 120 hours to another town R at an average speed of 27 knots.

(i) Calculate the distance between the two towns in nautical miles. (2mks)

(ii) Find the position of town R. (3mks)

21. The parallelogram OABC has vertices (0,0), (1,0), (4,2), (3,2) respectively.

(a) (i) OABC is mapped onto $O_1A_1B_1C_1$ by a reflection on the line $y = x$. Draw and label the image $O_1A_1B_1C_1$. (2mks)

(ii) State the matrix which represent this reflection. (1mk)

(b) $O_1A_1B_1C_1$ is mapped onto parallelogram $O A_2B_2C_2$ by a rotation through 180° about O.

(i) Draw and label $O A_2B_2C_2$ on your diagram. (2mks)

(ii) Describe the transformation that maps $O A B C$ onto $O A_2B_2C_2$ (1mk)

(c) OABC is mapped onto the rectangle $O A_3B_3C_3$ by a shear X axis invariant. If the co-ordinates of B_3 are (1,2), find:-

(i) The co-ordinates of C_3 . (2mks)

(ii) The matrix representing the shear. (2mks)

22. A farmer has at least 50 acres of land on which he plans to plant potatoes and cabbages. Each acre of potatoes requires 6 men and each acre of cabbages requires 2 men. The farmer has 240 men available and he must plant at least 10 acres of potatoes. The profit on potatoes is Ksh. 1000 per acre and on cabbages is Ksh. 1200 per acre. If he plants x acres of potatoes and y acres of cabbages:

(a) Write down three inequalities in x and y to describe this information. (3mks)

(b) Represent these inequalities graphically. (4mks)

(GRAPH PAPER PROVIDED)

(c) Use your graph to determine the number of acres for each crop which will give maximum profit and hence find the maximum profit. (3mks)

23.(a) Complete the table below for the function:

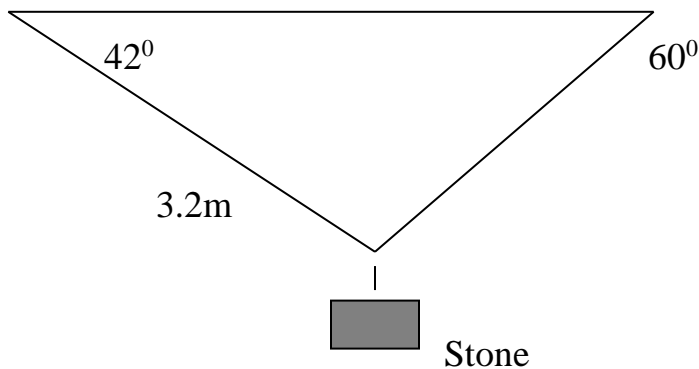
$y = x^2 - 3x + 5$	(2mks)						
x	2	3	4	5	6	7	8
y							

- (b) Use the mid-ordinate rule with six ordinates to estimate the area enclosed by the curve of the functions $y = x^2 - 3x + 5$, x - axis and the lines $x = 2$ and $x = 8$. **(3mks)**
- (c) Find the exact area of the region described in (b) above. **(3mks)**
- (d) If the mid-ordinates rule is used to estimate the area under the curve between $x = 2$ and $x = 8$, what will be the percentage error in the estimation? **(2mks)**

24. In a triangle ABC, $AB = 17\text{cm}$, $BC = 28\text{cm}$ and $AC = 34\text{cm}$.

Find:-

- (a) (i) $\angle BAC$ **(3mks)**
- (ii) Using the angle BAC in (a) (i) above, find the area of triangle ABC. **(2mks)**
- (iii) The radius of its circumcircle that can be drawn on the triangle. **(2mks)**
- (b) A stone is hung from a horizontal beam by two strings. The longer string makes an angle of 42° with the horizontal and is 3.2m long. If the shorter string makes an angle of 60° with the horizontal, calculate its length. **(3mks)**



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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 7 MATHEMATICS PAPER 1

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO CANDIDATES

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

FOR EXAMINERS USE ONLY

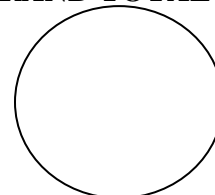
SECTION I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

SECTION II

17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL



SECTION I 50 MARKS

Answer all questions

1. Without using tables, evaluate $\frac{0.51 \times 5700}{6.8 \times 0.0095}$ giving the answer in standard form. (3mks)

2. Find the value of t in the following equation $81^{-1} \times \left(\frac{1}{27}\right)^t = \frac{1}{243^{-1}}$ (3mks)

3. Simplify the expression (3mks)

$$\frac{x^2 - 9y^2}{2x^2 - 7xy + 3y^2}$$

4. Evaluate using tables of reciprocals and cubes only expressing your answer to 4 significant figures

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

5. Simplify; $\frac{2}{3}$ of $5\frac{2}{5} - 2\frac{3}{10}$ (3mks)

$$\frac{3}{5} \div 4\frac{1}{2} + 1\frac{3}{5}$$

6. Find the equation of a line which passes through the point (2, 3) and is perpendicular to $y = 3x - 1$. Giving your answer in the double intercepts form (3mks)

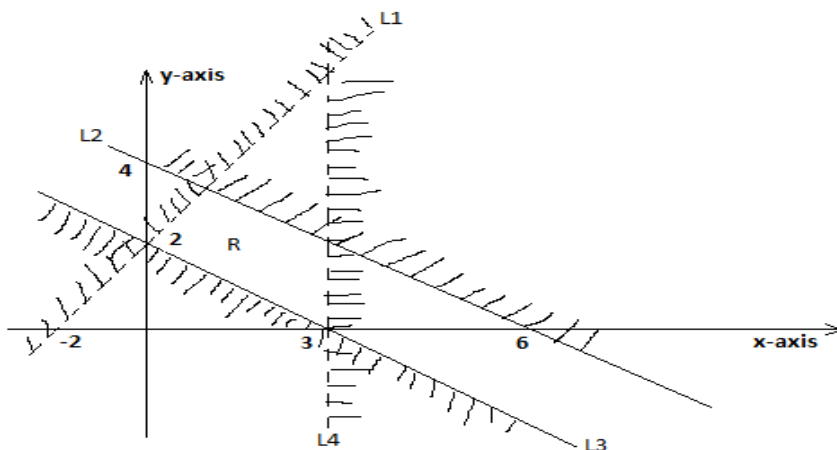
7. George received 10,000 Euros from his brother who stays in France .He sent to his sister who stays in Japan 10,000 Yen .In addition George bought a car worth sh.200,000.

Exchange rates :

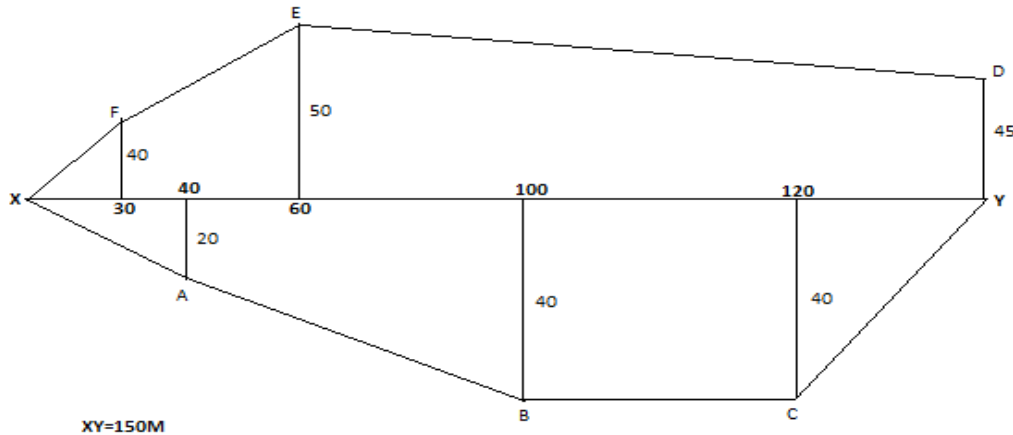
	Buying	Selling
1 Euro	73.4226	73.52953
100 Japanese yen	62.8011	62.8822

How much was left. (3marks).

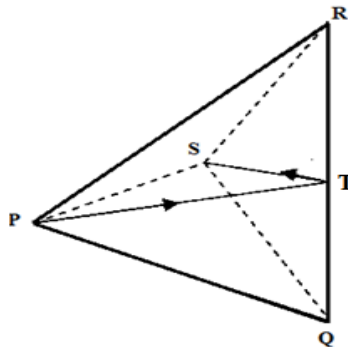
8. Write down four inequalities which fully describe the unshaded region R in the figure S below (4mks)



9. A line $PQ = 12.5\text{cm}$. By using another line, divide PQ into nine equal parts. (3mks)
10. The sum of the interior angles of a polygon is 1980° . Find the number of sides the polygon has. (3mks)
11. The diagram below is a sketch of a rice field (not drawn to scale), use it to generate a surveyor's field book. (All measurements are in metres) (4mks)



12. A boy walk directly from point Q towards the foot of a vertical flag post 200m away. After conveying a distance of 140m , he observes the angle of elevation of the top of the flag post is 75° . Calculate the angle of depression of point Q from the top of the flag post. (3mks)
13. Two similar blocks have masses of 729g and 216g respectively. If the surface area of the smaller block is 300cm^2 , calculate the surface area of the larger block. (3mks)
14. Using trapezoidal rule with 6 ordinates, find the area bounded by the curve $y=2x^3 - 5$, the x -axis and the lines $x=2$ and $x=8$. (3mks)
15. Kassim has a money box containing 100 mixed shs 5 and shs 10 coins with a total value of shs 600. How many of each type of coin does the box contain. (3mks)
16. The figure below shows a regular tetrahedron $PQRS$ of edges 4cm . Draw its net and measure the length of the straight path of PS through the midpoint T over the edge QR . (3mks)



SECTION II (50 MARKS)

(Answer ANY FIVE questions in the spaces provided)

17. Complete the table below for the equation $y=2x^2+2x-8$ by filling the blank space. (2mks)

x	-5	-4	-3	-2	-1	0	1	2	3	4
y	32			-4		-8			16	

a). On the graph provided below, plot the graph of $y=2x^2+2x-8$. (4mks)

(use the scale: y-axis=1unit, x-axis=1unit)

GRAPH PAPER PROVIDED)

b) Use your graph to solve:

i) $2x^2+2x-8=0$ (1mk)

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

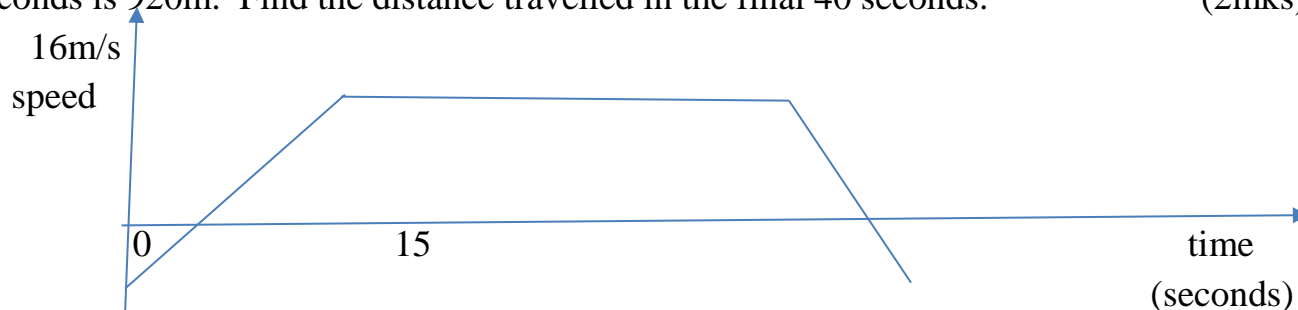
18. a) a bus left Kisumu at 9.30 am towards Nairobi at an average speed of 81km/hr. A matatu left Nairobi for Kisumu at 10.10 a.m at an average speed of 72km/hr. The distance between Kisumu and Nairobi is 360km. Determine:

(i) The time taken before the two vehicles met. (3mks)

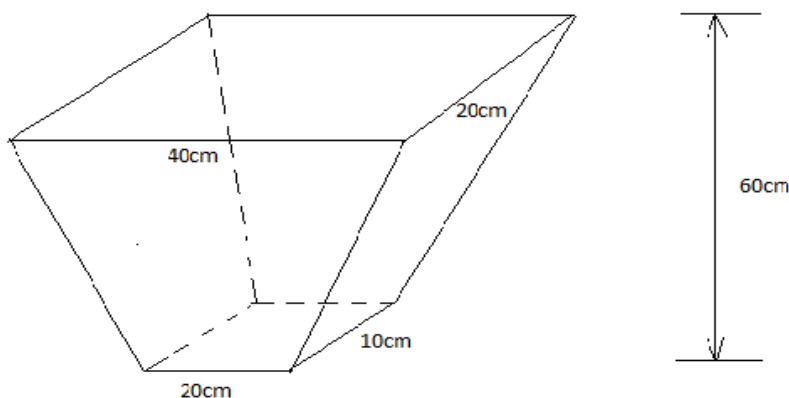
(ii) The distance between two vehicles 40 minutes after meeting. (2mks)

(iii) A car left Kisumu towards Nairobi at 9.50am at an average speed of 90km/hr. Determine the time the car caught up with the bus. (3mks)

(b) The figure below shows speed time graph of a journey. If total distance travelled in 80 seconds is 920m. Find the distance travelled in the final 40 seconds. (2mks)



19. The Figure shows a frustum of a right pyramid open container for storing water.



Calculate:

- a) The height of the pyramid from which the frustum was cut from. (2mks)
- b) The surface area of the frustum (4mks)
- c) The capacity of the frustum in litres (4mks)

20. The table below represent marks in percentage scored by 50 students in a class

Marks	Frequency
40-44	6
45-49	4
50-54	7
55-59	6
60-64	12
65-69	4
70-74	5
75-79	3
80-84	3

- a) State the modal class (1mk)
- b) Estimate:
 - (i) The mean mark (2mks)
 - (ii) The median (3mks)
 - (iii) On the grid provided draw a frequency polygon to represent the above information. (4mks)

(GRAPH PAPER PROVIDED)

21. Given that the column vectors

$$p = \begin{pmatrix} -3 \\ 4 \end{pmatrix}, q = \begin{pmatrix} 16 \\ -4 \end{pmatrix}, r = \begin{pmatrix} 9 \\ 6 \end{pmatrix} \text{ and that } a = 2p - \frac{3}{4}q + \frac{2}{3}r$$

Express a as column vector and hence calculate its magnitude (4mks)

b) Given that the midpoints of PQ is (-3,1) and Q (7,5), obtain the co-ordinates of P (3mks)

c) A translation $T\left(\begin{pmatrix} 2 \\ 1 \end{pmatrix}\right)$ maps triangle ABC onto triangle A¹B¹C¹. Given the co-ordinates A(2,3), B(2,5) and C(4,4). Find the co-ordinates of A¹B¹ and C¹. (3mks)

22. The coordinates of triangle ABC are A(1, 1), B(3, 1) and C(1, 3).

- (a) Plot the triangle ABC. (1mk)
- (b) Triangle ABC undergoes a translation vector $\begin{pmatrix} 2 \\ 2 \end{pmatrix}$. Obtain the image of A'B'C' under the transformation, write the coordinates of A'B'C'. (2mks)

- (c) $A'B'C$ undergoes a reflection along the line $X=0$, obtain the coordinates and plot on the graph points $A''B''C''$ under the transformation. **(2mks)**
- (d) The triangle $A''B''C''$ undergoes an enlargement scale factor -1, centre origin. Obtain the coordinates of the image $A'''B'''C'''$. **(2mks)**
- (e) The triangle $A'''B'''C'''$ undergoes a rotation centre (1, -2) angle 120° . Obtain the coordinates of the image $A''B''C''$. **(2mks)**
- (f) Which triangles are directly congruent? **(1mk)**
(graph papers provided)
23. 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 $t = 8$. **(2mks)**
- (b) The velocity of the particle when $t = 10$. **(3mks)**
- (c) The values of t when the particle is momentarily at rest. **(3mks)**
24. A pilot intends to fly from A to D through B and C, B is 750km from A and on a bearing of $N50^\circ E$. C is on a bearing of $N 40^\circ W$ from B and their distance apart is 600km. D is on a bearing of $S 85^\circ W$ from C and at a distance of 1050km.
- a) Using the scale of 1cm for 100km, show the flight route. **(4mks)**
- b) If the pilot on its way back decides to fly directly from D to A;
- i) By use of compass bearing find the direction of A from D **(1mk)**
- ii) Find the distance from D to A in kilometers. **(1mk)**
- iii) The plane flies at 500km/h. If it leaves D at 9.00a.m at what time did it arrive at A **(2mks)**
- d) i) Using your diagram in (a) above, (i) find the distance between A and C **(1mk)**
- ii) Find the compass bearing of A from point C **(1mk)**

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 7 MATHEMATICS PAPER 2

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO CANDIDATES

- Write your name and Admission number in the spaces provided at the top of this page.
- This paper consists of two sections: Section I and Section II.
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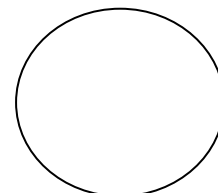
SECTION I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

SECTION II

17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL



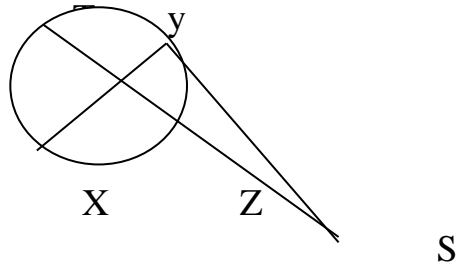
SECTION I 50 MARKS

Answer all questions

1. Solve for x in the equation $-2x^2 + x + 36 = 0$ using completing the square method
(3mks)
2. Simplify by rationalizing the denominator in $\frac{4-\sqrt{2}}{3+\sqrt{2}}$ leaving your answer in the form $a+b\sqrt{c}$ where a, b and c are integers.
(3mks)
3. Find the value of x in the equation $\cos(3x - 180^\circ) = \frac{\sqrt{3}}{2}$ in the range listed below.
 $0^\circ \leq x \leq 360^\circ$
(3mks)
4. Draw a line $AB=4\text{cm}$, P is a variable point in the plane of the paper, above AB , such that angle $APB = 60^\circ$ and the area of triangle $APB = 6\text{cm}^2$. Using a ruler and a pair of compasses only find the locus of P .
(3mks)
5. Expand and simplify the binomial $\left(2 + \frac{3}{x}\right)^5$. Hence use the first four terms of your expansion to find the value of $(2.5)^5$
(3mks)
6. The length and breadth of a rectangular floor garden were measured and found to be 4.1m and 2.2m respectively. Find the percentage error in its area.
(3mks)
7. Solve for x in the equation $3(\log x)^2 - \log x^5 + 2 = 0$
(3mks)
8. Make s the subject of the formulae in the following; $sa = \sqrt{\frac{s^2 + q}{t^2}}$
(3mks)
9. Each member of a class take one and only one of the three foreign languages: French, German and Spanish. 15 pupils take French, 9 take German and 6 take Spanish. Two pupils are chosen at random. Represent the information in a tree diagram hence find the probability that both pupils take different subjects.
(3mks)
10. The amount of oil used by a ship travelling at a uniform speed varies jointly with the distance and the square of the speed. If the ship uses 200 barrels of oil in travelling 200 miles at 36 mile per hour, determine how many barrels of oil are used when the ship travels 360 miles at 18 miles per.
(3mks)
11. Use logarithms to evaluate:
(4mks)

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

12. The figure below shows a circle of diameter XY. Chord TZ intersects XY at C. A tangent to the circle at Y meets TZ produced at S.



Given that $TC = 14$ cm, $CY = 4$ cm and $YS = 7.5$ cm. calculate the length of :

- a) CS (1mk)
 - b) XC (2mks)
13. Determine the values of x for which the matrix $\begin{pmatrix} 2x & x^2 \\ 2 & 1 \end{pmatrix}$ has no inverse (3mks)
14. Mr. Kimbo, a local retailer bought imported rice at sh. 56 per kilogram and local rice at sh. 48 per kilogram. He wants to mix the two types of rice so as to make a profit of 20%. If he sold the mixture at sh.120 per 2 kilogram packet, find the ratio the two types of rice was mixed. (3mks)
15. The sixth term of a geometric progression is 16 and the third term is 2. Determine the common ratio and the first term. (3mks)
16. The equation of a circle is given by $x^2 + 4x + y^2 - 2y - 4 = 0$. Determine the centre and radius of the circle. (3mks)

SECTION II

(Answer ANY FIVE questions in the spaces provided)

17. The table alongside shows the rates of taxation in a certain year.

Income in K£p. a	Rate (Sh. Per K£)
1 – 3900	2
3901 – 7800	3
7801 – 11700	4
11701 – 15600	5
15600 – 19500	7
Above 19500	9

In that year Mr. Kariuki at teacher at Kangaru High School was earning a basic salary of Ksh. 27 000 per month. In addition he was entitled to other taxable allowances totalling to 11 000 per month and a personal relief of Ksh 1056 per month. He lives in teachers' quarters where he is paying a nominal rent of Ksh. 3 500 per month.

- (a) Calculate how much income tax Mr. Kariuki is paid per month. **(4 marks)**
- (b) Mr. Kariuki's other deductions per month were co-operative society contribution of sh 2500 and loan repayment of sh. 3000, calculate his net salary per month. **(3 marks)**
- (c) Later the same year Mr. Kariuki was transferred to another school where he earned hardship allowance equivalent to 30% of his basic salary. On top of the deduction in (b) above, he also had a deduction of sh 2700 per month to KCT. Calculate the percentage change in his net salary per month **(3 marks)**
18. Given that $y = 2\sin x + \cos \frac{1}{2}x$, complete the table below for the missing values of y , correct to 1 decimal place **(2mks)**

X°	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
$Y = \sin 2x + \cos \frac{1}{2}x$	1.0	1.8			-0.4	-0.6			0.4	-0.7			-1.0

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

(GRAPH PAPER PROVIDED)

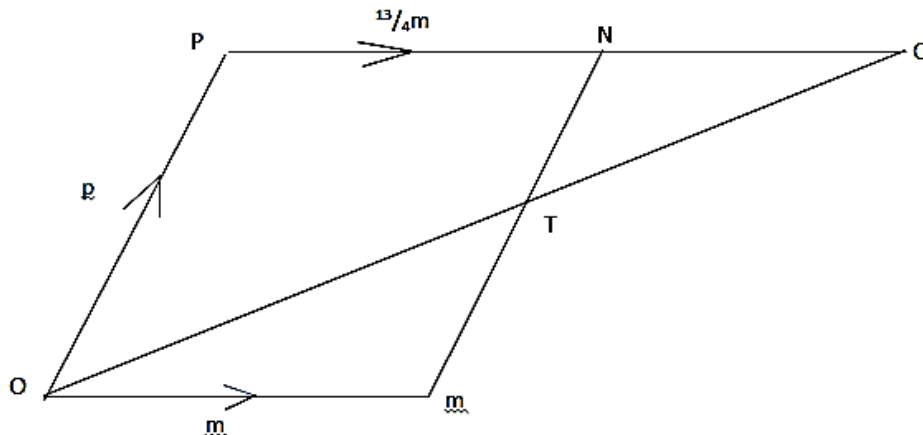
(c) Use the graph to estimate

(i) The minimum value of y **(1mk)**

(ii) The value of x for which

$$\frac{1}{2}\sin 2x + \frac{1}{2}\cos \frac{1}{2}x \geq 0.25 \quad \textbf{(3mks)}$$

19. Quadrilateral **OMNP** is such that **OM = m**, **OP = p** and **PN = $\frac{13}{4}m$** . PN is produced to Q such that **PN: PQ = 13:15**. T is a point on MN such that **MN = 3TN**



(a) Express in terms of m and p

(i) OT

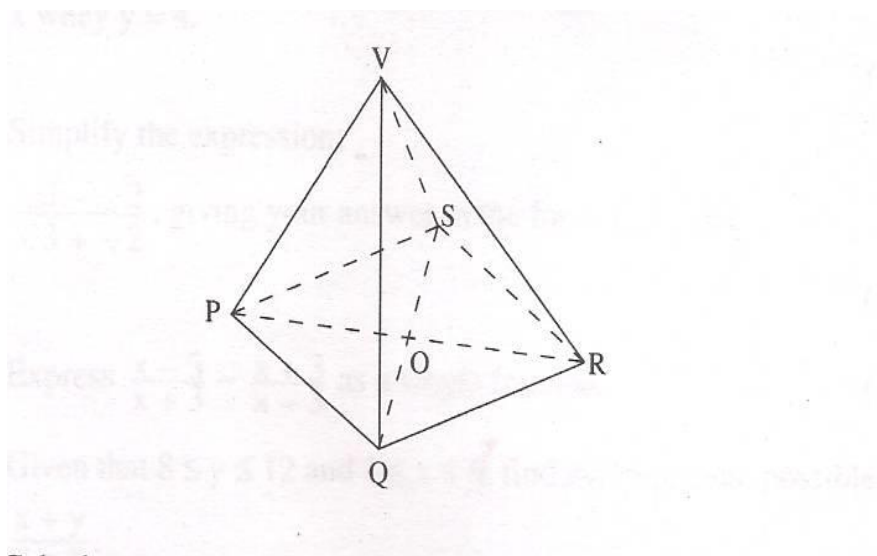
(2mks)

(ii) PQ (2mks)

(iii) OQ (2mks)

(b) Show that O, T and Q are collinear. (4mks)

20. The figure below represents a right pyramid on a square base PQRS of side 12 cm. O is the centre of the base and VO = 14 cm.



Calculate;

(a) The length of VP to 1 decimal place (3 marks)

(b) The angle which VP makes with the base PQRS (2 marks)

(c) The surface area of the pyramid to 1 decimal place (3 marks)

(d) The volume of the pyramid (2 marks)

21. The table shows the goods (P) produced by a certain factory in time (t) since 2010 is believed to obey a law of the form $P = kA^t$ where k and A are constants and t is time in years.

t	2010	2011	2012	2013	2014	2015	2016
P	5000	6080	7400	9010	10960	13330	16200

a) Express the law $P = kA^t$ where k and A are constants and t is time in years in the linear form $y = mx + c$ and fill the table appropriately. (3mks)

b) Plot a suitable straight line graph (GRAPH PAPER PROVIDED) (4mks)

c) Use the graph above to find the values of A and k. (3mks)

22. A small scale farmer wishes to buy some sheep and goats for rearing. A sheep costs sh.400 and a goat costs sh.300. The farmer has enough space for only 20 animals and may spend at most sh.6800. The number of goats should not exceed twice the number of sheep.

a) By letting x and y to represent the number of sheep and goats he can buy respectively, write down all inequalities from the above information. (4mks)

b) Represent the inequalities on the grid provided. (4mks)
(GRAPH PAPER PROVIDED)

c) From your graph; find the maximum number of animals he can buy at the lowest cost. (2mks)

23.(a) An aeroplane flies from town $A(20^{\circ}N, 60^{\circ}W)$ to town $B(20^{\circ}N, 20^{\circ}E)$. (Taking $R = 6400\text{km}$, $\pi = 3.142$) If it then flies due north from town B to town C , 420km away, calculate correct to the nearest degree, the latitude of town C . (3mks)

(b) Calculate the shortest distance in km between towns $P(60^{\circ}N, 40^{\circ}W)$ and $Q(60^{\circ}N, 30^{\circ}E)$ giving your answer to 2 decimal places (2mks)

(c) The local time at town $T(33^{\circ}N, 15^{\circ}W)$ is 1045 hours. What is the local time at $Q(50^{\circ}N, 30^{\circ}E)$? (2mks)

24. Use Trapezoidal rule to find the area between the curve. $y = x^2 + 4x + 4$, the x -axis and the ordinates $x = -2$ and $x = 1$ (Use 7 ordinates)

a) Complete the table correct to 2 d.p. (2mks)

x	-2	-1.5	-1	-0.5	0	0.5	1
y							

b) Find the area enclosed by the curve, the x -axis, lines $x = -2$ and $x = 1$. (3mks)

c) Use integration to find the exact area and hence find the percentage error in your approximation. (5mks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 8 MATHEMATICS PAPER 1

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

Instructions to candidates

- 1. Write your name, index and class number in the spaces provided above.
- 2. The paper consists of two sections: section I and section II.
- 3. Answer all the questions in section I and any five in section II
- 4. Section I has sixteen questions and section two has eight questions
- 5. All answers and working must be written on the question paper in the spaces provided below each question.
- 6. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question
- 7. KNEC Mathematical table and silent non-programmable calculators may be used.

For examiner’s use only

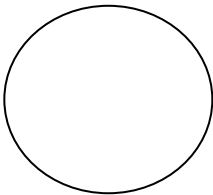
Section I

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

Section II

Grand Total

17	18	19	20	21	22	23	24	total



SECTION I

Answer all questions in this section.

1. Without using a calculator or mathematical table evaluate: (3 marks)

$$\frac{2\frac{1}{5} + \frac{2}{3} \text{ of } 3\frac{3}{4} - 4\frac{1}{6}}{1\frac{1}{4} - 2\frac{2}{5} \div 1\frac{1}{3} + 3\frac{3}{4}}$$

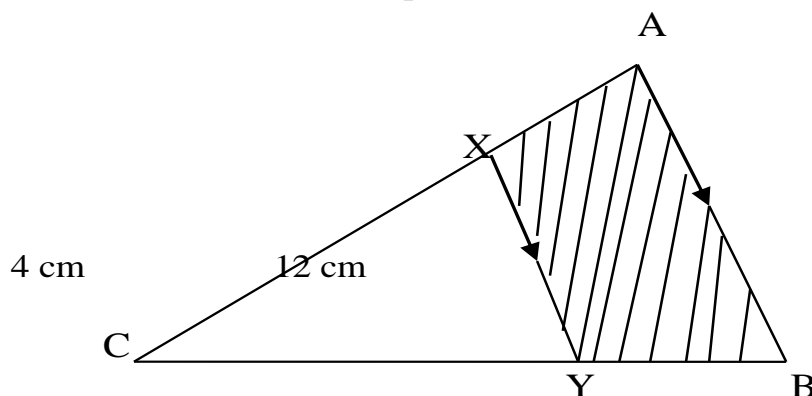
2. Simplify: (3 marks)

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

3. A straight line passes through the point $(-3, -4)$ and is perpendicular to the line whose equation is $3x + 2y = 11$ and intersects the x-axis and y-axis at points A and B respectively. Find the length of AB. (3 marks)
4. Evaluate using squares, cubes and reciprocal tables. (4 marks)

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

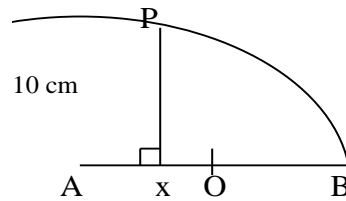
5. Given that $2 - 5x \leq \frac{1}{3}(x + 7) \leq 6 - \frac{1}{3}x$ and that x is an integer, find the sum of the smallest and the largest value of x . (3 marks)
6. Makau and Kilonzo live 20km apart. Makau leaves home at 10:00 am and walks to meet Kilonzo who started walking at 9:30 am to meet Makau. The speed of Makau and Kilonzo are in the ratio of 3:4. If they met at 11:30 am find their speeds. (3 marks)
7. In the figure below, lines AB and XY are parallel.



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

8. Given that $\log a = 0.30$ and $\log b = 0.48$ find the value of $\log \frac{b^2}{a}$. (2 marks)

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

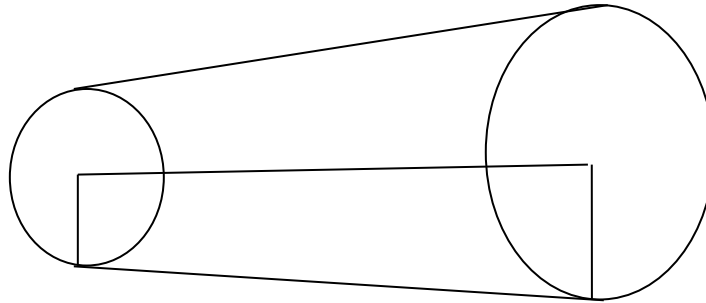


10. The gradient function of a curve that passes through the point (-1,-1) is $2x + 3$. Find the equation of the curve. **(3 marks)**
11. Evaluate: **(3 marks)**

$$\frac{\left(\frac{1}{27}\right)^{1/3} x (256)^{1/2} x 3^6}{(729)^{-1/3} x 72^2}$$

12. Estimate the area bounded by the curve $y = \frac{1}{2}x^2 + 1$, $x = 0$, $x = 3$ and the x - axis using the mid-ordinate rule. Use three strips. **(3 marks)**
13. ABCD is a rhombus. The measure of angle ABC is 150° . The diagonals of the rhombus intersect at E. The shorter diagonal measures 10cm. Calculate the length of the sides of the rhombus to the nearest integer hence calculate the area of the rhombus. **(3 marks)**
14. Three police posts are such that Q is on a bearing of 210° and 12 km from P while R is on a bearing of 150° and 8 km from P.
- (a) Using a suitable scale, draw a diagram to represent the above situation. **(2 marks)**
- (b) From the scale drawing determine:
- (i) the bearing of Q from R **(1 mark)**
- (ii) the distance of R from Q. **(1 mark)**
15. A student expands $(x - y)^2$ incorrectly as $x^2 + y^2$. Find his percentage error if he used this incorrect expansion for $x = 4$ and $y = -5$. Give your answer correct to 2 d.p. **(3 marks)**

16. A pulley is made up of two wheels of radii 6 cm and 9 cm respectively and the distance between their centres is 18 cm.



If a belt passes round the two pulleys, find its length.

(4 marks)

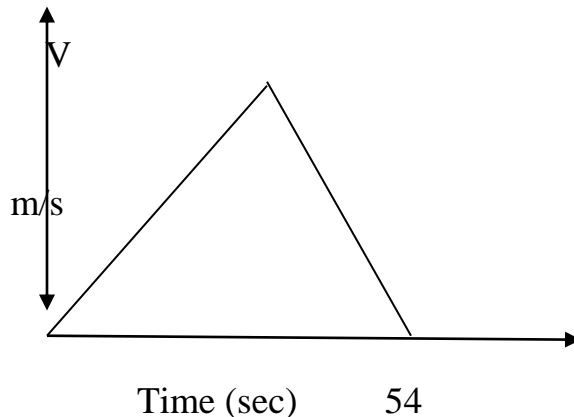
SECTION II

Answer any five questions in this section.

17. A circular lawn is surrounded by a path of uniform width of 7m. The area of the path is 21% that of the lawn.
- (a) Calculate the radius of the lawn. **(4 marks)**
- (b) Given further that the path surrounding the lawn is fenced on both sides by barbed wire on posts at intervals of 10 metres and 11 metres on the inner and outer sides respectively. Calculate the total number of posts required for the fence. **(4 marks)**
- (c) Calculate the total cost of the posts if one post costs sh 105. **(2 marks)**
18. A frustum with a regular pentagonal base is such that its top is of side 12cm and bottom is of side 24cm. If its perpendicular height is 20cm. Calculate:
- (a) The length of the slant edge. **(5 marks)**
- (b) The volume of the frustum. **(5 marks)**
19. Four trucks A, B, C and D take 10 days to transport 42,000 bags of maize to a depot. However, trucks A and B together take 30 days to transport the same number of bags while trucks C and D together take 15 days. Truck A carries $1\frac{1}{2}$ times the number of bags B carries and C carries $1\frac{4}{5}$ times as much as D.
- (a) Determine the number of bags of maize transported by each truck per day. **(5 marks)**
- (b) All the trucks A, B, C and D work together for 5 days, after which truck C and D are withdrawn. A and B work together for another 5 days after which truck A breaks down. How long does truck B take to complete the rest of the remaining bags? **(5 marks)**
20. Eunice bought some oranges worth Ksh 45, while Sharon spent the same amount of money but bought the oranges at a discount of 75 cents per orange.

- (a) If Eunice bought an orange at Sh x, write down a simplified expression for the total number of oranges bought by Eunice and Sharon. **(3 marks)**
- (b) If Sharon bought 2 more oranges than Eunice. Find how much each spent on an orange. **(5 marks)**
- (c) Find the total number of oranges bought by Eunice and Sharon. **(2 marks)**

- 21.(a) The figure shows a velocity time graph of an object which accelerates from rest to a velocity V m/s then decelerates to rest in a total time of 54 seconds. If the whole journey is 810 m,



- (i) Find the value of V . **(2 marks)**
- (ii) Find the deceleration given the initial acceleration is $1\frac{2}{3} \text{ m/s}^2$. **(2 marks)**
- (b) A bus left town x at 10:45 am and travelled towards town Y at an average speed of 60 km/hr. A car left town X at 11:15am on the same day and travelled along the same road at an average speed of 100 km/hr. The distance between town X and town Y is 500 km.
- (i) Determine the time of 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)**
22. The velocity of a particle t seconds after passing a fixed point O, is given by $V = at^2 + bt$ m/s, where a and b are constants. Given that its velocity is 2 m/s when $t = 1$ sec and it returns to 0 when $t = 4.5$ secs, calculate;
- (a) The values of a and b . **(4 marks)**
- (b) Hence find;
- (i) The values of t when the particle is instantaneously at rest. **(2 marks)**
- (ii) The total distance travelled by the particle during the first 4 seconds. **(2 marks)**
- (iii) The maximum velocity attained by the particle. **(2 marks)**
- 23.(a) Complete the table below for the function $y = -4 - 6x + 3x^2 + 2x^3$. **(3 marks)**

x	-4	-3	-2	-1	0	1	2
---	----	----	----	----	---	---	---

y							
---	--	--	--	--	--	--	--

(b) Draw the graph of $y = -4 - 6x + 3x^2 + 2x^3$ for values of x from -4 to 2. (3 marks)

(c) Use your graph to solve.

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

(ii) $4x^3 + 6x^2 - 12x - 8 = 0$ (2 marks)

24. A parallelogram OACB is such that $\mathbf{OA} = \mathbf{a}$, $\mathbf{OB} = \mathbf{b}$. D is the mid point of BC $\mathbf{OE} = h\mathbf{OC}$ and $\mathbf{AE} = k\mathbf{AD}$.

(a) Express the following in terms of \mathbf{a} , \mathbf{b} , h and k .

(i) \mathbf{OC} (1 mark)

(ii) \mathbf{OE} (1 mark)

(iii) \mathbf{AD} (1 mark)

(iv) \mathbf{AE} (1 mark)

(b) Find the values of h and k . (4 marks)

(c) Determine the ratios:

(i) $\mathbf{AE} : \mathbf{ED}$ (1 mark)

(ii) $\mathbf{OE} : \mathbf{OC}$ (1 mark)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 8 MATHEMATICS PAPER 2

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

Instructions to candidates

- 1) Fill the spaces provided above.
- 2) The paper consists of two sections: *section I* and *section II*.
- 3) Answer **all** the questions in **section I** and any **five** in **section II**
- 4) Section I has **sixteen** questions and section two has **eight** questions
- 5) All answers and working must be written on the question paper in the spaces provided below each question.
- 6) *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question*
- 7) Non-programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.

For examiner's use only.

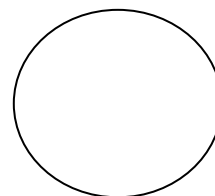
Section I

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

Section II

17	18	19	20	21	22	23	24	Total

Grand total



1. Evaluate without using tables or a calculator (4mks)

$$\sqrt{\frac{\frac{1}{3}}{(0.000125)} \times \frac{3}{0.0049 \times 3.9 \times 10}} \times 0.325 \times \sqrt{0.0036}$$

2. Find the value of the term independent of x in the expansion of (3mks)

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

3. Simplify the following giving your answer in the simplest form possible.

$$\frac{2}{\sqrt{6} + \sqrt{3}\sqrt{7} - \sqrt{5}} - \frac{5}{\sqrt{6} + \sqrt{3}\sqrt{7} - \sqrt{5}} \quad (3mks)$$

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

$$\frac{\tan 225^\circ - \cos 330^\circ}{\sin 210^\circ + \cos 840^\circ}$$

5. Given that $a = b + \sqrt{b^2 + c^2}$ make c the subject of the formula.

(3mks)

6. Two matrices A and B are such that

$$A = \begin{pmatrix} K & 4 \\ 3 & 2 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$$

Given that the determinant of $AB = 4$ find the image of triangle ABC where $A = (2,0)$, $B = (3,2)$ and $C = (3,4)$ under stretch, stretch factor K , parallel to the X axis. (3mks)

7. a. Find the position vector \mathbf{OC} of the centre of a circle C, whose equation is

$$2x^2 + 2y^2 + 4x - 6y - 26 = 0 \quad (2mks)$$

- b. If the circle passes through $P(3,2)$, use vector method to find the diameter of the circle. (2mks)

8. The sum of the digits in a three digit number is nine. The tens digit is half the sum of the sum of the other two and the hundreds digit is half the units digit.

Find the total value of the number.

(3mks)

9. Given that y is inversely proportional to x^n and β is the constant of proportionality and that $x = 2$, when $y = 12$, and $x = 4$, when $y = 3$, find the values of n and β .

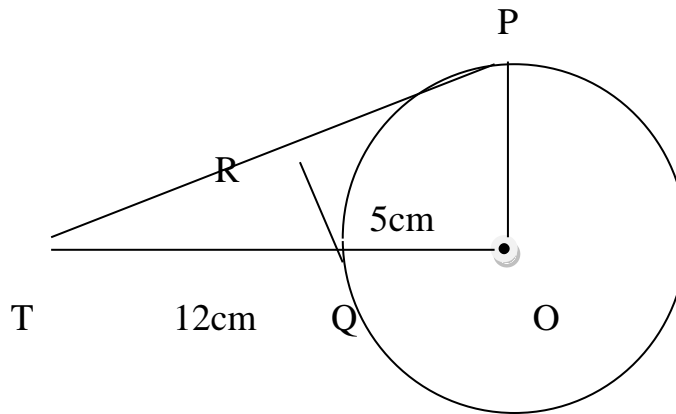
(4mks)

10. Find the exact area of the region bounded by the curve $y = 9x - x^3$ and the x axis.

(4mks)

11. In the figure below, RP and RQ are tangents to the circle centre O , radius r cm. OQ produced meets PR produced at T . $QT = 12$ cm and $QR = 5$ cm. Calculate the radius of the circle.

(3mks)

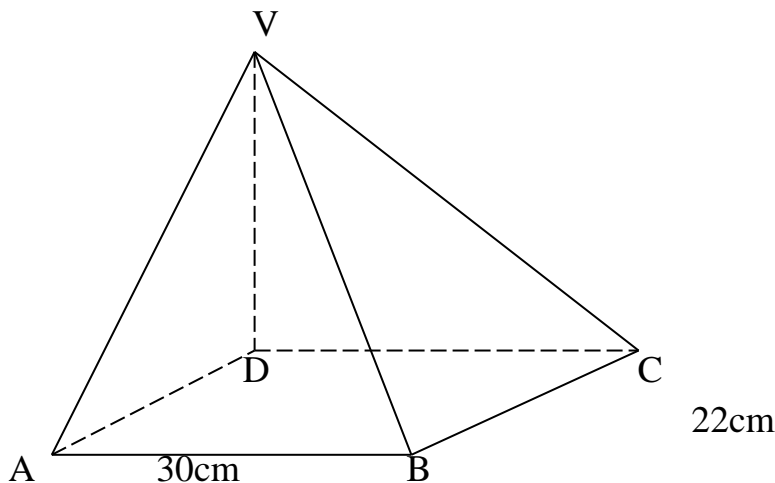


12. The figure below represents a right pyramid with a vertex V and a rectangular base, $ABCD$. $VA = VB = VC = VD = 40$ cm.

$AB = 30$ cm and $BC = 22$ cm. X is the mid-point of BC .

Calculate the size of the angle between planes VBC and $ABCD$

(3mks)



13. Given that $\mathbf{a} = 3\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$ and

$$\mathbf{b} = 2\mathbf{i} - 4\mathbf{j} - 3\mathbf{k}$$

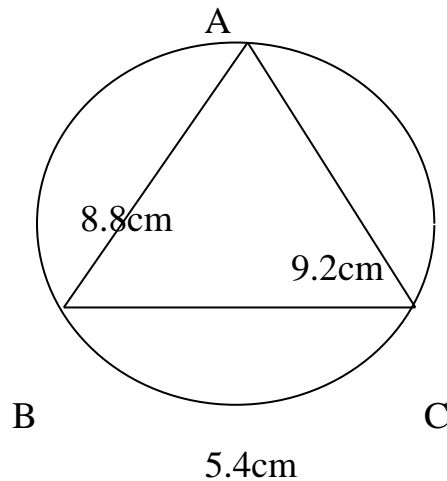
Find

$$2\mathbf{a} - 3\mathbf{b}$$

(3mks)

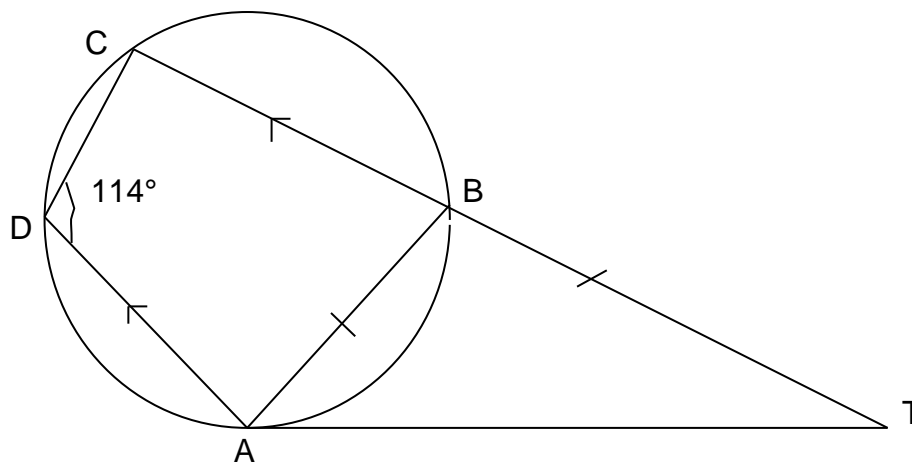
14. If $25x^2 + k + 9$ is a perfect square find x (2mks)

15. The figure below shows a circle centre O touching the vertices A , B , C of triangle $AB = 8.8\text{cm}$, $BC = 5.4\text{cm}$ and $AC = 9.2\text{cm}$.



Calculate the radius of the circle to the nearest whole number. (3mks)

16. XAY is a tangent to the circle ABCD. AD is parallel to the straight line CBY . Angle $ADC = 114^\circ$, and $AB = BY$



Calculate angles

i. $\angle ABC$ (1mk)

ii. $\angle BCA$ (1mk)

17. The following table shows individual rates of income tax

Income K£ PA	Rate (sh. Per K£)
1 – 4512	2
4513 -9024	3
9025 – 13536	4
13537 – above	5

Mr. Kariuki lives in a company house for which he pays a nominal rent of

Ksh.610 per month. For taxation purpose, his basic salary is increased by 15%. He is insured and pays sh.1200 as premiums per month and claims insurance relief of K£ 36 per annum. He also claims a family relief of sh.660 per month. In addition, he is a member of a co-operative society, to which he remits Ksh.1500 per month, as shares. If Mr. Kariuki's P.A.Y.E is ksh.2400 per month, calculate his net salary in shillings per month. **(10mks)**

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

i. Triangle ABC, such that $AB = 9\text{cm}$, $AC = 7\text{cm}$ and $\angle CAB = 60^\circ$ **(2mks)**

ii. The locus of P, such that $AP \leq BP$ **(2mks)**

iii. The locus of Q such that $CQ \leq 3.5\text{cm}$

iv. Locus of R such that $\angle ACR \leq \angle BCR$ **(2mks)**

b. Find the area of the region satisfied by both P and Q **(2mks)**

19. Points D(0° , 24°E), E(0° , 21°W), F(60°S , 120°W), G(60°S , 110°E) are marked in a globe representing the earth with radius = 0.7m.

(Taking π as $\frac{22}{7}$)

a. Find the length of the arc DE. **(3mks)**

b. If A is the centre of the latitude 60°S , and B is the centre of the latitude 0° find

i) the length AB **(3mks)**

ii) the area of the major sector AFG **(4mks)**

20. In a group of 40 people, 10 are healthy and every person of the remaining 30 has either high blood pressure, a high level of cholesterol or both. 15 have high blood pressure and 25 have high level of cholesterol. If a person is selected at random from this group, what is the probability that he/she

a. Has high blood pressure only **(4mks)**

b. Has high level of cholesterol only **(2mks)**

c. Has high blood pressure and high level of cholesterol **(2mks)**

d. Has either high blood pressure or high level of cholesterol **(2mks)**

21. Three consecutive terms in a G.P are 3^{2x+1} , 9^x and 81 respectively.

a. Calculate the value of x **(2mks)**

b. Find the common ratio of the series. **(2mks)**

c. Calculate the sum of the first 10 terms of the series. **(3mks)**

d. Given that the 5th and 7th terms of the G.P in (a) above form the 1st two consecutive terms of an A.P Calculate the sum of the 1st 20 terms of the A.P. **(3mks)**

22. Two variables y and x are believed to be related by the equation

$y = x + ax^b$. The table below shows the corresponding values of x and y .

X	1	1.5	2	2.5	3	3.5	4
y	7.54	9.33	11.00	12.59	14.12	19.90	27.23

a. By drawing a suitable line graph, estimate the values of a and b . **(9mks)**

b. Write down the equation connecting y and x . **(1mk)**

23. The marks obtained by fifty candidates were recorded in the table below.

Marks	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69
No. of candidates	6	8	12	9	7	5	3

a. Draw a cumulative frequency graph and use it to estimate. **(3mks)**

i. Median **(1mk)**

ii. Quartile deviation **(2mks)**

iii. The percentage number of candidates failing if the pass mark was 25 marks. **(2mks)**

iv. The range of marks scored by the middle 30% of the candidates. **(2mks)**

24. A theatre has a seating capacity of 250 people. The charges are sh.100 for an ordinary seat and sh.160 for a special seat. It costs sh.16,000 to stage a Show and the theatre must make a profit. There are never more than 200 ordinary seats and for a show to take place, at least 50 ordinary seats must be occupied. The number of special seats is always less than twice the number of ordinary seats.

a) Taking x to be the number of ordinary seats and y the number of special seats, write down all the inequalities representing the information above. **(4mks)**

b). On a graph paper, show the region represented by the above inequalities. **(4mks)**

c.) Determine the number of seats of each type that should be booked in order to maximize profit. **(2mks)**

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 9 MATHEMATICS PAPER 1

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO CANDIDATES:

- Write your **name**, **admission number**, **Signature** and write **date** of examination in the spaces provided
- The paper contains **two** sections. Section I and Section II.
- Answer **ALL** the questions in section I and any **five** questions in section II.
- Answers and working **must** be written on the question paper in the spaces provided below each question.
- Show all steps in your calculations below each question.
- Marks may be given for correct working even if the answer is wrong.
- Non programmable silent electronic calculators and KNEC mathematical table may be used, except where stated otherwise.

FOR EXAMINERS USE ONLY

SECTION I

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	23	24	TOTAL
Marks									

GRAND TOTAL

SECTION I (50 MARKS)

Answer all the questions from this section

1. Without using a calculator evaluate (3 marks)

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

2. (a) use mathematical tables to find the:

(i) The square of 86.46 (1 mark)

(ii) The reciprocal of 27.56 (1 mark)

- (b) Hence or otherwise calculate the value of; (2 marks)

$$\frac{86.46^2}{27.56}$$

3. The sum of the interior angles of an n – sided polygon is 1440° . Find the value of n and hence deduce the name of the polygon. (3 marks)
4. Two containers have base areas 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)

5. Given that the column vectors $\mathbf{a} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} -2 \\ -1 \end{pmatrix}$ and that $\mathbf{P} = 2\mathbf{a} - 4\mathbf{b} + 3\mathbf{c}$. Express \mathbf{P} as a column vector. (3 marks)

6. Solve the following inequalities and represent the range of values of x on a single number line. (3 marks)

$$5 - 3x > -7$$

$$x - 6 \leq 3x - 4$$

7. The cost of a car outside Kenya is US \$ 4800. You intend to buy one such car through an agent who deals with Japanese Yen. The agent will charge 15% commission on the price of the car and further 72 220 Japanese Yens for shipment of the car. How many Kenya shillings will you need to send to the agent to obtain the car given that:

$$1 \text{ US \$} = 117.20 \text{ Japanese Yens}$$

$$1 \text{ US \$} = \text{Kshs } 72.34$$

(3 marks)

8. Two numbers p and q are such that $p^3 \times q = 189$. Find p and q (3 marks)

9. Evaluate without using mathematical tables. (3 marks)

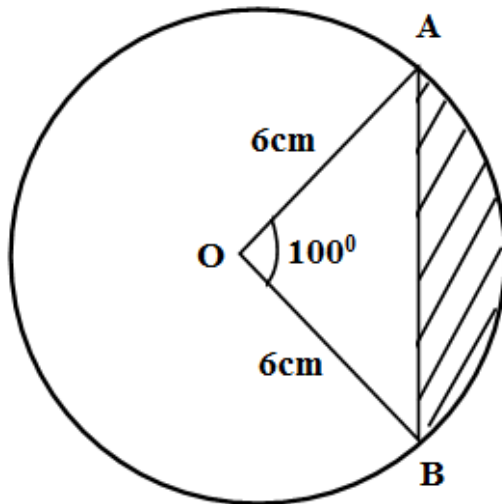
$$1000 \left(\sqrt{\frac{0.0128}{200}} \right)$$

10. Simplify the following expression by reducing it to a single fraction. (3 marks)

$$\frac{2x-3}{3} - \frac{x-2}{2} - \frac{1-x}{4}$$

11. Thirty men working at a rate of 10 hours a day can complete a job in 14 days. Find how long it would take 40 men working at the rate of 7 hours a day to complete the same job. (3 marks)

12. The figure below shows a circle centre O and radius 6cm. sector OAB subtends an angle of 100° at the centre of the circle as shown.



Calculate to 2 decimal places the area of the shaded region. (Take $\pi = \frac{22}{7}$) (3 marks)

13. Use the prime factors of 1764 and 2744 to evaluate (3 marks)

$$\frac{\sqrt{1764}}{\sqrt[3]{2744}}$$

14. A rectangular block is 50cm long and 15 cm wide. If its mass is 18kg and its density is 2.4g/cm^3 , find its height. (3 marks)
15. A triangle ABC is such that $AB = 12\text{cm}$, and $AC = 17\text{cm}$. if its area is 512cm^2 , find the size of angle BAC (3 marks)
16. (a) Find the greatest common divisor of the terms $9x^3y^2$ and $4xy^4$ (1 mark)
- (b) Hence factorize completely the expression (2 marks)
- $$9x^3y^2 - 4xy^4$$

SECTION II (50 MARKS)

Answer FIVE questions ONLY from this section

17. A straight line $y = \frac{2}{3}x - \frac{2}{3}$ meets the x – axis at point T.
- (a) Determine the coordinates of T. (2 marks)
- (b) A second line L_2 is perpendicular to line L_1 at T. Find the equation of line L_2 in the form $ax + by = c$ where a, b and c are constants. (3 marks)
- (c) A third line L_3 passes through $(-4,1)$ and is parallel to L_1 . Find;

(i) The equation of line L_3 in the form $y = mx + c$ (2 marks)

(ii) The coordinates of point S at which L_3 intersects L_2 . (3 marks)

18. A particle moves in a straight line so that its velocity is given by $V = \frac{1}{2}t^2 - 3t + 7$ where t is time in seconds. Find:

(a) The velocity after 8 seconds. (2 marks)

(b) The acceleration when $t = 0$ (2 marks)

(c) The minimum velocity attained. (2 marks)

(d) The distance travelled in the first 2 seconds. (4 marks)

19. The points $A^I B^I C^I$ are the images of $A(4, 1)$, $B(0, 2)$ and $C(-2, 4)$ respectively under a transformation represented by the matrix $M = \begin{pmatrix} 1 & 1 \\ 1 & 3 \end{pmatrix}$.

(a) Write down the coordinates of $A^I B^I C^I$ (3 marks)

(b) $A^{II} B^{II} C^{II}$ are the images of $A^I B^I C^I$ under another transformation whose matrix is $N = \begin{pmatrix} 2 & -1 \\ 1 & 2 \end{pmatrix}$. Write down the co-ordinates of $A^{II} B^{II} C^{II}$ (3 marks)

(c) Transformation M followed by N can be replaced by a single transformation P. determine the matrix for P. (2 marks)

(d) Hence determine the inverse of matrix P. (2 marks)

20. The distance between two towns A and B is 460 km. a minibus left town A at 8.45 am and travelled towards B at an average speed of 65 km/hr. A matatu left B at 10.55 am on the same day and travelled towards A at an average speed of 80 km/hr.

(a) How far from town B did they meet? (4 marks)

(b) At what time did the two vehicles meet? (2 marks)

(c) A motorist started from his home at 9.15 am on the same day and travelled to B at an average speed of 120 km/hr. he arrived at the same time as the minibus. Calculate the distance from B to his home. (4 marks)

21. A paper cup is made in the shape of a frustum of a cone with an open top of diameter 10.5 cm and a sealed bottom of diameter 7 cm. it has a depth of 12 cm, calculate:

(a) The total surface area of the cup. (6 marks)

(b) The capacity of the cup to the nearest deciliter. (4 marks)

22. The table below shows the marks scored by form four students in a mathematics test in Bidii secondary school.

Marks (%)	40 – 44	45 – 49	50 – 54	55 – 59	60 – 64	65 – 69	70 – 74
No of students	3	30	29	33	13	1	1

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

(b) Using an assumed mean of 57, calculate:

(i) The mean

(3 marks)

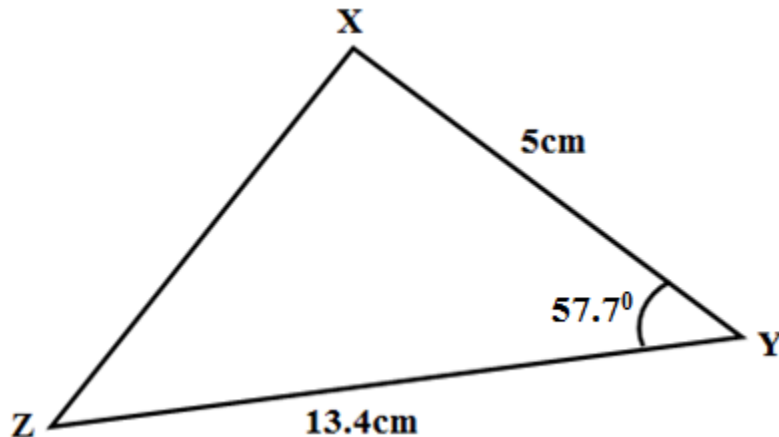
(ii) The standard deviation.

(3 marks)

(c) Find the mark scored by the 50th student.

(3 marks)

23. The figure below shows triangle XYZ in which line XY = 5cm, line YZ = 13.4cm and the size of angle XYZ = 57.7°



(a) Calculate the length of line XZ

(4 marks)

(b) Calculate the size of angle XZY

(4 marks)

(c) Calculate the size of angle YXZ to 4 significant figures

(2 marks)

24. Four towns P, Q, R and S are such that town P is 200 km West of Q. Town R is at a distance of 80km on a bearing of 049° from P. Town S is due East of R and due North Of Q.

(a) Using a scale of 1cm to represent 20km, make an accurate scale drawing to show the relative positions of the towns.

(4 marks)

(b) Find:

(i) Determine the bearing of S from P

(1 mark)

(ii) Determine the distance of Q from S

(2 marks)

(iii) Determine the bearing of Q from R

(1 mark)

(iv) Determine the distance of R from S

(2 marks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 9 MATHEMATICS PAPER 1

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO CANDIDATES:

- Write your **name**, **admission number** , **Signature** and write **date** of examination in the spaces provided
- The paper contains **two** sections. Section I and Section II.
- Answer **ALL** the questions in section I and any **five** questions in section II.
- Answers and working **must** be written on the question paper in the spaces provided below each question.
- Show all steps in your calculations below each question.
- Marks may be given for correct working even if the answer is wrong.
- Non programmable silent electronic calculators and KNEC mathematical table may be used, except where stated otherwise.

FOR EXAMINERS USE ONLY

SECTION I

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	23	24	TOTAL
Marks									

GRAND TOTAL

--

SECTION I (50 MARKS)

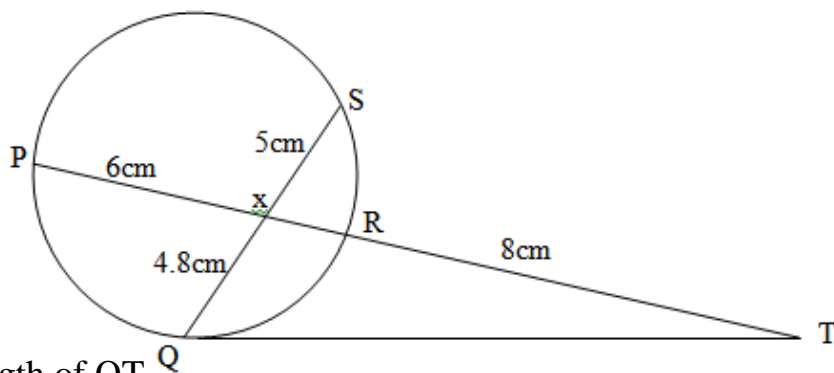
Answer all the questions from this section

1. Use Logarithms correct to four significant figures to evaluate.

(4marks)

$$\sqrt[3]{\frac{24.36 \times 0.066547}{1.48^2}}$$

2. Find the percentage error in the total length of four rods measuring 12.5cm, 24.5cm, 12.9cm and 10.1cm all the nearest 0.1cm. **(3 marks)**
3. In the figure below QT is a tangent to the circle at Q. PXRT and QXS are straight lines. PX = 6cm, RT = 8cm, QX = 4.8cm and XS = 5cm.



Find the length of QT **(3 marks)**

4. Use the trapezium rule with seven ordinates to find the area bounded by the curve $y = x^2 + 1$ lines $x = -2$, $x = 4$ and x - axis **(3 marks)**
5. Given that $x = \sqrt{\frac{tp}{2\mu+p}}$ make p the subject of the formula **(3 marks)**
6. Solve for x in the equation below:
 $\log 3(x + 3) = 3 \log 3 + 2$ **(3 marks)**
7. The points (5, 5) and (-3, -1) are ends of a diameter of a circle centre A. Determine:
 a) The coordinates of A. **(1 mark)**
 b) The equation of a circle expressing it in form $x^2 + y^2 + ax + by + c = 0$ **(2 marks)**
8. A transformation is represented by the matrix $\begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix}$. This transformation maps a triangle ABC of the area 12.5cm^2 onto another triangle A'B'C'. Find the area of triangle A'B'C'. **(3marks)**
9. Two taps A and B can fill a water bath in 8 minutes and 10 minutes respectively. Tap A is opened for 2 minutes then closed. Tap B is later opened for one minute then closed. How long will the two taps take running together to fill the remaining part of the water bath?

10. i) Expand and simplify $(1-3x)^5$ up to the term in x^3 (3 marks)
 ii) Hence use your expansion to estimate $(0.97)^5$ correct to 4d.p. (2 marks)
 (2 marks)
11. Solve for x in the equation:
 $2\cos 4x = -1$ for $0^\circ \leq x \leq 180^\circ$ (3 marks)
12. Wanjiku pays for a car on hire purchase in 15 monthly instalments. The cash price of the car is Ksh.300, 000 and the interest rate is 15%p.a. A deposit of Ksh.75, 000 is made. Calculate her monthly repayments.
 (3 marks)
13. The gradient function of a curve is given $\frac{dy}{dx} = 3x^2 - 8x + 2$. If the curve passes through the point, $(2, -2)$, find its equation. (3 marks)
14. Rationalize the denominator and simplify (3 marks)

$$\frac{2\sqrt{5}}{\sqrt{5} + 2}$$
15. The sum of two numbers is 24. The difference of their squares is 144. What are the two numbers? (3marks)
16. The data below represents the marks scored by 15 form 4 students in an exam:
 58, 61, 40, 37, 39, 40, 41, 43, 44, 37, 70, 44, 47, 36 and 52
 Calculate the interquartile range of the above data (3 marks)

SECTION II (50 MARKS)

Answer five questions only from this section

17. The following table shows the rate at which income tax was charged during a certain year.

Monthly taxable income in Ksh.	Tax rate %
0 - 9860	10
9861 - 19720	15
19721 - 29580	20
29581 - 39440	25
39441 - 49300	30
49301 - 59160	35
over 59160	40

A civil servant earns a basic salary of Ksh.35750 and a monthly house allowance of sh.12500. The civil servant is entitled to a personal relief of sh.1062 per month. Calculate:

- a) Taxable income (2 marks)
 b) Calculate his net monthly tax (5 marks)

c) Apart from the salary the following deduction are also made from his monthly income.

WCPS at 2% of the basic salary

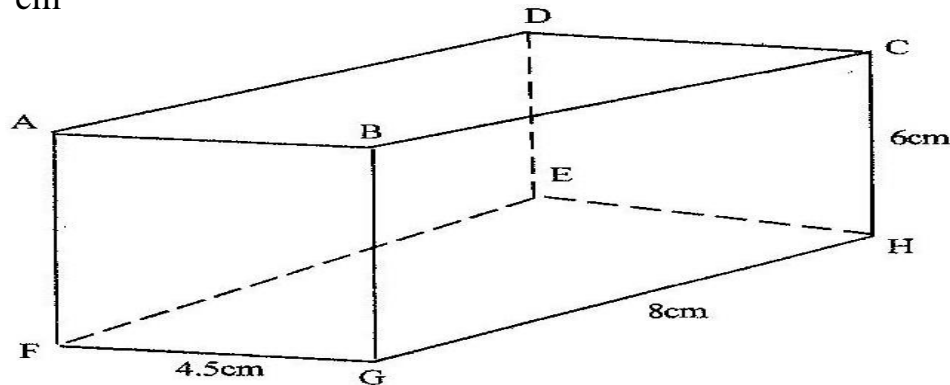
Loan repayment Ksh.1325

NHIF sh.480

Calculate his net monthly earning.

(3 marks)

18. The diagram below represents a cuboid ABCDEFGH in which $FG = 4.5$ cm, $GH = 8$ cm and $HC = 6$ cm



Calculate:

a) The length of FC **(2 marks)**

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

(ii) The size of the angle between the lines AB and FH **(3 marks)**

c) The size of the angle between the planes ABHE and the plane FGHE **(3 marks)**

19. A plane S flies from a point P (40°N , 45°W) to a point Q (35°N , 45°W) and then to another point T (35°N , 135°E).

a) Given that the radius of the earth is 6370 km find the distance from P to Q in Km.

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

(2 marks)

b) Find in nm

(i) The shortest distance between Q and T. **(2 marks)**

(ii) The longest distance between Q and T (to the nearest tens) **(2 marks)**

c) Find the difference in time taken when S flies along the shortest and longest routes if its speed is 420 knots **(4 marks)**

20. The probability that a pupil goes to school by a boda-boda is $\frac{2}{3}$ and by a matatu is $\frac{1}{4}$. If he uses a boda-boda the probability that he is late is $\frac{2}{5}$ and if he uses matatu the probability of being late is $\frac{3}{10}$. If he uses other means of transport the probability of being late is $\frac{3}{20}$.

a) Draw a tree diagram to represent this information. **(3marks)**

b) Find the probability that he will be late for school. **(3marks)**

c) Find the probability that he will be late for school if he does not use a matatu. **(2marks)**

d) What is the probability that he will not be late to school? **(2marks)**

21. A farmer has 50 acres of land. He has a capital Shs. 2,400 to grow carrots and potatoes as cash crops. The cost of growing carrots is Shs.40 per acre and that of growing potatoes is Shs.60 per acre. He estimates that the respective profits per acre are Shs.30 (on carrots) and Shs. 40 (on potatoes). By letting x and y to represent carrots and potatoes respectively:-

a) Form suitable inequalities to represent this information. **(4marks)**

b) By representing this information on a graph, determine on how many acres he should grow each crop for maximum profit. **(4marks)**

(GRAPH PAPER PROVIDED)

c) Find the maximum profit. **(2 marks)**

22. An arithmetic progression is such that the first term is -5 , the last term is 135 and the sum of the progression is 975.

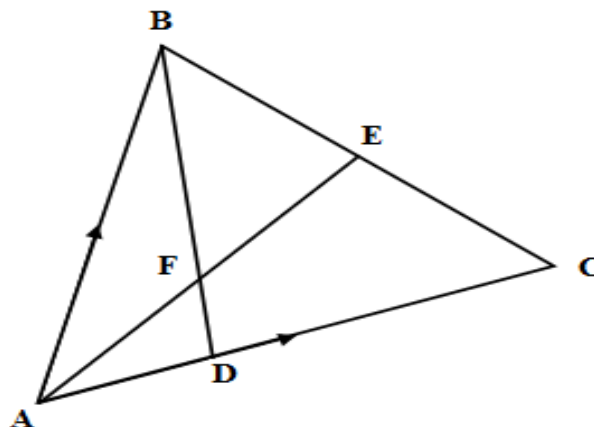
(a) Calculate

(i) The number of terms in the series **(4 marks)**

(ii) The common difference of the progression **(2 marks)**

(b) The sum of the first three terms of a geometric progression is 27 and first term is 36. Determine the common ratio and the value of the fourth term **(4 marks)**

23. In the figure below E is the midpoint of BC. AD: DC 3:2 and F is the meeting point of BD and AE.



a) If $AB = \mathbf{b}$ and $AC = \mathbf{c}$, find:

i) BD

(2marks)

ii) AE

(2marks)

b) If $BF = t \ BD$ and $AF = n \ AE$. Find the value of t and n .

(5marks)

c) State the ratio of BD to BF .

(1mark)

24. Given that $y = 2\sin 2x$ and $y = 3\cos (x + 45^\circ)$

(a) Complete the table below.

(2mks)

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

(b) Use the data to draw the graphs of $y = 2 \sin 2x$ and $y = 3 \cos (x + 45^\circ)$ for $0^\circ \leq x \leq 180^\circ$ on the same axes.

(4marks)

(GRAPH PAPER PROVIDED)

(c) State the amplitude and period of each curve.

(2marks)

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

(2marks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 9 MATHEMATICS PAPER 2

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO CANDIDATES:

- Write your **name**, **admission number**, **Signature** and write **date** of examination in the spaces provided
- The paper contains **two** sections. Section I and Section II.
- Answer **ALL** the questions in section I and any **five** questions in section II.
- Answers and working **must** be written on the question paper in the spaces provided below each question.
- Show all steps in your calculations below each question.
- Marks may be given for correct working even if the answer is wrong.
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FOR EXAMINERS USE ONLY

SECTION I

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	23	24	TOTAL
Marks									

GRAND TOTAL

SECTION I (50 MARKS)

Answer all the questions from this section

1. Use Logarithms correct to four significant figures to evaluate.

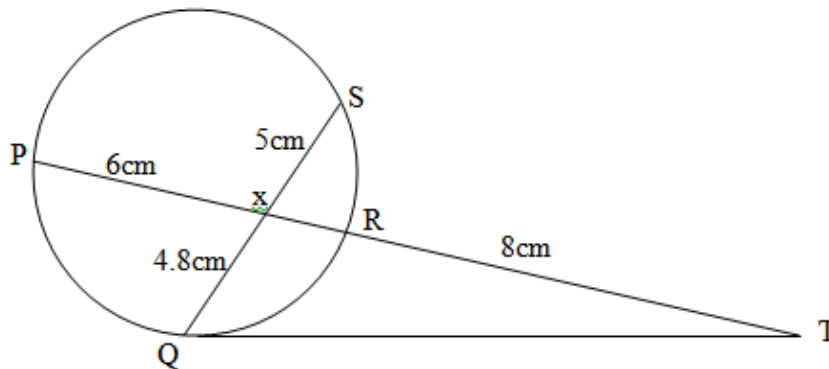
(4marks)

$$\sqrt[3]{\frac{24.36 \times 0.066547}{1.48^2}}$$

2. Find the percentage error in the total length of four rods measuring 12.5cm, 24.5cm, 12.9cm and 10.1cm all the nearest 0.1cm.

(3 marks)

3. In the figure below QT is a tangent to the circle at Q. PXRT and QXS are straight lines. PX = 6cm, RT = 8cm, QX = 4.8cm and XS = 5cm.



Find the length of QT

(3 marks)

4. Use the trapezium rule with seven ordinates to find the area bounded by the curve $y = x^2 + 1$ lines $x = -2$, $x = 4$ and x – axis

(3 marks)

5. Given that $x = \sqrt{\frac{tp}{2\mu+p}}$ make p the subject of the formula

(3 marks)

6. Solve for x in the equation below:

$$\log 3(x + 3) = 3 \log 3 + 2$$

(3 marks)

7. The points (5, 5) and (-3, -1) are ends of a diameter of a circle centre A. Determine:

a) The coordinates of A.

(1 mark)

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

(2 marks)

8. A transformation is represented by the matrix $\begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix}$. This transformation maps a triangle ABC of the area 12.5cm^2 onto another triangle A'B'C'. Find the area of triangle A'B'C'.

(3marks)

9. Two taps A and B can fill a water bath in 8 minutes and 10 minutes respectively. Tap A is opened for 2 minutes then closed. Tap B is later opened for one minute then closed. How long will the two taps take running together to fill the remaining part of the water bath?

(3 marks)

10. i) Expand and simplify $(1-3x)^5$ up to the term in x^3

(2 marks)

ii) Hence use your expansion to estimate $(0.97)^5$ correct to 4d.p.

(2 marks)

11. Solve for x in the equation:

$$2\cos 4x = -1 \text{ for } 0^\circ \leq x \leq 180^\circ$$

(3 marks)

12. Wanjiku pays for a car on hire purchase in 15 monthly instalments. The cash price of the car is Ksh.300, 000 and the interest rate is 15%p.a. A deposit of Ksh.75, 000 is made. Calculate her monthly repayments.

(3 marks)

13. The gradient function of a curve is given $\frac{dy}{dx} = 3x^2 - 8x + 2$. If the curve passes through the point, $(2, -2)$, find its equation.

(3 marks)

14. Rationalize the denominator and simplify

(3 marks)

$$\frac{2\sqrt{5}}{\sqrt{5} + 2}$$

15. The sum of two numbers is 24. The difference of their squares is 144. What are the two numbers?

(3marks)

16. The data below represents the marks scored by 15 form 4 students in an exam:

58, 61, 40, 37, 39, 40, 41, 43, 44, 37, 70, 44, 47, 36 and 52

Calculate the interquartile range of the above data

(3 marks)

SECTION II (50 MARKS)

Answer five questions only from this section

17. The following table shows the rate at which income tax was charged during a certain year.

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19721 - 29580	20
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- Taxable income (2 marks)
- Calculate his net monthly tax (5 marks)
- Apart from the salary the following deduction are also made from his monthly income.

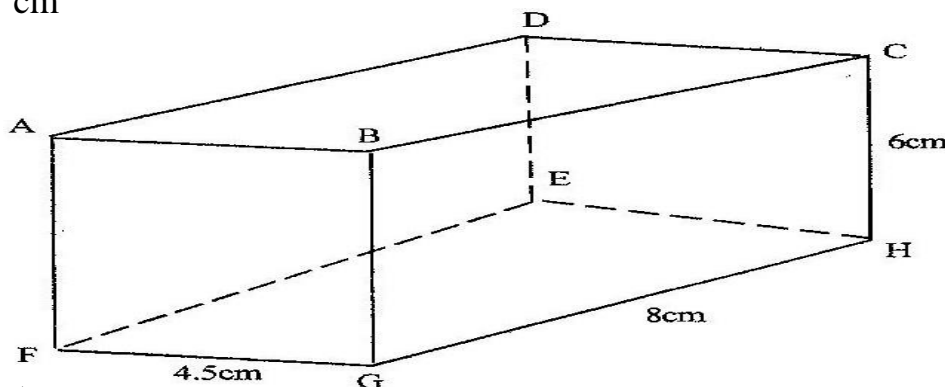
WCPS at 2% of the basic salary

Loan repayment Ksh.1325

NHIF sh.480

Calculate his net monthly earning. (3 marks)

18. The diagram below represents a cuboid ABCDEFGH in which FG= 4.5 cm, GH=8cm and HC=6 cm



Calculate:

- The length of FC (2 marks)
 - The size of the angle between the lines FC and FH (2 marks)
 - The size of the angle between the lines AB and FH (3 marks)
 - The size of the angle between the planes ABHE and the plane FGHE (3 marks)
19. A plane S flies from a point P (40°N , 45°W) to a point Q (35°N , 45°W) and then to another point T (35°N , 135°E).
- Given that the radius of the earth is 6370km find the distance from P to Q in Km.
(Take $\pi = \frac{22}{7}$) (2 marks)
 - Find in nm
 - The shortest distance between Q and T. (2 marks)
 - The longest distance between Q and T (to the nearest tens) (2 marks)
 - Find the difference in time taken when S flies along the shortest and longest routes if its speed is 420 knots (4 marks)
20. The probability that a pupil goes to school by a boda-boda is $\frac{2}{3}$ and by a matatu is $\frac{1}{4}$. If he uses a boda-boda the probability that he is late is $\frac{2}{5}$ and if he uses matatu the probability of being late is $\frac{3}{10}$. If he uses other means of transport the probability of being late is $\frac{3}{20}$.
- Draw a tree diagram to represent this information. (3marks)

b) Find the probability that he will be late for school. **(3marks)**

c) Find the probability that he will be late for school if he does not use a matatu. **(2marks)**

d) What is the probability that he will not be late to school? **(2marks)**

21. A farmer has 50 acres of land. He has a capital Shs. 2,400 to grow carrots and potatoes as cash crops. The cost of growing carrots is Shs.40 per acre and that of growing potatoes is Shs.60 per acre. He estimates that the respective profits per acre are Shs.30 (on carrots) and Shs. 40 (on potatoes). By letting x and y to represent carrots and potatoes respectively:-

a) Form suitable inequalities to represent this information. **(4marks)**

b) By representing this information on a graph, determine on how many acres he should grow each crop for maximum profit. **(4marks)**

(GRAPH PAPER PROVIDED)

c) Find the maximum profit. **(2 marks)**

22. An arithmetic progression is such that the first term is -5 , the last term is 135 and the sum of the progression is 975 .

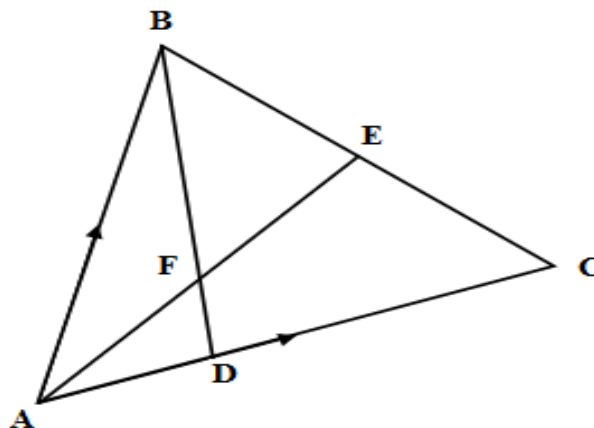
(a) Calculate

(iii) The number of terms in the series **(4 marks)**

(iv) The common difference of the progression **(2 marks)**

(b) The sum of the first three terms of a geometric progression is 27 and first term is 36 . Determine the common ratio and the value of the fourth term **(4 marks)**

23. In the figure below E is the midpoint of BC . $AD:DC$ $3:2$ and F is the meeting point of BD and AE .



a) If $AB = \mathbf{b}$ and $AC = \mathbf{c}$, find:

i) \overrightarrow{BD} **(2marks)**

ii) \overrightarrow{AE} **(2marks)**

b) If $BF = t \overrightarrow{BD}$ and $AF = n \overrightarrow{AE}$. Find the value of t and n . **(5marks)**

c) State the ratio of BD to BF . **(1mark)**

24. Given that $y = 2\sin 2x$ and $y = 3\cos (x + 45^\circ)$

(a) Complete the table below.

(2mks)

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

(b) Use the data to draw the graphs of $y = 2\sin 2x$ and $y = 3\cos (x + 45^\circ)$ for $0^\circ \leq x \leq 180^\circ$ on the same axes.

(4marks)

(GRAPH PAPER PROVIDED)

(c) State the amplitude and period of each curve.

(2marks)

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

(2marks)

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 10 MATHEMATICS PAPER 1

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

Instructions to Candidates

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. This paper consists of **TWO** sections: **Section I** and **Section II**.
4. Answer **ALL** the questions in **Section I** and **only five** questions from **Section II**.
5. All answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
7. Marks may be given for correct working even if the answer is wrong.
8. **Non-programmable** silent electronic calculators **and** KNEC Mathematical tables may be used except where stated otherwise.
9. This paper consists of 14 printed pages.
10. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

For examiner's use only

Section I

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

Section II

17	18	19	20	21	22	23	24	Total

Grand total

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SECTION 1 (50 MARKS)

Answer all questions in this section

1. Evaluate without using a calculator

$$\frac{\frac{1}{4} + \frac{1}{5} \div \frac{1}{2} \text{ of } \frac{1}{3}}{\frac{1}{2} \text{ of } (\frac{4}{5} - \frac{3}{4} + \frac{1}{2})} \quad (3\text{mks})$$

2. Simplify completely.

$$\frac{3a^2 + 5ab - 2b^2}{9a^2 - b^2} \quad (3\text{mk})$$

3. Solve for x in the equation.

$$27^x \times 3^{(2x-2)} = 9^{(x+2)} \quad (3 \text{ marks})$$

4. Given that $\sin \theta = \frac{2}{3}$ and θ is an acute angle, find without using tables or calculators

(a) $\tan \theta$, giving your answer in surd form. (2mks)

(b) $\cos (90^\circ - \theta)$ (1mk)

5. Four machines give out signals at intervals of 24, 27, 30 and 50 seconds respectively. At 5.00pm all the four machines gave out a signal simultaneously. Find the time this will happen again. (3mks)

6. Two pipes A and B can fill an empty tank in 3hrs and 5hrs respectively. Pipe C can empty the full tank in 6 hours. If the three pipes A, B, and C are opened at the same time, find how long it will take for the tank to be full. (3mks)

7. A tourist arrived in Kenya with sterling pound (£) 4680 all of which he exchanged into Kenyan money. He spent Ksh. 51,790 while in Kenya and converted the rest of the money into U.S dollars. Calculate the amount he received in U.S dollars. The exchange rates were as follows.

	Buying	Selling.	
US \$	65.20	69.10	
Sterling Pound (£)	123.40	131.80	(4mks)

8. A straight line through the points A (2,1) and B(4,n) is perpendicular to the line $3y+2x=5$.

Determine the value of n and the equation. (4mks)

9. Determine the quartile deviation of the set of numbers below. (2mks)

8, 2, 3, 7, 5, 11, 2, 6, 9, 4

10. Solve the equation $2\cos 2(x + 30^\circ) = 1$ for $0^\circ \leq x \leq 360^\circ$. (3 marks)

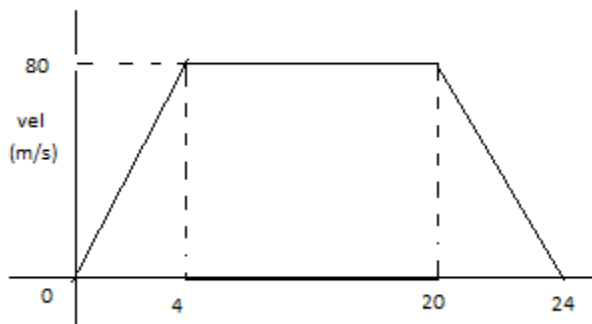
11. Without using tables or calculators, find the value of t in

$$\log (t + 5) - \log (t - 3) = \frac{2}{3} \quad (3\text{mks})$$

12. Solve for x : $3(x + 2) - \frac{20x - 5}{4} > 3\frac{1}{4}$ (3 mks)

13. Three years ago John was four times as old as his son Peter. In five years' time the sum of their ages will be 56. Find their present ages. (3mks)

14. The figure below show a velocity time graph for a wagon.



(a) Find the total distance travelled by the wagon. (2 marks)

(b) For how long did it maintain a constant speed? (1mark)

15. The volumes of two similar solids are 800cm^3 and 2700cm^3 . If the surface area of the larger One is 2160cm^2 , find the surface area of the smaller figure. (3mks)

16. A ball is in the shape of a sphere. It weighs 125g. The material used to make it has a density of 2.5g/cm^3 . What is the volume of the material to make a dozen such balls? (3 marks)

SECTION II (50 MARKS)

Answer any five questions in this section.

17.(a) Complete the table below for the equation $y = x^2 + 3x - 6$ given $-6 \leq x \leq 4$

(2mks)

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

(b) draw the graph of $y = x^2 + 3x - 6$ (3mks)

(GRAPH PAPER PROVIDED)

(c) Use your graph to solve the quadratic equations.

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

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

18. A saleswoman is paid a commission of 2% on goods sold worth over ksh. 100,000. She also paid a monthly salary of ksh. 12,000. In a certain month, she sold 360 handbags at ksh. 500 each.

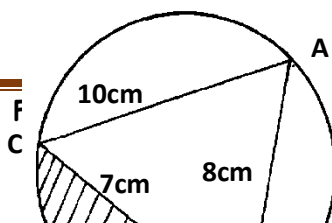
a) Calculate the saleswoman's earnings that month. (3 mks)

b) The following month the sales woman's monthly salary was increased by 10%. Her total earnings that month were ksh. 17600. Calculate:

(i) The total amount of money received from the sales of hand bags that month.(5 mks)

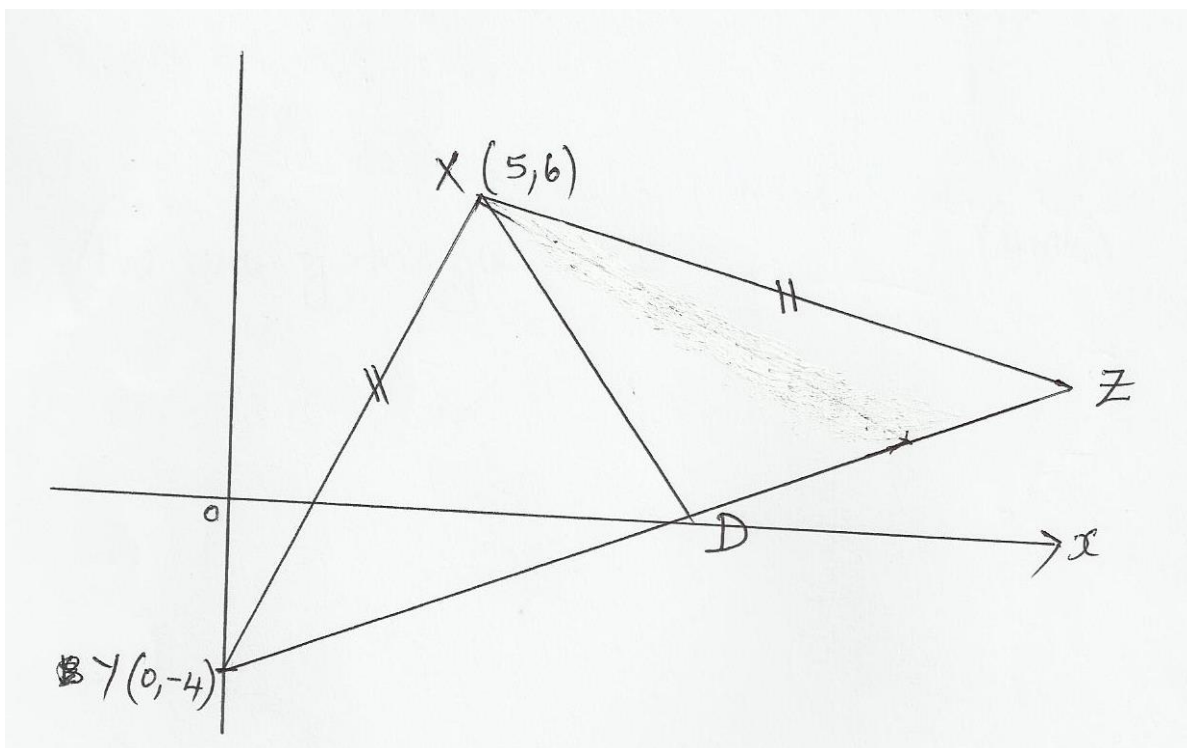
(ii) The number of handbags sold that month. (2 mks)

19. The figure below shows a triangle **ABC** inscribed in a circle. **AC** = 10cm, **BC** = 7cm and **AB** = 10cm.



- (a) Find the size of angle **BAC**. (2mks)
 (b) Find the radius of the circle. (2mks)
 (c) Hence calculate the area of the shaded region. (6mks)

20. The diagram below which is not drawn to scale, shows an isosceles triangle XYZ in which $XY=YZ$. The Coordinates of x and y are (5, 6) and (0, -4) respectively.

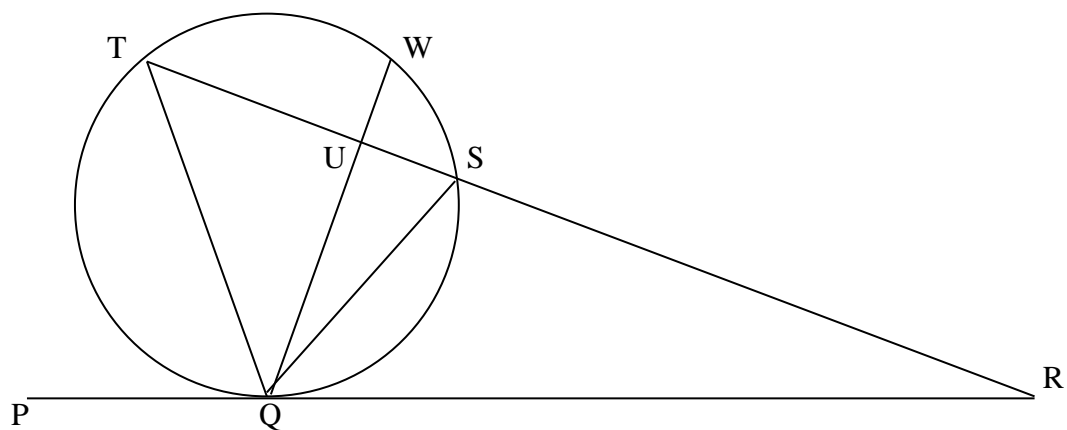


Given that the equation of line YZ is $y = \frac{3}{4}x - 4$ and that the perpendicular from X to YZ meet YZ at D,

find.

- (i) The equation of **XD** (2 marks)
 (ii) The coordinate of **D** (2 marks)
 (iii) The coordinates of **Z** (2 marks)
 (iv) The area of triangle **XYZ** (4 marks)

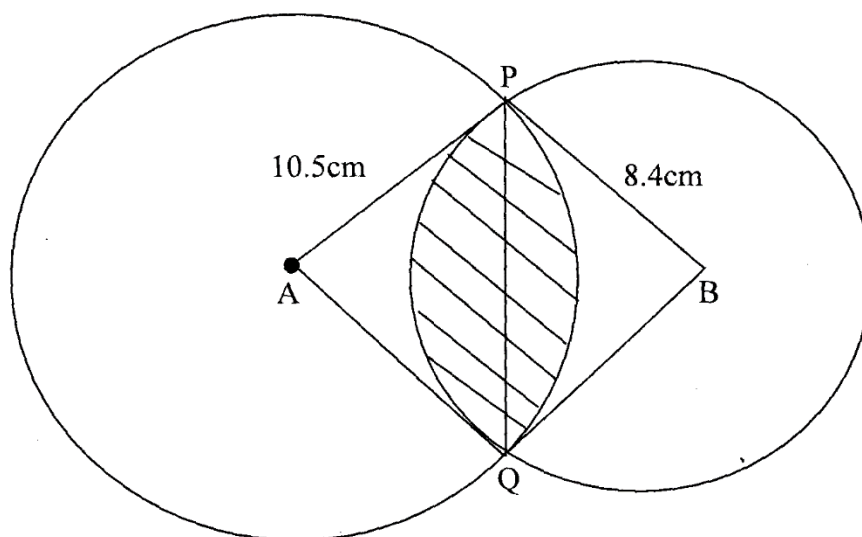
21. In the figure below, PQR is a tangent at Q and RST is a straight line. $\angle QTU = 50^\circ$,
 $\angle UTW = 33^\circ$ and $\angle TRQ = 25^\circ$



Giving reasons in each case, calculate

- (i) Angle TSQ (3 marks)
- (ii) Angle TSW (3 marks)
- (iii) Angle TUQ (2 marks)
- (iv) Angle PQW (2 marks)

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



- (a) Calculate angle PAQ. (2 mks)
 - (b) Calculate angle PBQ. (2 mks)
 - (c) Calculate the area of the shaded part. (6 mks)
23. A and B are two towns 360 kilometers apart. A bus left A at 8.00 am travelling at 60km/h for town B. After forty minutes, a saloon car left A travelling in the same direction as the bus at a speed of 80km/h.
- a) How far from B did the saloon car catch up with the bus?
 - b) At what time did it catch up with the bus?

c) When the saloon caught up with the bus it got a break - down and had to be repaired before proceeding to **B** at the same speed. If they both reached **B** at the same time, find how long it took to repair the saloon?

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

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

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

(i) the first term and common difference of the AP. **(5mks)**

(ii) the sum of the first nine terms of the AP. **(2mks)**

(iii) The difference between the fourth and the seventh terms of an increasing AP. **(2mks)**

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

SCHOOL.....CLASS.....

DATE.....

TOP STUDENT KCSE PREDICTIONS

SERIES 1 TRIAL 10 MATHEMATICS PAPER 2

Kenya Certificate of Secondary Exams

TIME: 2½ HRS.

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above
3. The paper contains **two** sections: **Section I** and **Section II**.
4. Answer **All** the questions in **section I** and **strictly any five** questions **from Section II**.
5. All answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
7. Marks may be given for correct working even if the answer is wrong.
8. Non-programmable silent electronic calculators and **KNEC** mathematical tables may be used, except unless stated otherwise.
9. This paper consists of **13 printed pages**. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing

For Examiner's use only.

Section I

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

Section II

17	18	19	20	21	22	23	24	Total

Grand Total

--

Section I (50 marks)

Answer all questions

1. Use logarithms in all steps to evaluate.

(4marks)

$$\frac{2.532 \times 83.45}{\sqrt{0.4562}}$$

2. The sum of the interior angles of two regular polygons of sides $n-1$ and n are in the ratio of 2:3. Name the polygon with the fewer sides.

(3marks)

2. The diameter AB of a circle passes through points A (-4, 1) and B(2, 1). Find the equation of the circle and leave your answer in the form $x^2 + y^2 + ax + by = c$ where a , b and c are constants.

(4 marks)

4. Without using mathematical tables and calculators simplify.

(3marks)

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

5. Expand $(2 + x)^5$ up to the terms in x^3 . Hence approximate the value of $(2.03)^5$.

(3marks)

6. The sides of a triangular stool were measured as 8 cm, 10cm, and 15cm. Calculate the % error in the perimeter correct to 2d.p.

(3marks)

7. Solve for x given that the following is a singular matrix

(3mks)

$$\begin{pmatrix} 1 & 2 \\ x & x-3 \end{pmatrix}$$

8. The current price of a vehicle is sh. 500,000. If the vehicle depreciates at rate of 12% p.a find the number of years it will take for its value to fall to sh. 180,000.

(3 marks)

9. Two variables are such that A is partly constant and partly varies as the square root of B . Given that

$$A = 27 \text{ when } B = \frac{1}{4} \text{ and } A = 18; \text{ when } B = 25, \text{ find } A \text{ when } B = 12\frac{1}{4}.$$

(3 marks)

10. Determine the amplitude and period of the graph of $y = 6 \sin \left(\frac{x}{2} - 90^\circ \right)$.

(2marks)

11. A cylindrical container of radius 14 cm and 7cm is filled with water. If the container was a cube, what would be the base area of the cube?

(3marks)

12. Solve the following equation.

(3marks)

$$1 + \log_5 x = \log_5 12$$

13. A law relating some two variables K and L was found to be $KL^n = C$. Make n the subject of the formula.

(3marks)

14. Solve the equation below by completing the square method $3x^2 - 7x + 2 = 0$

(3 marks)

15. Maize and millet costs Sh. 45 and Sh. 56 per kilogram respectively. Calculate the ratio in which they were mixed if a profit of 20% was made by selling the mixture at 66 per kilogram. (4marks)

16. Given that $P = (3i + k)$ and $Q = (2i - k)$, find $|PQ|$ (3mk)

Section II

(Answer five questions only from this section)

17. The position of two towns are A (30°S , 20°W) and B (30°S , 80°E) find

- (a) the difference in longitude between the two towns. (1 mark)
- (b) (i) the distance between A and B along parallel of latitude in km (take radius of the earth as 6370km and $\pi = \frac{22}{7}$). (3 marks)
- (ii) in nm. (2 marks)
- (c) Find local time in town B when it is 1.45pm in town A. (4 marks)

18. Mr. Johnson is a teacher in Kenya .He earns a basic salary of Sh. 19,620 per month. He is paid a house allowance of Sh. 12,000, a medical allowance of Sh. 2,246 and a commuter allowance of Sh. 4,129 .He is deducted Sh. 1,327 towards a Retirement Benefit's Scheme. Use the tax rates given below to answer the questions below.

Monthly taxable (shp.m)	Rate of tax (%)
0 – 10,164	10
10,165 – 19,740	15
19,741 – 29,316	20
29,317 – 38,892	25
Over 38,892	30

- (a) Calculate the monthly taxable income. (2marks)
- (b) Calculate the PAYE he pays to the government if he gets a monthly tax relief of Sh. 1162. (6marks)
- (c) Calculate his net monthly salary (2marks)

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

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

(a) State the medium class (1mk)

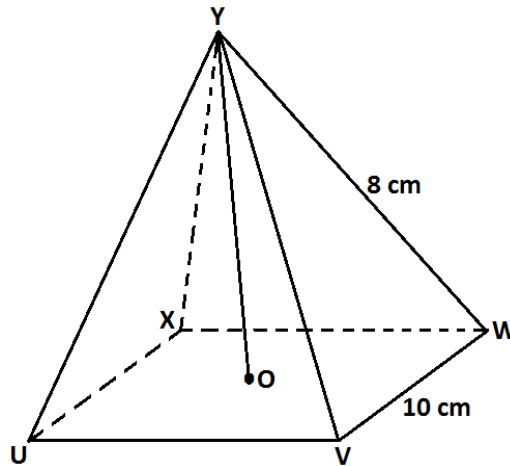
(b) Using a working mean of 45.5, calculate:-

(i) the mean age (3mks)

(ii) the standard deviation (3mks)

(iii) Calculate the 6th decile. (3mks)

20. UVWXY is a right pyramid on a horizontal square base of side 10cm. $YU = YV = YW = YX = 8\text{cm}$.



(a) Calculate the height of the pyramid. (3marks)

(b) The angle between

(i) The slant face YWV and the base UVWX. (2marks)

(ii) YV and the base UVWX. (2marks)

(c) Calculate the angle between the planes UYV and WXY. (3marks)

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

(a) all the three candidates will pass (2mks)

(b) all the three candidates will not pass. (2mks)

(c) only one of them will pass (2mks)

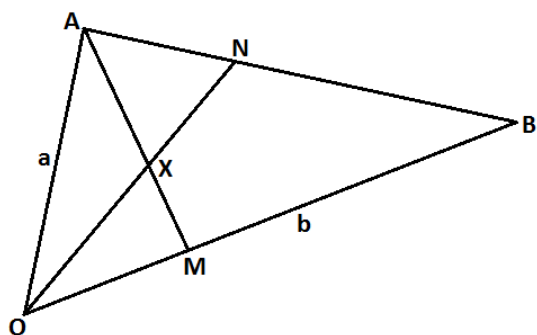
(d) only two of them will pass. (2mks)

(e) at most two of them will pass. (2mks)

22. Complete the table below giving your values correct to 2 d.p. (2marks)

x	0°	15°	30°	45°	60°	75°	90°	105°	120°
$3\cos x^\circ$	3.00		2.60		1.50		0	-0.78	
$4\sin(2x - 10^\circ)$		1.37		3.94	3.76		0.69		-3.06

- (b) draw the graphs of $y = 3\cos x^0$ and $y = 4\sin(2x - 10^0)$ on the same set of axis on the grid provided. (GRAPH PAPER PROVIDED) (4marks)
- (c) Use your graph to find values of x for which $3\cos x - 4\sin(2x - 10^0) = 0$. (2marks)
- (d) State
- (i) The amplitude of the graph $y = 3\cos x$. (1mark)
- (ii) The period of the graph $y = 4\sin(2x - 10^0)$. (1mark)
23. Use a ruler and a pair of compasses only all constructions in this question.
- (a) Construct the rectangle ABCD such that $AB = 7.2\text{cm}$ and $BC = 5.6\text{cm}$. (3mks)
- (b) Construct on the same diagram the locus L_1 of points equidistant from A and B to meet with another locus L_2 of points equidistant from AB and BC at M. measure the acute angle formed at M by L_1 and L_2 . (3mks)
- (c) Construct on the same diagram the locus of point K inside the rectangle such that K is less than 3.5cm from point M. Given that point K is nearer to B than A and also nearer to BA than BC, shade the possible region where K lies. Hence calculate the area of this region. Correct to one decimal place. (4mks)
24. In the figure below, M and N are points on **OB** and **BA** respectively such that **OM: MB = 2:3** and **BN: NA = 2:1**. ON and AM intersect at X



- (a) Given that **OA = a** and **OB = b**, Express in terms of **a** and **b**
- (i) **ON** (2marks)
- (ii) **AM** (1mark)
- (b) Given that $\mathbf{OX} = h\mathbf{ON}$ and $\mathbf{AX} = k\mathbf{AM}$ where h and k are scalars
- (i) Determine the constants k and h (5marks)
- (ii) The ratio which X divides **AM**. (2marks)



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