CROSSCOUNTRY MOCKS

MATHEMATICS

(MOCKS TRIALS 1-10)

SERIES 1 COMPILATION OF RECENT TOP CROSS-COUNTRY MATHEMATICS MOCKS IDEAL FOR KCSE REVISION PURPOSES.

KCSE MODEL MOCK TRIALS

SERIES 1

FOR MARKING SCHEMES CALL/WHATSAPP

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CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 1 PAPER 1

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

(a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*
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(f) Non- programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION A (50 MARKS)

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

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

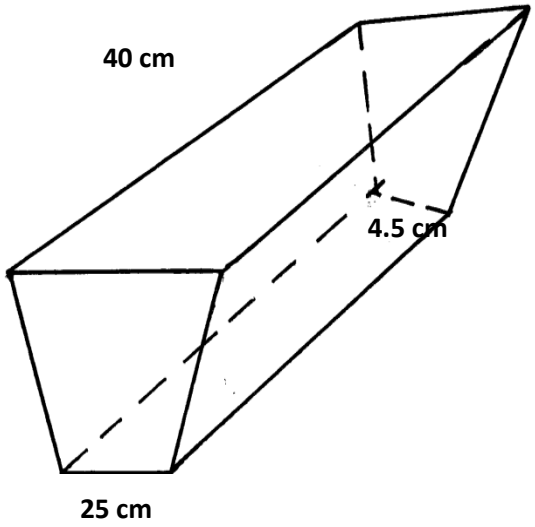
3. Without using table or calculators, evaluate $\sqrt{\frac{0.0032+0.0608}{1.44x0.4}}$

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

5. In a fundraising committee of 45 people, the ratio of men to women is 7:2. Find the number of women required to join the existing committee so that the ratio of men to women is changed to 5: 4. **(3mks)**

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

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

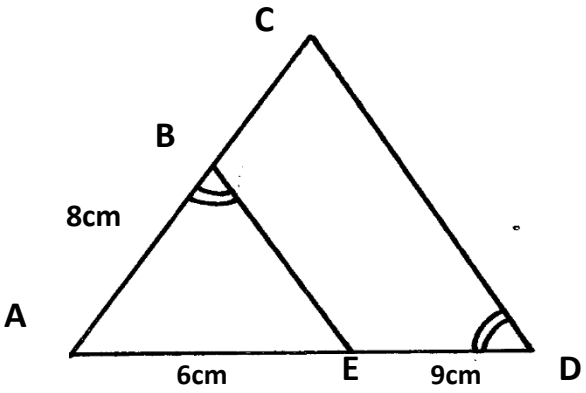


8. Jemima's team entered a contest where teams of students compete by answering questions that earn either 3 points of 5 points. Jemima's team scored 44 points after answering 12 questions correctly. How many five-points questions did the team answer correctly. **(3mks)**

9. Using compass and ruler only construct a triangle Arc such that AB= 6cm ,BC = 5cm and angle ABC = 67.5o measure the length of AC **(4mks)**

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

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



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

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

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

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

15. Give the matrices $A = \begin{pmatrix}3 & 2\\4 & 1\end{pmatrix}$ and $B = \begin{pmatrix}1 & -1\\2 & 3\end{pmatrix}$ and that C = Ab, find the inverse of C . **(3mks)**

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

SECTION II

Answer only five questions from this section

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

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

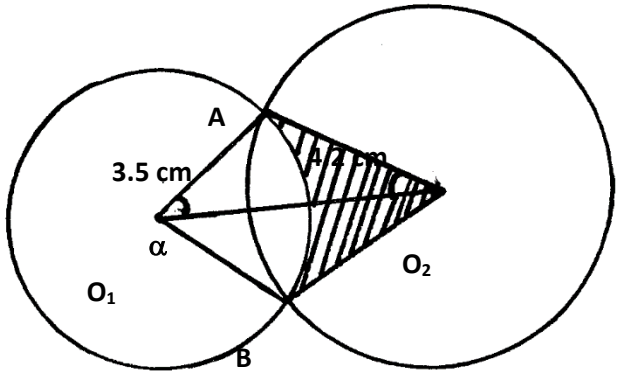
(b) From the diagram determine

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

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

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

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



Calculate

(a) The size of ∠AO1B (to the nearest degree) **(3mks)**

(b) The size of ∠ A O2 B (to the nearest degree) **(3mks)**

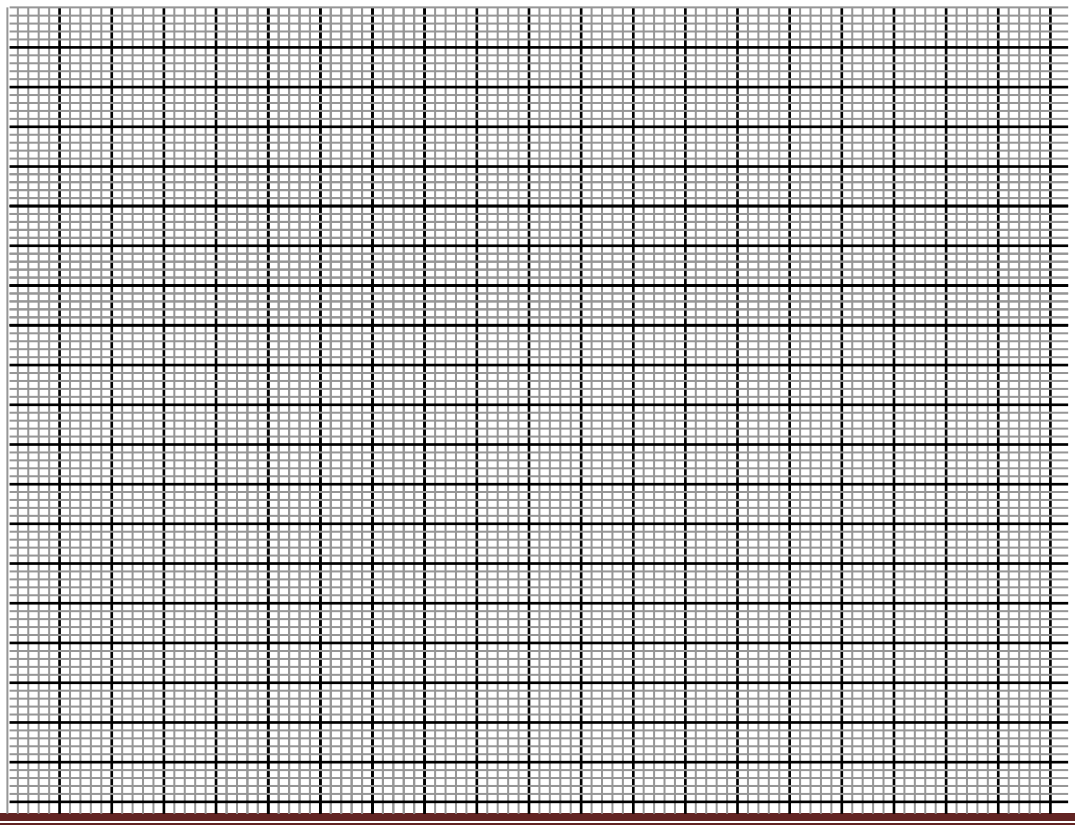
(c) The area of quadrilateral O1AO2B, correct to 2 decimal places. **(2mks)**

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

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

X	-4	-3	-2	-1	0	1	2
2x2	32		8	2	0	2	
4x-3			-11		-3		
Y			-3			3	13

(b) Draw the graph of the function y = 2x3 + 4 4x – 3 on the grid provided. **(3mks)**



(c) Use your graph to estimate the roots of the equation $2x2 + 4x - 3 = 0$ **(1mk)**

(d) Use your graph to obtain the roots of the equation $2x2 + x - 5 = 0$ to 1 decimal place. **(3mks)**

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

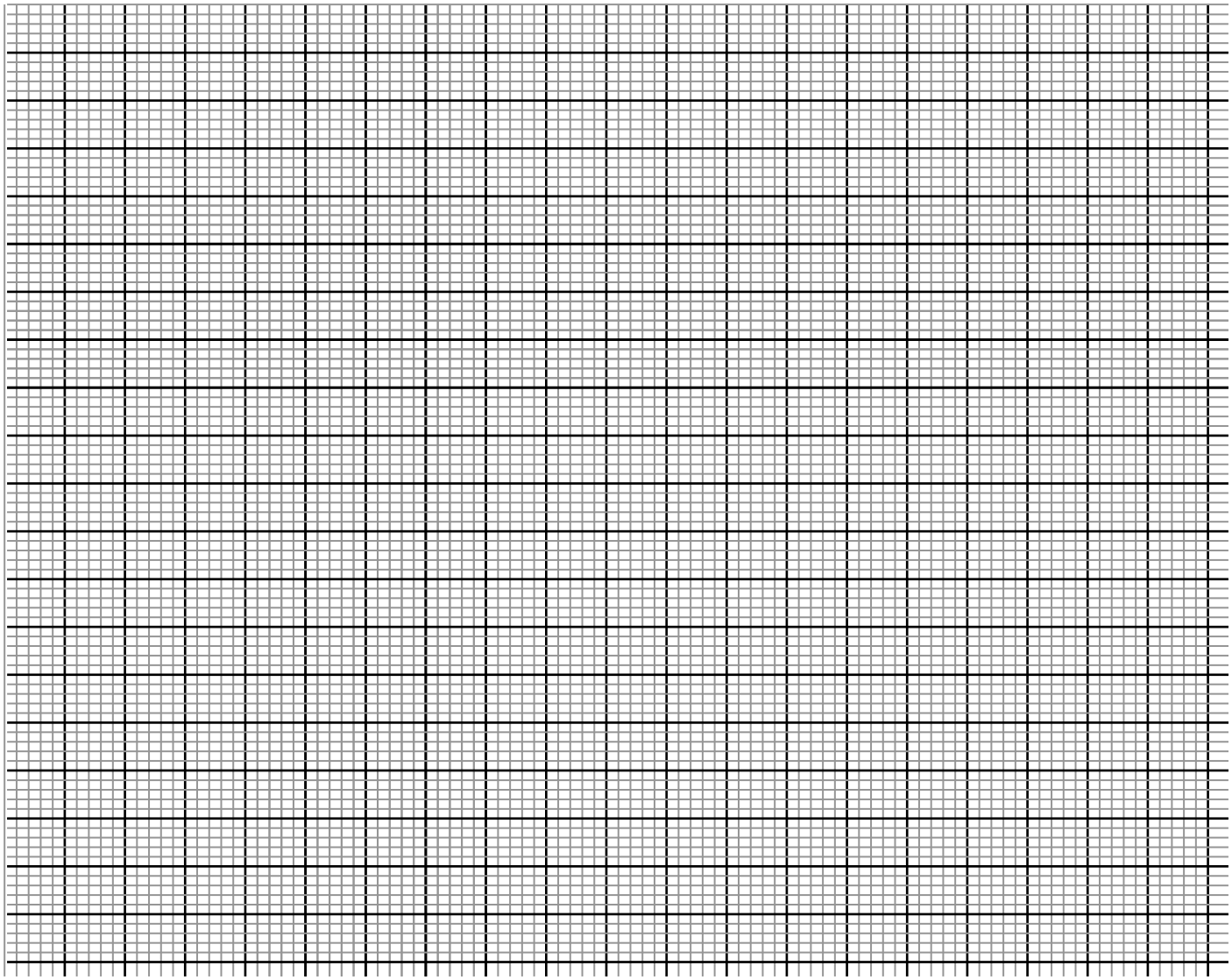
20 The table below shows patients who attend a clinic in one week and were grouped by age as shown in the table below.

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

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

(b) On the grid provided draw a histogram to represent the distribution. **(3mks)**

Use the scales: 1cm to represent 5 units on the horizontal axis 2 cm to represent 5 units on the vertical axis.



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

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

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

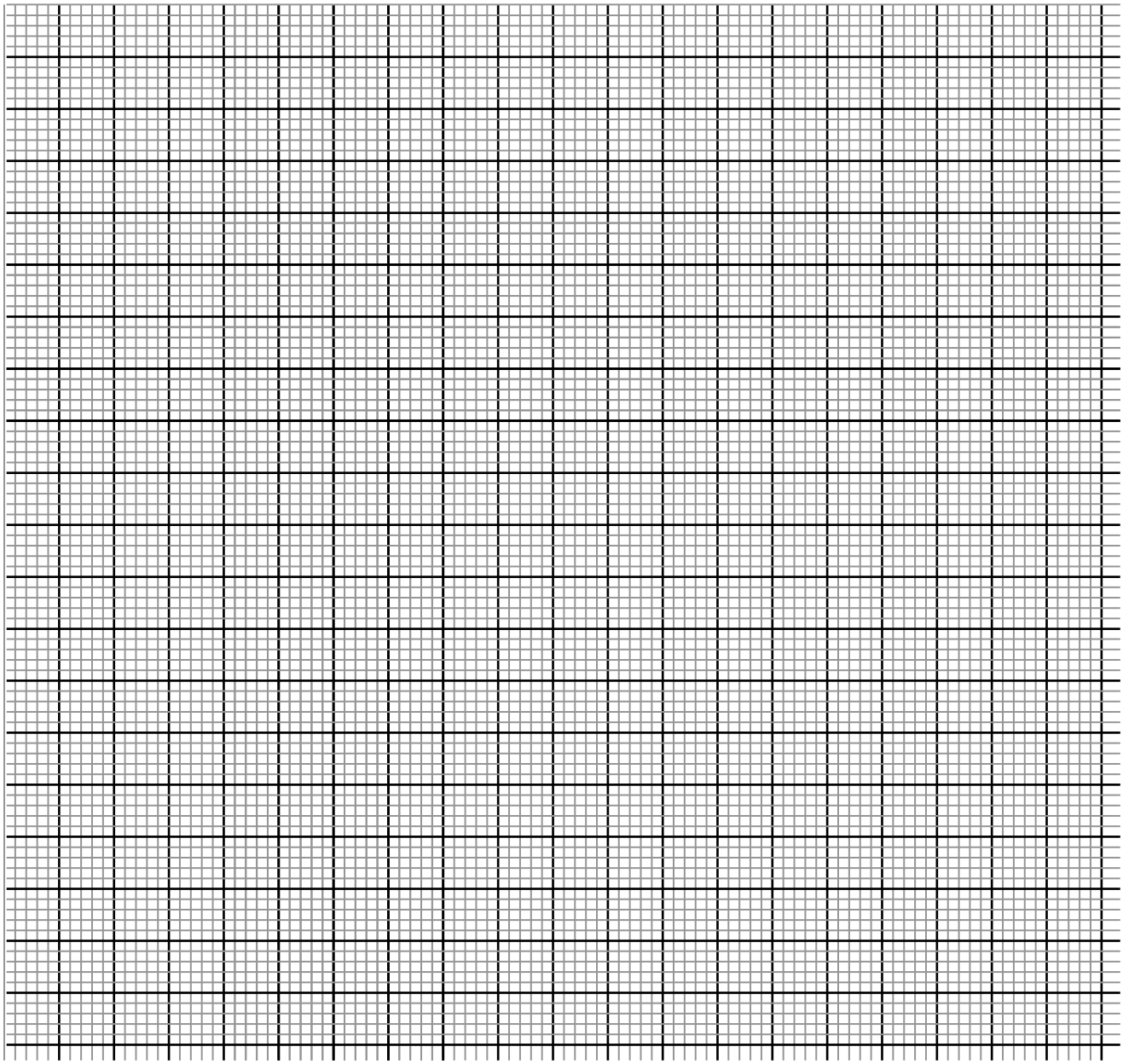
$Y > -3$

$4y \leq 5x + 20$

$2y < -5x + 10$

$4y \leq -3\ 3x - 12$

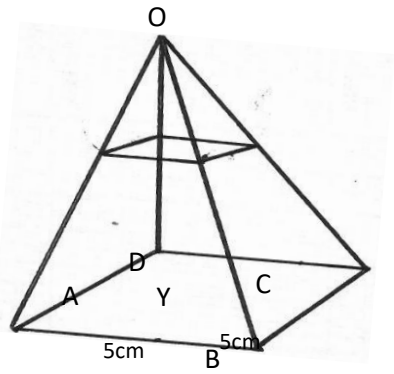
(b) calculate the area of this region in a square units **(2mks)**



22.(a) Use trapezium rule with 8 strip to find the are bounded by the curve y = x 2 + 2 and the x – axis, x = 2 and x = 2 **(5mks)**

(b) Calculate the actual area in (a) above Hence find the percentage error in the area. **(5mks)**

23.



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

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

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

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

24. Complete the table below. **(2mks)**

X	-180^o	-150^o	-120^o	-90^o	-60^o	-30^o	0^o	30^o	60^o	90^o	120^o	150^o	180^o
$3\sin\left(\frac{x}{2}+15\right)$	-2.90			-1.50						2.60		3.0	
Cos (2x + 30)^o	0.87		-0.87		0			0			0	0.87	

(b) On the same set of axes draw the graph of y = 3 sin $\left(x/2+15\right)$ and y = Cos (2x + 30) for

$-180 \le x \le 180^o$ **(5mks)**

(c) (i)Use the graph in (b) above to solve 3 sin $\left(x/2+15\right)$ Cos (2x + 30) = 0 **(1mk)**

(ii) State the period and the amplitude of 3 sin $\left(x/2+15\right)$ **(2mk)**

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 1 PAPER 2

TIME: 2 ½ HOURS

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GRAND TOTAL

1. Use logarithms to evaluate : $\frac{34.33}{\sqrt{5.25x0.042}}$ **(4mks)**

2 A sales man gets a commission of 2.5 % on sales upto sh. 100.00 . He gets an additional commission of 1.6 % on sales above this. Calculate the commission he gets on sales worth sh. 320.00 **(3mks)**

3. Make P the subject of the formula **(3mks)**

$w = \frac{PQ}{\sqrt{(P^2 - Q)}}$

4. Two dice are tossed and the outcome on each fie recorded. Find the probability that the sum shown on both die is greater or equal to 7. **(2mks)**

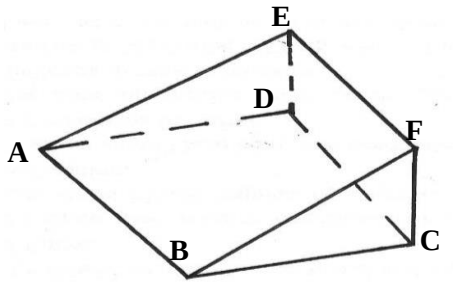
5. Brain and Bonface working together can do a piece of work in 6 days. Bonface working a lone would take 10 days to complete the work. They start working together but after 4 days Bonface leaves and the remaining work is done by Brian. Find how long Brian takes to complete the remaining work. **(4mks)**

6. Two variables M and N are such that M varies partly as N and Partly as the square root of N. given that N = 16 when M = 500 and N = 25 when M = 800. Find the equation connecting M and N **(4mks)**

7. Given log = 0.4771 and log 5 = 0.6990, find without using table or calculator log 0.045. **(3mks)**

8. A certain sum of money put to compound interact amounts to sh.5600 at the end of the first year. The interest added at the end of the second year is sh.672, calculate the rate percent p.a and the sum invested. **(4mks)**

9.

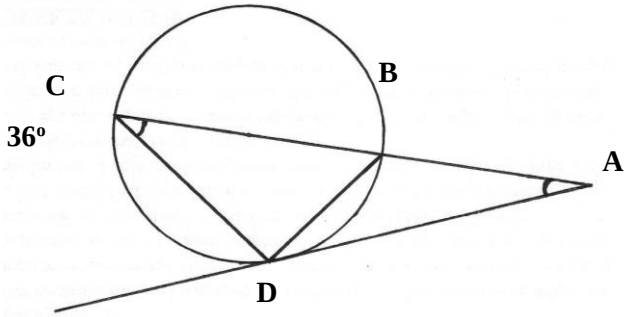


The diagram above represents a redge in which AB= BC= 12cm and CF = 5cm. determine the angle between the plane ABFE and the plane ABCD **(2mks)**

10. Find the constant term in the expansion $\left(3x - \frac{1}{2x}\right)^8$ **(3mks)**

11. A tuktuk taxi travelling at 20m/s accelerates uniformly and in 4 seconds, its velocity is 30m/s. it maintains this velocity for another 5 seconds before decelerating uniformly to rest after 3 seconds. calculate the total distance travelled by the tuktuk during the journey. **(3mks)**

12. In the figure below, AB X is a tangent . Angle CAB = 17o and angle ACB = 36o calculate the size of angle BDC (3mks)



13. Find $\frac{dy}{dx}$ given that $y = \frac{x^2 + 4x + 4}{x + 2}$ **(3mks)**

14. The perimeter of a triangular field is 120m. two of the sides measures 21m and 40m. calculate the size of the largest angle of the field. **(3mks)**

15. Solve for x $2^{2x+3} - 9(2^x) + 1 = 0$ **3mks)**

16. Peters joined a firm with a commencing salary of 20,000 per month with an animal monthly increment of 10%. How much does he receive per moth during the seventh year. (3mks)

17. An examination involves a written and a practical test. The probability that a candidate passes the written test is 6/11. If a candidate passes a written test then the probability of passing the practical test is 3/5, other wise it would be 2/7.

(a) Illustrate this information on a tree diagram **(2mks)**

(b) Determine the probability that a candidate is awarded

(c) (i) credit for passing both tests **(2msk)**

(ii) pass for passing the written test **(2mks)**

(iii) retake for passing the test **(2mks)**

(iv) Fail for not passing the test **(2mks)**

18.. The relationship between the variables a and y is believed to be y = a/x + bx. Where a and b are constants. The table below shows corresponding values of x and y

X	1	2	3	4	5
Y	5.00	7.00	9.67	12.50	15.40

(a) Write the relationship in the form of y = mx + c **(1mk)**

(b) By drawing a suitable straight line graph estimate the values of a and b **(7mks)**

(c) Find the value of y when x = 1000 **(2mks)**

19. The vertices of triangle ABC are a(3,1) B (0,2) and c (2,-1)

(a) A'B'C' is the image of ABC under reflection on the line y x = 0. Draw A'B'C' on the grid provided hence state the co-ordinates of its vertices **(3mks)**

(b) A"B"C" is the image of A'B'C' under positive quarter turn about the origin. Draw triangle A"B"C" and state the co-ordinates of its vertices. **(3mks)**

(c) A'''B'''C''' is the image of triangle ABC under shear matrix, y axis invariant and linear scale factor 3. Write down the shear matrix hence find the co-ordiantes of the vertices of triangle A'''B'''C''' **(1mk)**

20. Two points P and Q are found on the earth's surface the position of P is (52°S,66°W) and Q (52°S,144°E). Taking earth's radius as 6370km,

(a) find the difference in longitude between the two points P and Q **(1mk)**

(b) (i) calculate the shortest distance between points P and q along (i) the latitutde in km **(1mk)**

(ii) The longitude in Km **(4mks)**

(d) A plane travelling at 800km/hr leaves point P At 10.00am and sais through south pole to point q. Find the local time the plane arrives at point Q to the nearest minute. **(4mks)**

21. Tosincompany has two types of machines, A and B for juice production. Type A machine can produce 800 litres per day while type A machine can produce 1600 litres per day. Type A machine needs four operators and type B needs seven operators. At least 800 litres must be produces daily and the total number of operators should not exceed 41. There should be two or more machine of each type.Leting x be the number of machines of type A and y for type B.

(a) Form all inequalities in x and y to represent the above information **(4mks)**

(b) On the grid provided below,draw the in equalities and shade the unwanted region **(4mks)**

(c) Use the graph I (b) above to determine the least number of operators required for the maximum possible production. **(2mk)**

22. Using a ruler and a compass only,construct a triangle ABC such that AB = 6.8 cm, BC = 5.6 cm and angle ABC = 37 ½ ° **(3mks)**

(b) Locate the :

(i) Locus P such that angle APB = angle ACB **(3mks)**

(ii) Locus Q such that Q is equidistant to points A and B **(2mks)**

(iii) Locus R such that R is equidistant to lines AB and AC **(2mks)**

23. The distance S meters from a fixed point O, covered by a particle after t seconds B given by the equation $S = t^3 - 6t^2 + 9t + s$

(a) calculate the gradient of the curve at t = 0.5 seconds **(3mks)**

(b) Determine the values of S at the turning points of the curve **(3mks)**

(c) Sketch the curve in the space provided. **(4mks)**

24. The table below shows the distribution of marks obtained by 50 students

Marks	45-49	50-54	55-59	60-64	65-69	70-74	75-79
No of students	3	9	13	15	5	4	1

(a) Calculate the mean using asuitable assumed mean **(3mks)**

(b) calculate the variance **(3mks)**

(c) calculate standard deviation **(1mk)**

(d) If 30 students were to pass ,calculator the pass mark (give your answer to nearest whole mark) **(3mks)**

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 2 PAPER 1

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

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GRAND TOTAL

SECTION I:(50 MARKS)

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

1. Without using a calculator, evaluate:

$$\frac{1\frac{4}{5}\ of\ \frac{25}{18} \div 1\frac{2}{3} \times 24}{2\frac{1}{3} - \frac{1}{4}\ of\ 12 \div \frac{5}{3}}$$

Leaving your answer as a mixed number. **(3mks)**

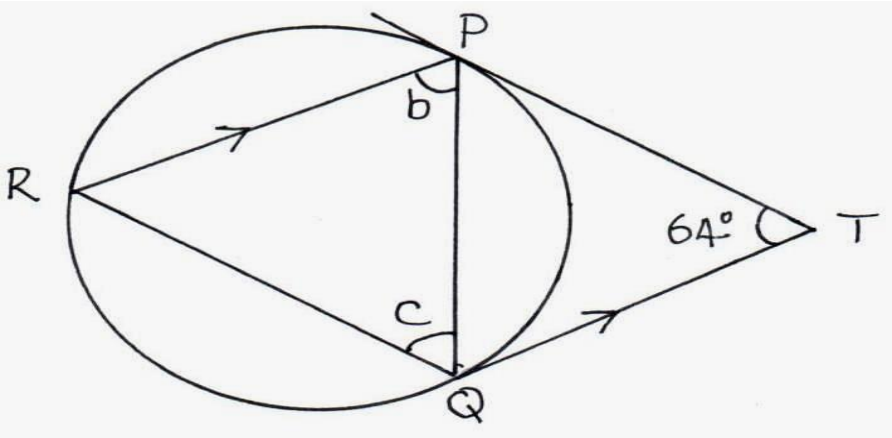
2. Simplify:

$$\frac{2a^2 - 3ab - 2b^2}{4a^2 - b^2}$$ **(3mks)**

3. Without using Mathematical tables or a calculator evaluate:

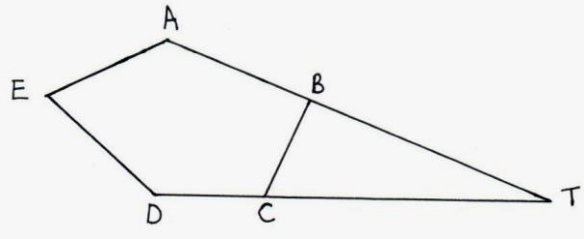
$6\ Log_2 \sqrt[3]{64} + 10\ Log_3 \sqrt[5]{243}$ **(3mks)**

4. In the figure below TP and TQ are tangents to the circle and PR is parallel to TQ. Find the angle marked b and c. **(2mks)**



5. A train 20m long is moving at an average speed of 52km/h. Another train 30m long is moving in the opposite direction at an average speed of 48km/h. How long do the trains take to completely pass each other. Leave your answer in seconds. **(3mks)**

6. ABCDE is a regular pentagon. Its sides AB and DC are produced to meet at T. Calculate ∠BTC. **(2mks)**



7. Two cylindrical buckets are similar in shape with base radius 7cm and 10.5cm. The smaller bucket holds 4 litres. Calculate the volume of the larger bucket. **(3mks)**

8. A fridge costs Sh.1400. It may be bought at hire purchase by paying a deposit of Sh.3500 and the remainder, which has an interest charge of 18% added, in 12 equal monthly installments. Calculate:
The monthly installments to the nearest shilling. **(4mks)**

9. The second term of four consecutive odd numbers is 2n + 1. If the sum of the three numbers is 10104. Find the value of n. **(3mks)**

10. A translation maps a point P (3, 2) onto P^1 (5, -4)

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

(b) A point Q^1 is the image of the point Q (2, 5) under the same translation. Find the length of P^1Q^1, leaving the answer in surd form. **(3mks)**

11. A contractor employs 40 men to do a piece of work in 60 days each man working 9 hours a day. He is then requested to do the job in 48 days. How many more men working 10 hours a day does he need to employ. **(3mks)**

12. Solve for y if: $9^{(y2)} = 27^{(2y + 2)}$. **(4mks)**

13. Solve for χ:

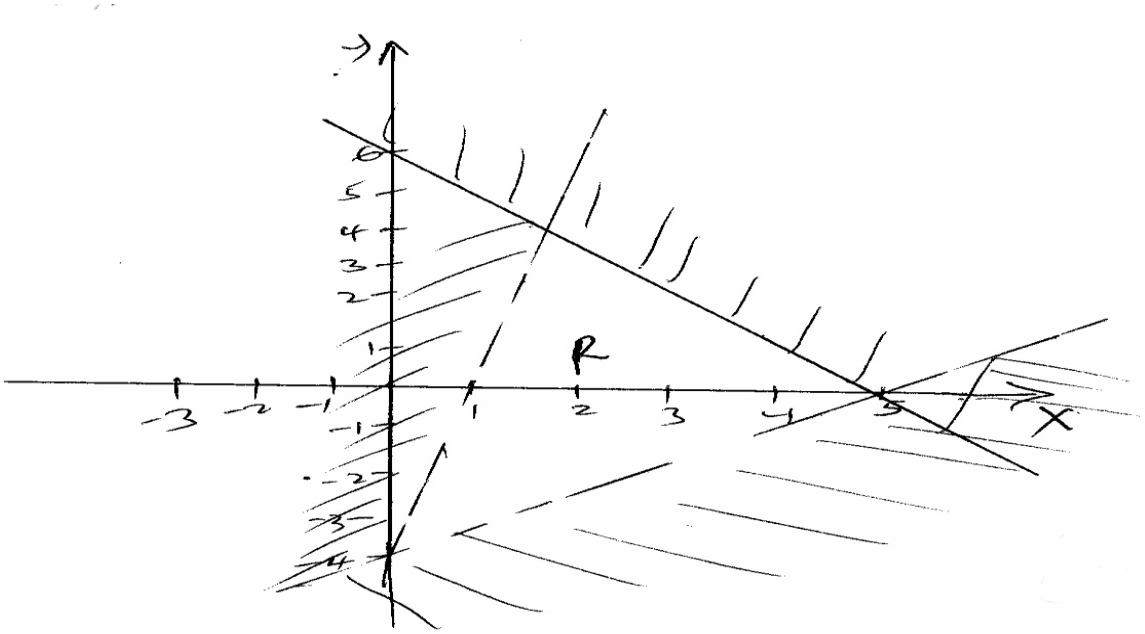
$\text{Sin}(2\chi + 20) = \text{Cos}\ \frac{\chi}{3}$. (3mks)

14. **(i)** Express 48 and 60 as a product of their prime factors. **(2mks)**

(ii) A room of side 48m and 60m is to be decorated using square tiles side XM. Find the greatest area of the tile. **(2mks)**

15. A man spent $\frac{1}{9}$ of his salary on food and $\frac{1}{4}$ of the remainder on electricity and water bills. He paid fees with 20% of his salary and invested 16% of what was left on business. After taking a game drive on which he spent Ksh.2000, he saved Ksh.5350. Calculate his monthly earnings. **(3mks)**

16. Form three inequalities that satisfy the region R. **(3mks)**



SECTION II:(50 MARKS)

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

17. Three hundred and sixty litres of a homogeneous paint is made by mixing three paints A, B and C. The ratio by volume of paint A to paint B is 3: 2 and paint B to paint C is 1: 2. Paint A costs Sh.180 per litre, paint B Sh.240 per litre and paint C Sh.127.50 per litre. Determine:

(a) The volume of each type of paint in the mixture. **(5mks)**

(b) The amount of money spent in making one litre of the mixture. **(3mks)**

(c) the percentage profit made by selling the mixture at Sh.221 per litre. **(2mks)**

18. The length and breadth of a rectangle are given as $(6\chi - 1)$ and $(\chi - 2)$ cm respectively. If the length and breadth are each increased by 4cm, the new area is three times that of the original rectangle.

(a) Form an equation in χ and solve it. **(4mks)**

(b) Find the dimensions of the original rectangle. **(2mks)**

(c) Express the increase in area as a percentage of the original area. **(4mks)**

19. Three points A (0, 4), b (2, 3) and C (-2, -1) are vertices of a triangle.

Find:

(a) **(i)** the gradient of AC. **(1mk)**

(ii) the gradient of the perpendicular bisector of line AC. **(1mk)**

(iii) the coordinates of the mid-point of line AC. **(1mk)**

(b) **(i)** the gradient of AB. **(1mk)**

(ii) the gradient of the perpendicular bisector of line AB. **(1mk)**

(iii) The coordinates of the mid-point of AB. **(1mk)**

(c) **(i)** Find the equation of perpendicular bisector of AC. **(1mk)**

(ii) Perpendicular bisector of AB. **(1mk)**

(iii) Hence find the coordinates of the circumcentre of the triangle. **(2mks)**

20. A bird flies from a tree P to another tree Q which is 50 metres on a bearing of 030° from P. Form Q the bird flies 80 metres due West to another tree R and finally flies due South to another tree S which is on a bearing of 240° from P.

(a) Construct an accurate scale drawing showing the positions of P, Q, R and S. Use a scale of (1cm = 10m).

(i) From your diagram measure the distance and bearing of R from P. **(3mks)**

(ii) The distance of S from R in metres. **(1mk)**

(iii) The distance of S from P in metres.

21. The table below shows marks out of 40 obtained by 100 students in form 2.

Marks	1 - 5	6 - 10	11 - 20	21 - 25	26 – 40
No. of students	7	$3\chi - 2$	38	$5\chi + 3$	χ

(a) Determine the value of χ. **(2mks)**

(b) Using a scale 1cm to represent 5 marks on the horizontal axis and an area of 1cm² to represent 5 students, draw a histogram to represent this data. **(5mks)**

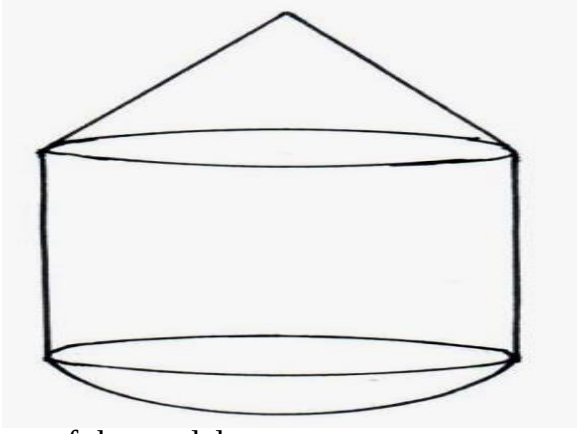
(c) Use histogram to estimate the median. **(3mks)**

22.(a) Use the trapezium rule to estimate the area between the curve $y = 3\chi^2 + 1$, lines $\chi =$ 1 and $\chi = 3$ and X-axis. Use five ordinates. **(3mks)**

(b) Use integration method to find the exact area under a curve $y = 3\chi^2 + 1$. **(3mks)**

(c) Find the percentage error in estimating the area. **(2mks)**

23. **(a)** The figure below is a model representing a rocket capsule. The model whose total height is 15cm is made up of a conical top; a hemispherical bottom and the middle part is cylindrical. The radius of the base of the cone and that of the hemisphere are each 3cm. The height of the cylindrical part is 8cm.

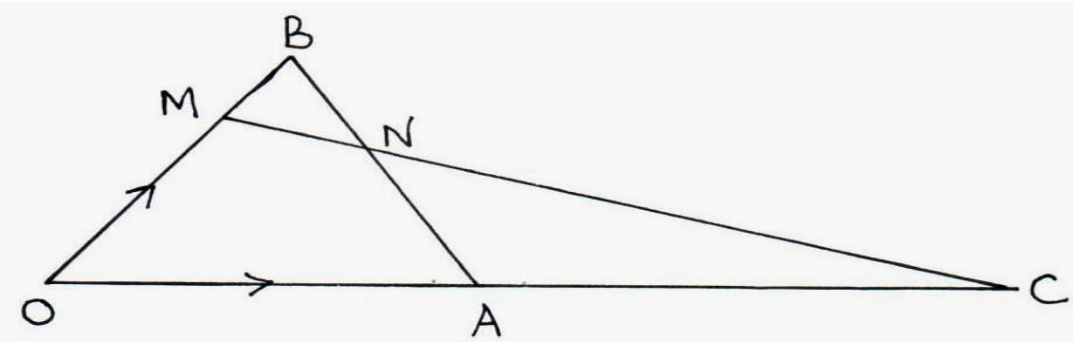


Calculate the external surface area of the model. **(4mks)**

(b) The actual rocket has a total height of 6 metres. The outside of the actual rocket capsule is to be painted. Calculate the amount of paint required if an area of 20m² requires 0.75 litres of the paint. **(6mks)**

24. In the triangle OAB, $\underset{\sim}{OA} = \underset{\sim}{a}$, $\underset{\sim}{OB} = \underset{\sim}{b}$ and $\underset{\sim}{OC} = \frac{3}{2}\underset{\sim}{OA}$.

M divides OB in the ratio 3: 2.



(a) Express in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$ only, the vectors.

(i) AB. **(1mk)**

(ii) MC. **(1mk)**

(b) Given the MN = hMC and BN = KBA, express vector MN in two different ways hence find the value of h and K. **(6mks)**

(c) Show that the points M, N and C are collinear. **(2mks)**

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 2 PAPER 2

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

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FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION I: (50 MARKS)

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

1. Find the percentage error in:

$$\frac{20 \times 25.0}{10.5}$$ **(3mks)**

Use reciprocal and square tables to evaluate, to 4 significant figures.

2. $\frac{1}{485.6} + 8.254^2$ **(3mks)**

3. Make K the subject of the formula and simplify.

$$t = \frac{2y + 1}{\sqrt{2Ky + K}}$$ **(3mks)**

4. Expand $\left(5 - \frac{\chi}{2}\right)^6$ up to term in χ^3 uses your expansion to estimate the value of $\left(4\frac{1}{2}\right)^6$ correct to one decimal place. **(2mks)**

5. Find the number of terms in the series. a + 3a + 9a + ---- 243a. **(3mks)**

6. The number χ is chosen at random from the set (0, 3, 6, 9) and the number y is chosen at random from the set (0, 2, 4, 6, 8). Calculate the probability of each of the following separate evens.

(a) $\chi > 6$. **(1mk)**

(b) $\chi + y = 11$. **(2mks)**

7. Given that $4y = 3 \text{ Sin } \frac{2}{5}\theta$ for $O \leq \theta \leq 360°$ determine.

(a) Amplitude of the curve. **(1mk)**

(b) Period of the curve. **(2mks)**

8. Find the radius and centre of the circle whose equation is:

$$\frac{\chi^2}{2} - 2\chi + \frac{y^2}{2} - 5y + 2 = 0$$ **(3mks)**

9. Simplify the following:

$$\frac{1 - \frac{\sqrt{5}}{3}}{\frac{2}{3} + \frac{\sqrt{5}}{3}}$$

10. Construct the locus of point P such that $\angle APB = 120°$ using a pair of compasses and ruler only. **(3mks)**

11. Given that $5^{\chi} = 7^{y}$ find the ratio χ: y. **(3mks)**

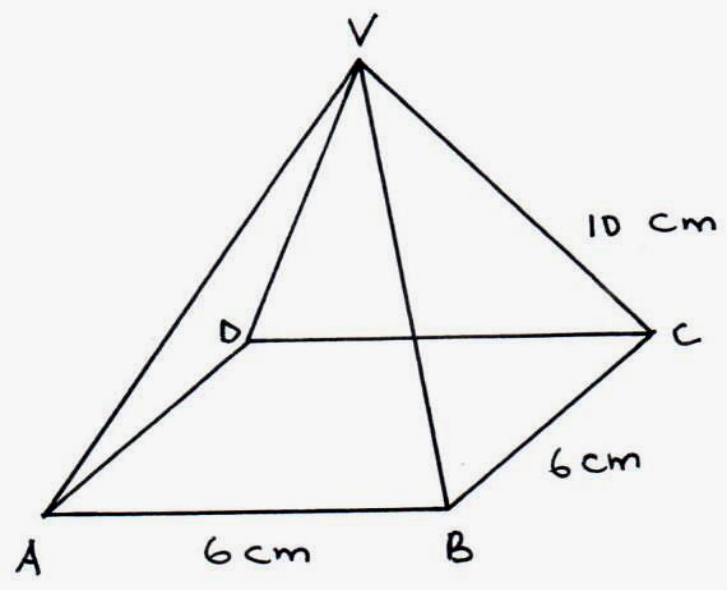
12. Find the equation of the normal to a curve $\chi^2 = 4y + 1$ at the point (2, 0.75).(4mks)

13. Calculate the standard deviation of 42, 45, 46, 50, 52, 56, 59. **(3mks)**

14. OA = 3i + 4j – 6K and OB = 2i + 3j + K. P divide line AB in the ratio 3: -2. Write the coordinate of P. **(3mks)**

15. Two variables y and χ are such that y varies partly as χ and partly as the square of χ. Determine
the relationship between y and χ given when $\chi = 2$, $y = 28$, $\chi = 3$, $y = 48$. **(3mks)**

16. Draw the net of the solid below and calculate surface area of its surfaces VA = VB = VC = VD = 10cm. **(3mks)**



SECTION II: (50 MARKS)

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

17. The first, fourth and thirteenth terms of an Arithmetic Progression (AP) correspond to the first three consecutive terms of an increasing Geometric Progression (G.P). Given the first term of the AP is **a** and the common difference is **d**.

(a) Write down the first three terms of the G.P in terms of **a** and **d**. **(1mk)**

(b) The sum of the third and the eleventh terms of the A.P is 30.
Calculate:

(i) the common difference of the A.P. **(5mks)**

(ii) the first term of the A.P. **(1mk)**

(iii) the common ratio of the G.P. **(1mk)**

(iv) sum of the first 10 terms of the G.P. **(2mks)**

θ	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
$\text{Tan } \frac{1}{2}\theta$	0.0°	0.27		1	1.73	3.73		-3.73	-1.73				
2 Cos θ		1.73	1			1.73				0	1	1.73	2

18. **(a)** Complete the table below.

(b) Using the grid provided and the table above, draw the graph of $Y = \tan \frac{1}{2}\theta$ and Y = 2 Cos θ. **(5mks)**

c) Use your graph to:

(i) Solve $\tan \frac{1}{2}\theta - 2\,Cos\,\theta = O$. **(1mk)**

(ii) determine period of $\tan \frac{1}{2}\theta$. **(1mk)**

(iii) determine amplitude of y = Cos θ. **(1mk)**

19. Income tax for all the income earned is charged at the rate shown in the table below.

Salary in K*f* per month	Tax in Shs. per *f*	Total tax per slab
The first 300	2	
Next 300	3	
Next 300	5	
Next 300	7	
Excess χ	11	

(a) Complete the table by filling the value for the total tax per slab. **(2mks)**

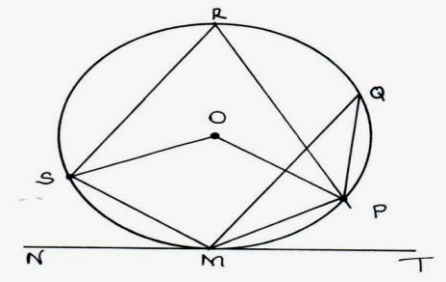
(b) Emma claiming a tax relief of Ksh.600 discovered that a total of Kshs.5710 is deducted from her earnings in form of income tax. How much is her taxable amount in Ksh. **(6mks)**

(c) Determine her net income if she earns a non-taxable entertainment allowance of Shs.3010 and that she pays a bank loan of Kshs.400. **(2mks)**

20. In the figure below O is the centre of the circle TN is a tangent to the circle of m

∠PQM = 15°

∠SMN = 33°



Giving reasons; find

(i) ∠POM.

(ii) ∠PMT

(iii) ∠PRS.

(iv) ∠OSM

(v) ∠OPM

21. (a) Draw the table for the equation $y = \chi^3 + 2\chi^2$. **(2mks)**

χ	-3	-2.5	-2	-1.50	-1	-0.5	0	0.5	1	1.5
$2\chi^2$	18	12.5	8	4.5	2		0		1	4.5

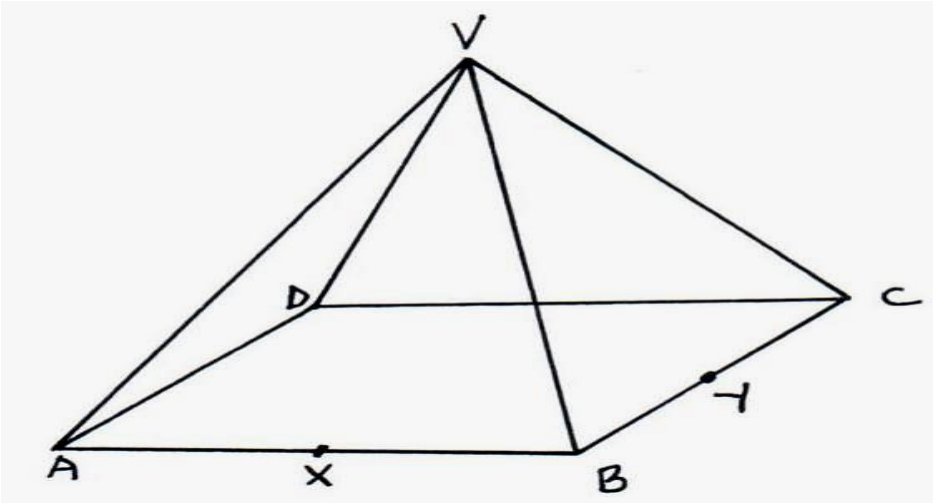
χ^3	-27		-8		1		0		1	
y	-9		0		3		0		2	

(b) On the grid provided, draw the graph of $y = \chi^3 + 2\chi^2$ for $-3 \leq \times \leq 1.5$. Take the scale 2cm for 1 unit on the X-axis and 1cm for 1 unit on the Y-axis. (3mks)

(c) **(i)** Solve the equation $\chi^3 + 2\chi^2 = 0$.

(ii) Solve the equation $\chi^3 + 2\chi^2 - \chi - 2 = 0$ using your graph and another line graph. **(3mks)**

22. The figure below shows a right pyramid with a square base ABCD. VC = 20cm, AB = BC = 10.



X and Y are the mid-point of AB and BC respectively. Calculate

(a) the vertical height VO to 2d.p. **(3mks)**

(b) the angle between VD and ABCD. **(2mks)**

(c) the angle which plane VXY makes with the base. **(5mks)**

23. P and Q are two points on the same parallel of latitude 66°25¹, whose longitudes differ by 120°. Calculate

(a) the radius of the parallel of latitude where P and Q lie R (6370km). **(2mks)**

(b) the distance of P and Q measured along the parallel of latitude. **(2mks)**

(c) **(i)** the length of the straight line joining PQ. **(2mks)**

(ii) the distance PQ along the latitude in nautical mile. **(2mks)**

(d) If an aircraft took 30min to fly P to Q. Calculate its speed in knots. **(2mks)**

24. In a certain Mathematical relationship, the values of A and B are found to obey the relationship $B = CA + KA^2$ where C and K are constants. Below is a table of values of A and B.

A	1	2	4	6
B	3.2	6.75	15.1	25.2

(a) By drawing a suitable straight line graph, determine the values of C and K. **(8mks)**

(b) Hence write the relationship between A and B. **(1mk)**

(c) Determine the value of B when A = 7. **(1mk)**

CROSSCOUNTRY MOCKS
MATHEMATICS

TRIAL 3 PAPER 1

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

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SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION 1 (50 Marks)

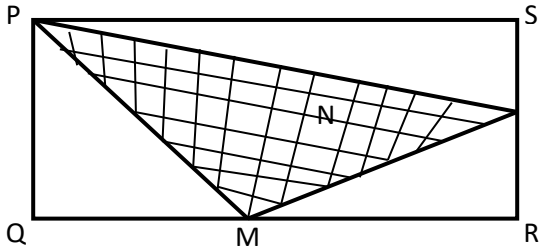
Answer ALL questions from this section

1. Evaluate: $\frac{\frac{1}{2}\ of\ 18 \div -3 + 2\frac{1}{2} x \frac{3}{-5}}{\frac{1}{2} + 3\frac{3}{4} \div \frac{3}{4}}$ **(3 marks)**

2. A line L passes through point (3, 1) and is perpendicular to the line 2y = 4x + 5. Determine the equation of L **(3 marks)**

3. Solve the following inequalities and represent the solution on a number line and hence state the integral values of x $7x - 4 \leq 9x + 2 < 3x + 14$ **(4 marks)**

4. In the figure below PQRS is a rectangle in which PS = 10Kcm and PQ = 6Kcm M and N are midpoints of QR and RS respectively. Find the area of the shaded part. **(4 marks)**



5. A seven sided polygon has three of its angles equal to θ and the other angles are (2θ - 30), (θ 28), 3(θ - 4) and (126 - θ). Calculate the value of θ **(3 marks)**

6. Solve for x in the equation. **(3 marks)**

$\frac{81^{2x}\ x\ 27^{x}}{9^{x}} = 729$

7. The GCD and LCM of three numbers are 3 and 1008 respectively. If two of the numbers are 48 and 72, find the least possible value of the third number. **(3 marks)**

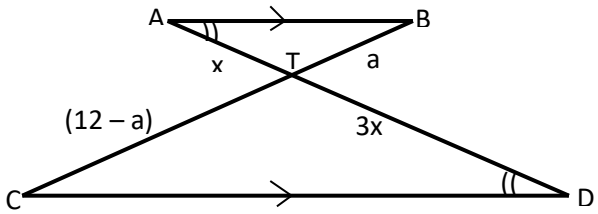
8. Mr. Waweru needs to import a car from Japan where cost is USD 5000 outside Kenya. He intends to buy the car through an agent who deals in Japanese yen. The agent will charge him 20% commission on the price of the car and further 80,325 Japanese yen for shipment of the car. How many Kenya shillings will he need to send to the agent to obtain the car given that?

1USD = 105.00 yen and 1USD = KSh. 63.00

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

(3 marks)

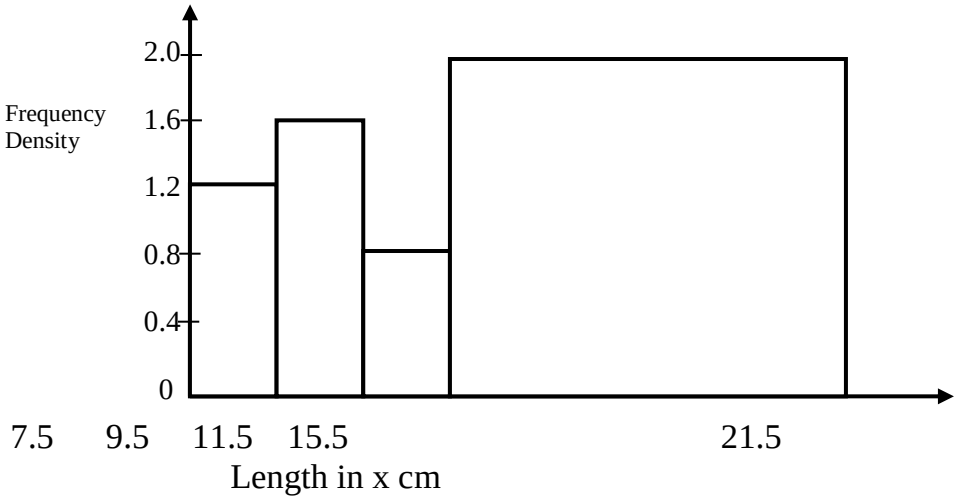
10. The figure below AB//CD, AD and BC intersect at T. Given that AT:TD = 1:3 and CB = 12cm. Calculate the length of TB. **(3 marks)**



11. Use a calculator to work out. **(3 marks)**

$\left(\frac{34^3 - 257}{97\ x\ 1243}\right)^{\frac{1}{4}}$

12. The figure below shows a histogram.



Fill in the table below the missing frequencies.

Length in x cm	Frequency
7.5≤ x ≤ 9.5	12
9.5≤ x ≤ 11.5	
11.5≤ x ≤ 15.5	
15.5≤ x ≤ 21.5	

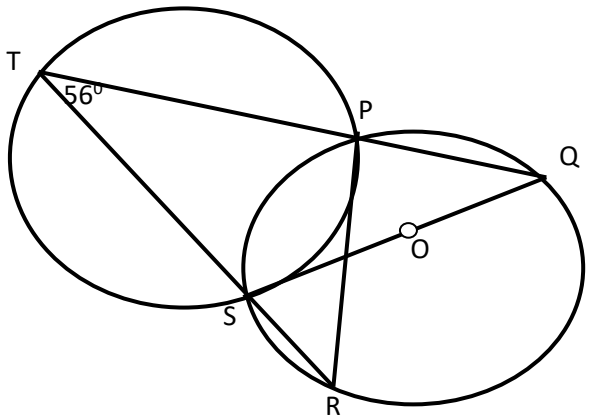
13. Solve for x: $(Log_2^2 x)\ \ Log_2 x^3 = 4$ **(4 marks)**

14. Mutua bought 8 pairs of trousers and six shirts at Sh. 4160. Had he bought twice as many shirts and half as many trousers, he would have saved Sh. 160. Find the cost of each item. **(3 marks)**

15. Simplify the following expression. **(3 marks)**

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

16. In the figure below O is the centre of circle PQRS. ∠PTS = 56^0 and ∠PQS = 28^0 and TPQ is a straight line.



Find: (a) ∠TSP **(1mark)**

(b) ∠PRQ **(1 mark)**

SECTION II: (50 marks)

17. Three partners Mutua, Muthoka and Mwikali contributed Sh. 600,000, Sh. 400,000 and Sh. 800,000 respectively to start a business of a matatu plying Mbumbuni – Machakos route. The matatu carries 14 passengers with each paying Sh. 250. The matatu makes two round trips each day and ever full. Each day Sh. 6000 is used to cover running costs and wages.

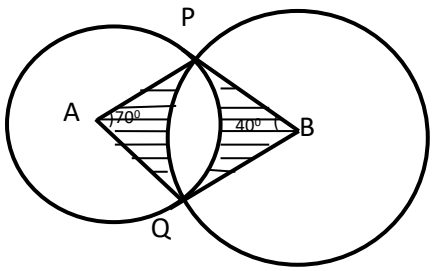
(a) Calculate their net profit per day. **(2 marks)**

(b) The matatu works for 25 days per month and is serviced every month at a cost of KSh.10, 000. Calculate their monthly profit in June. **(1 mark)**

(c) The three partners agreed to save 40% of the profit, 24% to be shared in the ratio of their contribution. Calculate Muthoka's share in the month of July **(4 marks)**

(d) The matatu developed mechanical problems and they decided to sell it through an agent who charged a commission of 5% on selling price. Each partner received KSh. 475,000 from the agent after he had taken his commission. Determine the price at which the agent sold the matatu **(3 marks)**

18. T he diagram below shows two circles centre A and B which intersect at point P and Q. Angle PBQ = 40^0 and angle PAQ = 70^0, and PA = AQ = 8cm.



Use the diagram to calculate to two d.p

a) The length PQ **(2 marks)**

b) The length PB **(2 marks)**

c) Area of minor segment of circle centre A **(2 marks)**

d) Area of minor segment of circle centre B **(2 marks)**

e) The area of shaded region. **(2 marks)**

19. **(a) (i)** Fill the table below for the function.

$y = 2x^2 + 5x - 12$ for $-8 \leq x \leq 4$ **(2 marks)**

x	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4
$2x^2$	128					18				2			32
5x	-40					-15				5			20
-12	-12					-12				-12			-12
y	76					-9				-5			40

(ii) Using the table, draw the graph of the function $y = 2x^2 + 5x - 12$. Use the scale 1cm to 1 unit on the x-axis and 1cm for 10 units for the y – axis **(4 marks)**

(b) Use the graph drawn above to solve the following equations.

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

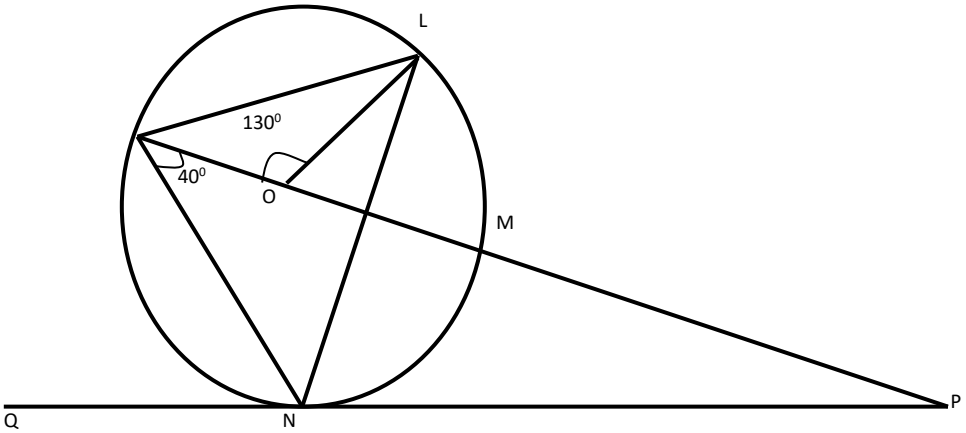
(ii) $3 - 7x - 3x^2 = 0$ **(2 marks)**

20. A country bus left Emali at 11.45 a.m. and travelled towards Mombasa at an average speed of 80km/hr. A Nissan matatu left Emali at 1.15 p.m on the same day and travelled along the same road at an average speed of 120km/hr. The distance between Emali and Mombasa is 400km.

a) Determine the time of the day when the Nissan matatu overtook the bus. **(5 marks)**

b) Both vehicles continue towards Mombasa at their original speeds. Find how long the matatu had to wait at Mombasa before the bus arrived. **(5 marks)**

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



Stating the reason in each case, find the values of the following angles,

a) MLN **(2 marks)**

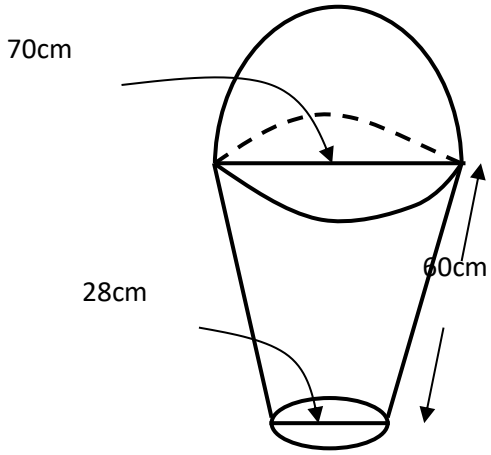
b) OLN **(2 marks)**

c) LNP **(2 marks)**

d) MPN **(2 marks)**

e) KNQ **(2 marks)**

22. The figure below shows a model of a solid in the shape of a frustum of a cone with a hemispherical top.



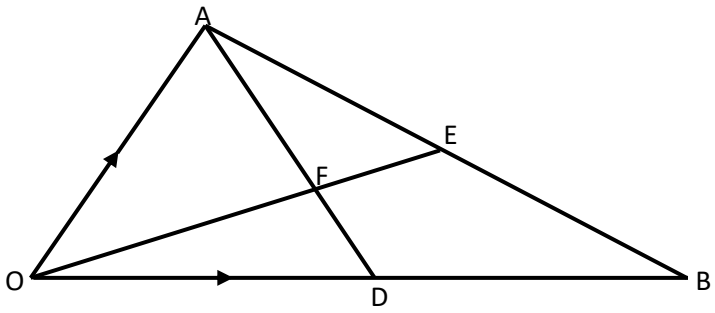
The diameter of the hemispherical top is 70cm and is equal to the diameter of the top of the frustum. The frustum has a base diameter of 28cm and a slant height of 60cm.

(a) Calculate the area of the hemispherical surface. **(1mark)**

(b) Calculate the slant height of the cone from which the frustum was cut. **(4marks)**

(c) Calculate the total surface area of the model **(5 marks)**

23. In the figure, E is the midpoint of AB and OD:OB = 2:5 and F is the point of intersection of OE and AD.



Given that OA = $\underset{\sim}{a}$ and CB = $\underset{\sim}{b}$, Express in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$

(a) (i) OE **(1 mark)**

(ii) AD **(1 mark)**

(b) Given further that AF = tAD and OF = hOE where t and h are scalars, find the values of t and h **(5 marks)**

(c) Show that the points O, F and E are colliner **(3 marks)**

24. The displacement S metres of a body moving along a straight line after t seconds is given by

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

(a) Find its initial acceleration. **(3 marks)**

(b) calculate:-

(i) The time when the body was momentarily at rest. **(3 marks)**

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

(c) Calculate the maximum velocity attained **(2 marks)**

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 3 PAPER 2

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

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17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

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

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

2. Solve for x in the equation
$2\text{Sin}^2x - 1 = \text{Cos}^2x + \text{Sin}x$ for $0 \leq x \leq 360$ **(3 Marks)**

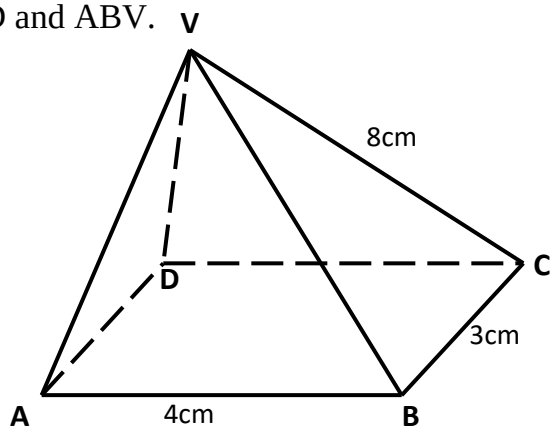
3. (a) Expand $\left(1 + \frac{3}{x}\right)$ upto the fifth term **(2 Marks)**

(b) Hence use your expansion to evaluate the value of $(2.5)^5$ to 3 d.p. **(2 Marks)**

4. Make p the subject of the formula **(3 Marks)**

$$E + x = x + \sqrt{\frac{p-3u}{y-3xp}}$$

5. The figure below shows a rectangular based right pyramid. Find the angle between the planes ABCD and ABV. **(2marks)**



6. A object A of area 10cm^2 is mapped onto its image B of area 60cm^2 by a transformation whose matrix is given by P= $\begin{Bmatrix} x & 4 \\ 3 & x+3 \end{Bmatrix}$. Find the possible value of x **(3 Marks)**

7. The position vector of A and B are a = 4i + 4j – 6k and b = 10i + 4j + 12k. D is a point on AB such that AD:DB is 2:1. Find the co-ordinates of D **(3 Marks)**

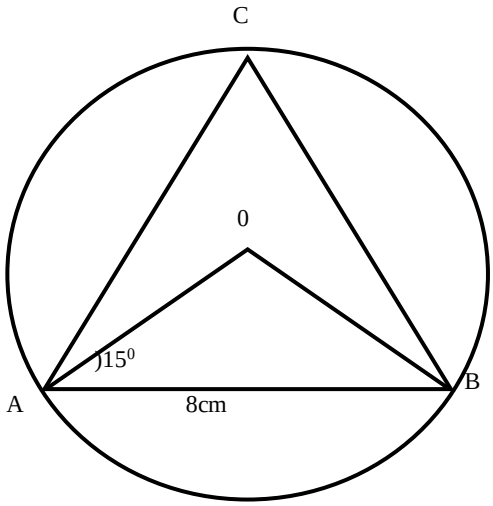
8. A dealer has two types of grades of tea, A and B. Grade A costs Sh. 140 per kg. Grade B costs Sh. 160 per kg. If the dealer mixes A and B in the ratio 3:5 to make a brand of tea which he sells at Sh. 180 per kg, calculate the percentage profit that he makes **(3 marks)**

9. A variable Z varies directly as the square of X and inversely as the square root of Y. Find the percentage change in Z if X increased by 20% and Y decreased by 19% **(3 Marks)**

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

11. Find the centre and radius of the circle whose equation is $2x^2 + 2y^2 - 8x + 12y - 2 = 0$ **(3 Marks)**

12. In the figure below AB = 8cm and O is the centre of the circle. Determine the area of the circle if angle OA = 15^0 **(3 Marks)**



13. Pipe A can fill a tank in 2 hours, pipes B and C can empty the tank in 5 hours and 6 hours respectively. How long would it take

(a) To fill the tank if A and B are left open and C closed **(2 Marks)**

(b) To fill the tank with all the pipes open **(2 Marks)**

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

(b) Hence solve the simultaneous equation below using matrix method **(3 Marks)**

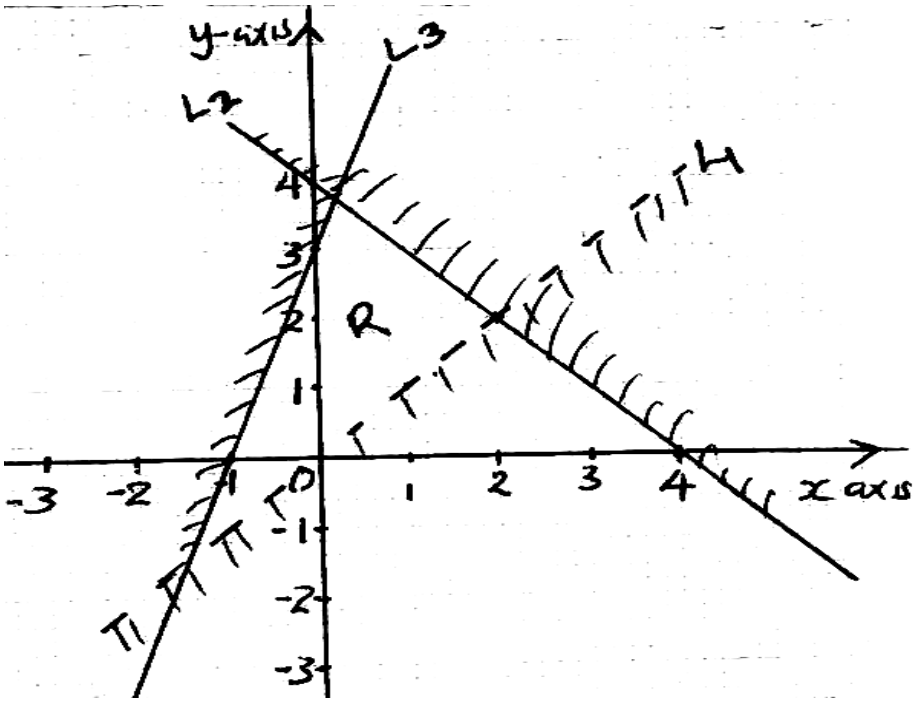
$4x + 3y = 6$

$5y + 3x - 5 = 0$

15. Evaluate by rationalizing the denominator and leaving your answer in surd form. **(2 Marks)**

$$\frac{\sqrt{8}}{1+Cos\ 45^0}$$

16. Form the three inequalities that satisfy the given region R **(3 Marks)**



SECTION II – 50 MARKS

Answer any FIVE questions from this section

17. Mr. Muema is a teacher and his monthly earnings are a basic salary of Sh. 42,000, a house allowance of Sh. 12,000, medical allowance of Sh. 2, 680 and hardship allowance equivalent of 30% of his basic salary. He is entitled to a personal relief of Sh. 1056 per month. He also has an insurance scheme for which he pays a monthly premium of Sh. 4000. He is therefore entitled to a relief on the premium of 15% of the premium paid. Using the taxation schedule below.

Income (K£ p.a.	Rate (%)
1 – 5808	10
5809 – 11,280	15
11,281 – 16,752	20
16,753 – 22, 224	25
22, 225 – 27,696	30
27,697 and above	35

Calculate

(a) Mr. Muema's taxable pay in K£ p.a. **(2 Marks)**

(b) Mr. Muema's net tax per month. **(6 Marks)**

(c) Mr. Muema's net pay per month. **(2 Marks)**

18. (a) Find the table for the curses given by $y = 3\sin(2x + 30^0)$ and $y = \text{Cos}2x$ for x values in the range $0 \leq x \leq 180^0$

x	0	15	30	45	60	75	90	105	120	135	150	165	180
$y = 3\sin(2x + 30)$	1.5		3		1.5		-1.5			-2.60	-1.00		1.5
$y = \text{Cos}\ 2x$	1			0		-0.866		-0.866	-0.5			0.866	1

(b) Using the scale Horizontal axis 1cm represent 30^0, vertical axis 1cm represent 1 unit, draw the graphs of $y = 3\ \text{Sin}(2x + 30)$ and $y = \text{Cos}\ 2x$ **(4 Marks)**

(c) Use your graph to solve the equation $3\ \text{Sin}(2x + 30) = \text{Cos}\ 2x$ **(1 Mark)**

(d) Determine the following from your graph

(i) Amplitude of $y = 3\text{Sin}(2x + 30)$ **(1 Mark)**

(ii) Period of $y = 3\ \text{Sin}(2x + 30)$ **(1 Mark)**

(iii) Period of $y = \text{Cos}\ 2x$ **(1 Mark)**

19. The positions of two towns on the earths surface are A (40^0S, 45^0W) and B (40^0S, 135^0E) Calculate:

(a) The difference in distance between towns A and B along the parallel of latitude and along the great circle (in nm) **(4 Marks)**

(b) Two planes X and Y left town A at 8:00 a.m. flying at 758 knots each towards town B. If plane X flies along the parallel of latitude and plane Y along the great circle; then determine the position of one of the planes when other lands at town B (4 Marks)

(c) What is the local time at town B when the second plane lands (2 Marks)

20. The probability of passing KCSE depends on the performance in the KCPE. If the candidate passes the KCPE, the probability of passing KCSE is $\frac{4}{5}$. If the candidate fails in the KCPE, the probability of passing KCSE is $\frac{3}{5}$. If a candidate passes KCSE the probability that he/she will get employed is $\frac{5}{8}$. If he/she fails KCSE the probability of getting employed is $\frac{1}{3}$. The probability of passing KCPE is $\frac{2}{3}$.

(a) Draw a well labelled tree diagram to represent the above information. **(2 Marks)**

(b) Using the tree diagram, find the probability that a candidate:-

(i) Passes the KCSE **(2Marks)**

(ii) Gets employed **(2 Marks)**

(iii) Passes KCSE and get employed **(2 Marks)**

(iv) Passes KCPE and does not get employed **(2 Marks)**

21. The heights of 100 maize plants were measured to the nearest centimeter and the results recorded in the table shown below.

Height x (cm)	Frequency	d	d^2	fd	fd^2	cf
25 – 29	5			-15		5
30 – 34	12			-24		17
35 – 39	18	-1	1	-18		35
40 – 44	30	0	0	0		65
45 – 49	17	1	1			
50 – 54	11	2				
55 – 59	7	3				

(a) Complete the table **(2 Marks)**

(b) Calculate to 2 d.p.

(i) The mean **(2 Marks)**

(ii) The standard deviation **(2 Marks)**

(c) Using the data above plot an ogive and use it to find the quartile deviation **(4 Marks)**

22. Without plotting estimate the area bounded by $y = x^2+4$, the x – axis and the lines x = 1 and x = 3 by using

(a) Mid-ordinate rule with 4 strips of equal width **(3 Marks)**

(b) Trapezium rule with 4 strips of equal width (**3 Marks)**

(c) The percentage error arising from using the Mid-ordinate rule **(4 Marks)**

23.(a) Construct a parallelogram ABCD in which AB = 9cm, AD = 5cm and angle BAD = 60^0. **(2 Marks)**

(b) Measure the length AC **(1 Mark)**

(c) Show the locus of point P which moves so that it is equidistant from A to C.(1 Mark)

(d) Show the locus of point Q which moves such that angle BQD = 90^0. **(2 Marks)**

(e) The position of point X such that AX ≥ XC and angle BXD = 90^0 **(2 Marks)**

(f) Shade the region inside the parallelogram such that AX≥XC and angle BXD ≥900

(2 Marks)

23. Mumbua owns a restaurant where she stocks two types of drinks called Kazuri and Malezi. The two drinks are produced in cans of the same size. She needs to order fresh supplies and has room for upto 1000 cans. Malezi is more popular and she decides to order at least twice as many cans of Malezi as Kazuri. She wishes however, to have at least 100 cans of Kazuri and not more than 800 cans of Malezi. Taking X and Y to be the number of cans of Kazuri and Malezi respectively;

(a) Write down 4 inequalities involving X and Y which satisfy these conditions**(4 Marks)**

(b) Using a scale 1cm to represent 100 cans on each axis, plot the inequalities and graph them **(4 Marks)**

(c) The profit of a can of Kazuri is Shs. 2. Using your graph determine the number of cans of each drink that the shopkeeper should order to give maximum profit **(2 Marks)**

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 4 PAPER 1

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

(a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*
(b) ***Sign** and write **date** of examination in the spaces provided.*
(c) This paper consists of **TWO** sections. Section **I** and Section **II**.
(d) Answer **ALL** the questions in section **I** and only **FIVE** questions from Section **II**
(e) Marks may be given for correct working even if the answer is wrong.
(f) Non- programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION 1(5OMARKS)

Answer ALL questions in the section

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

$\sqrt{}\overline{5184}$

$5\frac{5}{8} \times 1\frac{7}{9} - 5/4 \text{ of } 4\frac{4}{5} + 2\frac{4}{5} \div \frac{7}{10}$

2 Factories completely: $28x^2 + 3xy - y^2$ **(2mrks)**

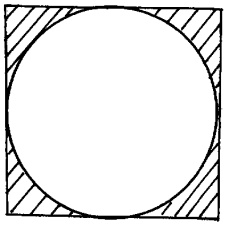
3. Aman walks directly from point **A** towards the foot of a tall building 240m away . After covering 180m, he observes that the angles of elevation of the top of the building is $\mathbf{45^0}$. Determine the angle of elevation of the top of the building from **A**. **(4mrks)**

4. Solve for x in the equation **(3mrks)**

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

5. A perpendicular is drawn from the point **T** (3,5) to the line $2y + x = 3$. Find the equation of the perpendicular. **(3mrks)**

6. Acircle is inscribed in a square as shown below.



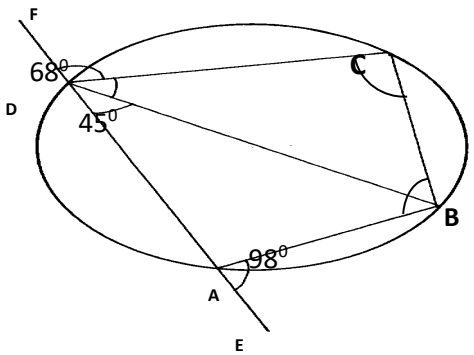
What percentage of the square to 2dp is not covered by the circle? **(3mrks)**

7 Food aid 369,880 French Franc was donated to the Turkana drought stricken area. The food was purchased from United states of America (USA) and paid for in US dollars. Calculate the exact value ofthe food aid in dollars if:

1 French Franc = ksh 12.70 and 1 Us dollars = ksh 84.50

(3mrks)

8. In the figure below, **EADF** is a straight line, $\angle$**CDF** $= 68^0$, $\angle$**BDC** $= 45^0$ and $\angle$**BAE** $= 98^0$



Calculate the size of

(a) $\angle ABD$ **(2mrks)**

(b) $\angle CBD$ **(2mrks)**

9. **(a)** Use a ruler and apair compasses only to construct triangle **ABC** in which **AB** = 6cm, **BC** =8cm and angle **ABC** =60^0. **(2mrks)**

(b) Determine the distance from **A** to the ortho-centre of the triangle in (a) above. **(2mrks)**

10. Simplify the expression $\dfrac{4t^2 - 25a^2}{6t^2 + 9at - 15a^2}$ **(3mrks)**

11. A cyndrical piece of wood of radius 3.5cm and length 130cm is cut lengthwise into two equal pieces. Calculate the surface of one piece. (Takeπ = 22/7) **(3mrks)**

12. The gradient of a curve is given by $(1 - x)^2$ and the curve cuts x - axis at x=3. Determine the equation of the curve. **(3mrks)**

13. Simplify $\dfrac{25^{3/4} \times 0.9^2 \times 2^2}{5^{3/2} \times 3^3}$ in the form **A/B** where **A** and **B** are integers. **(3mrks)**

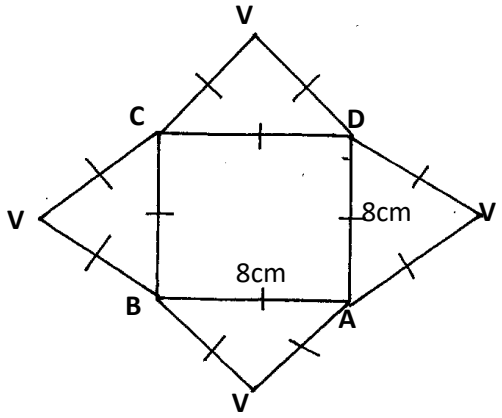
14. Given that $\sin (x + 30)^0 = \cos 2x^0$ for $0^0 \leq x \leq 90^0$

(a) Find the value of **x** **(2mrks)**

(b) Hence find the value of $\cos^2 3x^0$. **(2mrks)**

15. Find the range of x if $2 \leq 3 - x < 5$. **(2mrks)**

16. The diagram below shows the net of a solid.



(a) Sketch the solid. **(2mrks)**

(b) State the order of rotational symmetry of the solid. **(1mrk)**

SECTION II: (50MRKS)

Answer only FIVE questions from this section

17. Chemelil Sugar Academy hall has 200seats. During the District Drama Festival, tickets were sold atsh 150 for a dults and sh 75 for students.

(a) On day one of the festival 80% of the seats in the hall were occupied and twenty of the seats were occupied by students. Calculate the total money collected from the sale of tickets this day. **(3mrks)**

(b) On the last day of the festival, **x** students occupied the seats and all seats were occupied. The money collected from the tickets sales was sh 25,350.

(i) Write down an equation of **x**. **(2mrks)**

(ii) Calculate the value of **x**. **(2mrks)**

(c) The money collected from the sale of tickets during the festival was divided among cost of hosting, allowances for adjudicators and electricity bill in the ration 7: 3: 2. If the allowances amounted to sh 126,000 calculate the

(i) Amount collected during the festival. **(3mrks)**

(ii) The cost of electricity bill during the festival. **(1mrk)**

18. (a) Complete the table below for the function $y = 2x^2 + 6x - 5$ for $-4 \leq x \leq 3$ **(2mrks)**

x	-4	-3	-2	-1	0	1	2	3
$2x^2$			8		0	2		
6x	-24		-12		0			18
-5	-5	-5	-5	-5	-5	-5	-5	-5
y			-9		-5			

(b) Draw the graph of $y = 2x^2 + 6x - 5$ for $0 - 4 \leq x \leq 3$ in the grid provided below. **(3mrks)**

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

(i) $2x^2 + 6x - 5 = 0$ **(2mrks)**

(ii) $2x^2 = x + 6$. **(3mrks)**

19. The frequency table below shows the marks scored by the 40 pupils in a mathematics test.

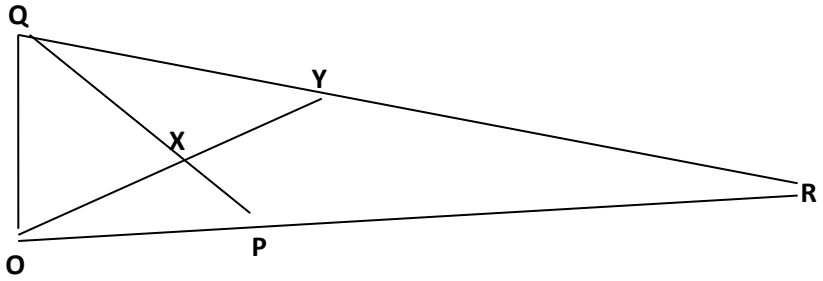
Marks	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99
Number of pupils	2	3	10	12	8	3	2

(a) State the modal mark. **(1mrk)**

(b) Calculate the mean mark. **(5mrks)**

(c) Calculate the median mark. **(4mrks)**

20. In the figure below $\underset{\sim}{OP} = p$ and $\underset{\sim}{OQ} = q$



(a) Express $\underset{\sim}{QP}$ in terms of $\underset{\sim}{p}$ and $\underset{\sim}{q}$ **(1mrk**

(b) If **X** is the mid point of **QP**, find OX in terms of $\underset{\sim}{p}$ and $\underset{\sim}{q}$. **(1mrk)**

(c) Given that $\underset{\sim}{QR} = 3\underset{\sim}{p}$, express QR in the terms of $\underset{\sim}{p}$ and $\underset{\sim}{q}$ **(2mrks)**

(d) Given that $QY = m\underset{\sim}{QR}$ and $OY = n\underset{\sim}{OX}$, where m and n are scalars. Express

(i) OY in terms of m, p and q. **2mrk)**

(ii) OY in terms of n,p and q. **(1mrk)**

(e) Use the results in (d) (i) and (ii) above to find the values of m and n. **(3mrks)**

21. A triangular plot **ABC** is such that the length of the side **AB** is two thirds that of **BC**. The ratio of the lengths **AB:AC** = 4:9 and angle at **B** is obtuse. If the perimeter of the plot is 38m calculate:

(a) The length of the side **BC** **(4mrks)**

(b) (i) The area of the plot to 2dp. **(4mrks)**

(ii) the size of angle **ABC** to 2dp **(2mrks)**

22. (a) Triangle **PQR** has vertices at **P**(3,-1), **Q**(5, 2) and **R**(2, 3). Plot and draw **P′QR′**on the grid provided. **(1mrk)**

(b) Given that triangle **P′ Q′ R′**is the image of **PQR** under positive quarter turn about the origin, plotand draw P′Q′R′ on the same axes as PQR (3mrks)

(c) **P″Q″R″**is the image of **P′Q′R′**after reflection in the line y+x =0. Plot and draw **P″Q″R″** on the same axes as **PQR**and **P′Q′R′** above. **(3mrks)**

(d) State the pairs of triangles above that are:

(i) oppositely congruent **(2mrks)**

(ii) directly congruent **(1mrk)**

23. Two planes, **P** and **Q** leaves Kisumu international Airport at 8.00a.m. Plane p flies in thedirection 320^0 at a speed of 180km/h while plane **Q** flies in the direction 088^0 at a speed of 210km/h.

(a) Use scale drawing to show the relative positions of the Airport plane, plane**P** and **Q** at 9.40a.m. **(5mrks)**

(b) Use the scale drawing above find

(i) The distance between the planes at 9.40 a.m. **(2mrks)**

(ii) The compass direction of the airport from plane **P** at 9.40a.am. **(1mrk)**

(iii) The shortest distance from the airport to the joining the two planes at 9.40a.am. **(2mrks)**

24. The velocity, V m/s, of the particles projected into space is given by the formula: $V = 5t^2 - 2t^2 + 9$ where t is time in seconds elapsed since projection,

Determine:

(a) The acceleration of the particle when t = 4 **(3mrks)**

(b) The value of t which minimizes the acceleration. **(2mrks)**

(c) The velocity of the particle when acceleration is minimum. **(2mrks)**

(d) The total distance moved by the particle between t = 1 to t= 4 seconds. **(3mrks)**

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 4 PAPER 2

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

(a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*
(b) ***Sign*** *and write **date** of examination in the spaces provided.*
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FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION 1

1. Evaluate without using tables or calculator. **(3mrks)**

$$\frac{2.5 \times \sqrt{18}}{3 \times \sqrt{12.8}}$$

2. Given that $6 \leq x \leq 13$ and $2 \leq y \leq 5$. Find the range within which $\frac{x + y}{x - y}$ lies **(3mrks)**

3. (a) Find the standard deviation for the set of numbers 2, 5, 6, 7, 3, 8, 9, 8, **(3mrks)**

(b) Suppose a constant term 5 is added to every number. Find the new standard deviation give a reason for your answer. **(1mrk)**

4. A point **P** divides the line **RT** in the ratio -2:5. Find the coordinates of **P** given **R**(3,1) and **T**(6,-5) **(3mrks)**

5. Expand $(1 + 2x)^7$ upto the term in x^3. Use your expansion to estimate $(1.02)^7$to 4dp.(3mrks)

6. Three business partners Denga, Nyamita and cobe agreed to share shs. 1800 gained after a sale ofproperty. For every shs. 1 that Denga gets, Nyamita gets 50cts and for every shs 2 that Nyamita'sgets cobe gets shs. 3. Find Nyamita's share. **(3mrks)**

7. The probability of a couple getting a baby girl is 0.55 and that of a baby boy is 0.45. The couple intend to have two children. Find the probability that they will be of different sexes. **(3mrks)**

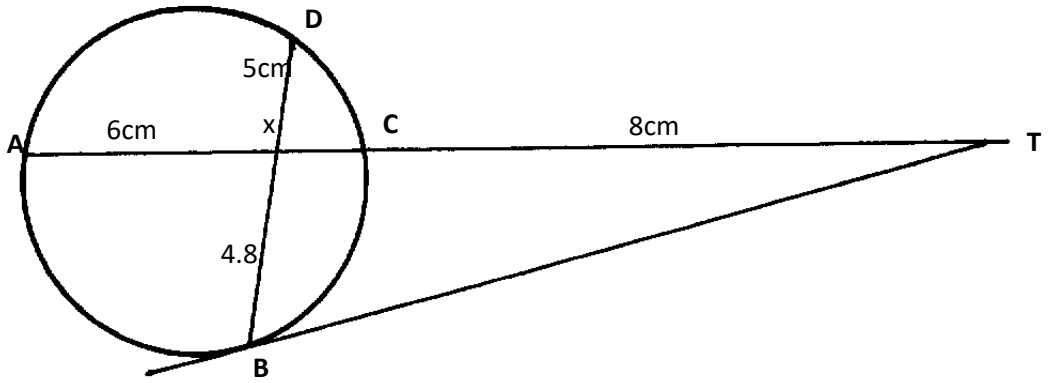
8 Use logarithm table to evaluate. **(4mrks)**

$$\left(\frac{6.79 \times 0.3911^{3/4}}{\log 5}\right)$$

9.In what ratio will coffee grade **A** costing kshs. 90 per kg be mixed with grade **B** costing kshs.60 per kg so that a profit of 25% is realized by selling the mixture at kshs.80 per kg. (3mrks)

10. **h** varies directly as **v** and inversely as the square of **r.** Find the percentage change in **h** if **v** is increased by 20% and at the same time **r** is increased by 50%. (3mrks)

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



Find the length of **BT**. **(2mrks)**

12. Solve the simultaneous equations **(3mrks)**

$$\text{Log}\ (x - 1) + 2\log y = 2\log 3$$
$$\text{Log}\ x + \log y = \log 6$$

13 Given that the area of an image is four times the area of the object under a transformation whose matrix is

$$\begin{pmatrix} x & x-4 \\ x+8 & x \end{pmatrix}$$

Find the value of x. **(3mrks)**

14. Find the amplitude period and phase angle of $y = -\left(5\cos\frac{3x}{7}\right) - 25^0$ without sketching the graph. **(3mkrs)**

15. Two planes **P** and **Q** are at **(36^0N 125^0W)** and **(36^0N 55^0E)** respectively. Calculate the distance in nautical mile between **P** and **Q** measured along the circle through the North Pol **(3mrks)**

16 Draw a line **AB** 6cm. **P** is a variable point in the plane of the paper above **AB** such that $\angle$**APB** =$\mathbf{60^0}$ and the area of the triangle **APB** = **12.5cm^2**. By accurate construction locate the locus of **P.** **(4mrks)**

SECTION II

Attempt any five questions from this section

17. Complete the table by filling the black spaces. **(2mrks)**

X^0	0	30	60	90	120	150	180	210	240	270	300	330	360
Cos x	1.00						-1.0						1.00
2 cos ½ x^0	2.00						0.00						-2.00

(a) Using the scale 1cm to represent 30^0on the horizontal axis 4cm to represent 1 unit on the vertical axis draw, on the grid provided, the graphs **y** = cos x and **y** = 2 cos ½ x^0 on the same axis. **(4mrks)**

(b) Find the period and the amplitude of $y = 2\cos ½ x^0$ **(2mrks)**

(c) Describe the transformation that maps the graph of y = cos x on the graph of $y = 2\cos ½ x^0$ **(1mrk)**

(d) State the value of x for which **(1mrk**

$$\cos x - 2\cos ½ x = 0$$

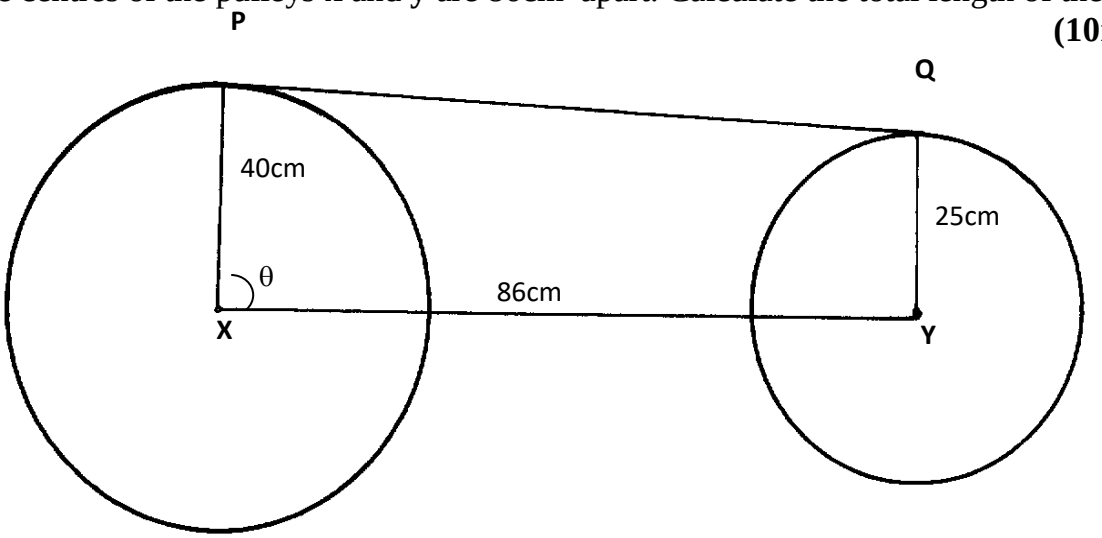
18. The product of the first three terms of a geometric progression is 64.If the first term is a and the common ratio is **r**.

(a) Express **r** in terms of **a.** **(3mrks)**

(b) Given that the sum of the three terms is 14; Find the values of a and r and hence write down two possible sequences each upto the 4^{th} term. **(5mrks)**

(c) Find the product of the 50th terms of the two Sequences. **(2mrks)**

19. The figure below shows a direct –belt drive system consisting of two pulleys of radii 40cm and 25cm. The centres of the pulleys **x** and **y** are 86cm apart. Calculate the total length of the belt to4 s.f. **(10mrks)**



20. Water is flowing through a cylindrical pipe at the speed of 1.2m/s. If the pipe has an internal radius of 1.4cm, Calculate

(a) The volume of water delivered by the pipe per second in cm^3 (Take $\pi = 22/7$ **(2mrks)**

(b) The depth to which the pipe fills a rectangular tank of base dimensions 1.5m x 2m in one hour to thenearest 0.1cm. **(3mrks)**

(c) The time taken, to the nearest second for the pipe to fill a 50 litre bath tub (initially empty) which has a hole at the base that drains the tub at the rate of 3 litres per minute. **(5mrks)**

21. The table below gives some of the values of x and y for the function $y = ½ x^2 + 2x + 1$ for $0 \leq x \leq 6$

x	0	1	2	3	4	5	6
y	1	3.5	7	11.5	17	23.5	31

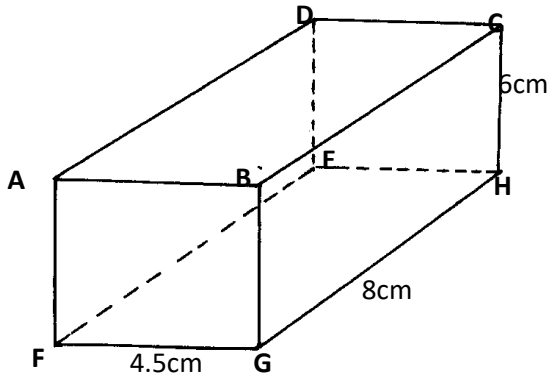
a) Use the values in the table above to draw the graph of $y = ½ x^2 + 2x + 1$ **(2mrks)**

(b) Using Trapezoidal rule, estimate the area bound by the curve**x**axis, **y** axis and the line x =6 using trapezia. **(3mrks)**

(c) Use the mid – ordinate rule with 6 trips to estimate the area bound by the curve, x axis and x =6. **(3mrks)**

(d) If the exact area of the region described above is $78cm^2$, Calculate the percentage error made when mid ordinate rule is used. Give your answer to two d.p**.** **(2mrks)**

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



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

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

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

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

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

23 Mr. Olik a drapper in Muhoroni town is required to supply two types of shirts, type **A** and type **B** to Muhoroni Secondary School. The total number of shirts must not be more than 400. He has to supply more of type **A**than type **B**shirts. However the number of type **A** shirts must not bemore than 300 and the number of type **B** shirts must not be less than 80 let x be number of type **A**shirts and y be the number of type **B** shirts.

(a) Write down in terms of **x** and **y** all the linear inequalities representing the information above. **(4mrks)**

(b) On the grid provided, draw the inequalities and shade the unwanted regions.(4mrks)

(c) Mr. Olik made profit of kshs. 600 per shirt of type **A** and shs. 400 per shirt of type **B.**

(i) Use the graph to determine the number of shirts of each type that should be made to maximise the profit. **(1mrk)**

(ii) Calculate the maximum possible profit. **(1mrk)**

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

(a) The distance between the two towns along the parallel of latitude in km. **(2mrks)**

(b) The distance between the towns in nautical miles. **(2mrks)**

(c) A plane flew from **X** to **Y** taking the shortest distance possible. It took the plane 15hrs to move from **X** and **Y**. Calculate its speed in Knots. **(3mrks)**

(d) Find the local time at **Y** when the local time at **X** on 10^{th} April is 10.00pm. **(3mrks)**

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 5 PAPER 1

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

(a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*
(b) ***Sign** and write **date** of examination in the spaces provided.*
(c) This paper consists of **TWO** sections. Section **I** and Section **II**.
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(e) Marks may be given for correct working even if the answer is wrong.
(f) Non- programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION 1: (50 MARKS)

Attempt ALL Questions in this section

1. Evaluate: **(3mks)**

$$\frac{8 \times \frac{1}{3} \text{ of } 9 \div 2}{(12+2x3) - \frac{2}{3} \text{ of } 144 \div 12}$$

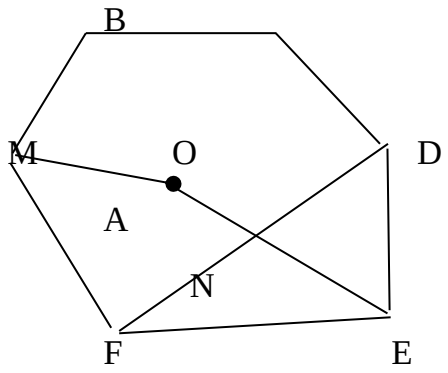
2. The prime numbers less than 10 are multiplied to form a number.

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 midpoint 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)**

$$\frac{0.0065 \times 6.48}{\bullet\bullet \quad 0.27}$$

8. In a class of boys and girls, the probability of selecting a girl at random is 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)**

$$\frac{4\cos 60^0 + 16\cos^2 45 + 2\sin 30}{\sin^2 45}$$

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

OP and find the magnitude of OP giving your answer in surd form. (3mks)

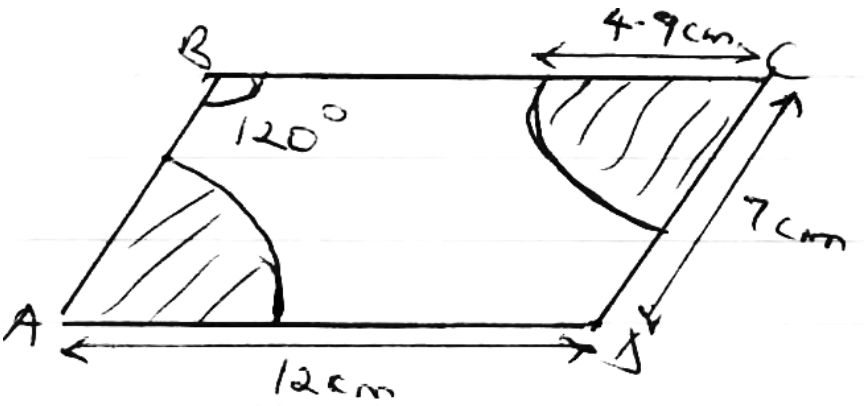
13. A tourist arrived from USA and changed his US $1500 TO Ksh. He spent Ksh. 3000 per night in a hotel for 20 nights and a further Ksh. 9000 daily for the entire period. He left for South Africa having changed the balance to South African Rand. Calculate the amount of South African Rands he left with, 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 40^0 and the angle of depression from the bottom of the flag post is 33^0. 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

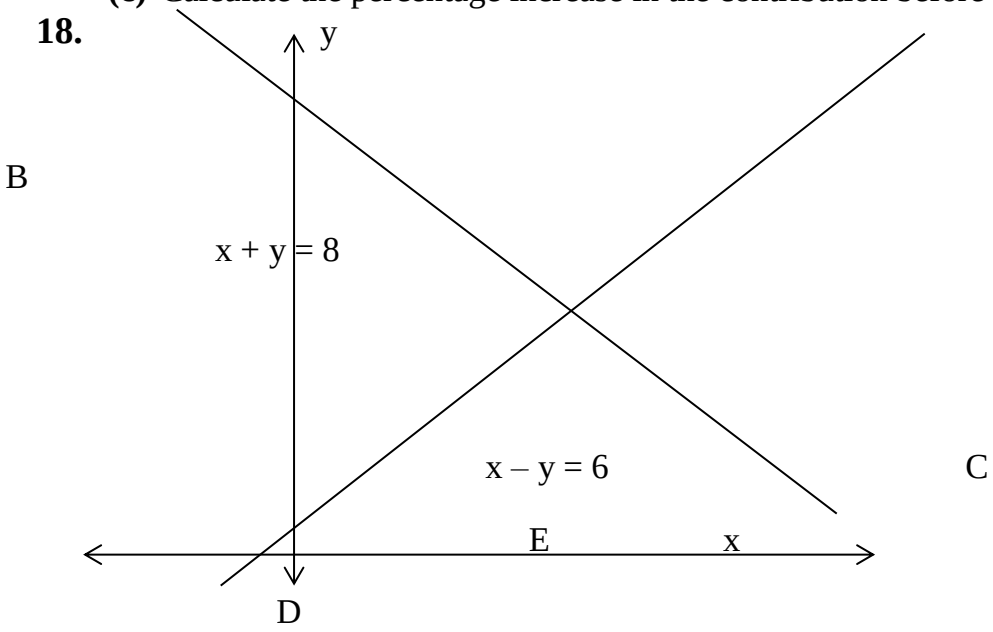
17. A group of choir members decided to raise 3600/= to buy a guitar. Each member was to contribute equal amount. In the preparation process five members transferred to another church, that meant the remaining contributors had to pay more to achieve the target.

(a) Show that the increase in the contribution per member was:Sh. $\frac{18,000}{n(n-5)}$ if n is the initial number of members.

(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.

18.



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

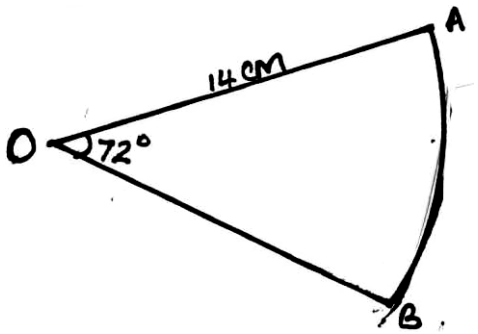
(a) State the modal class. (1mk)

(b) Calculate the mean mark. (3mks)

(c) Calculate the 70^{th} 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 = 14cm and the angle AOB = 72^0.



(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 1½ 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 1½ 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)**

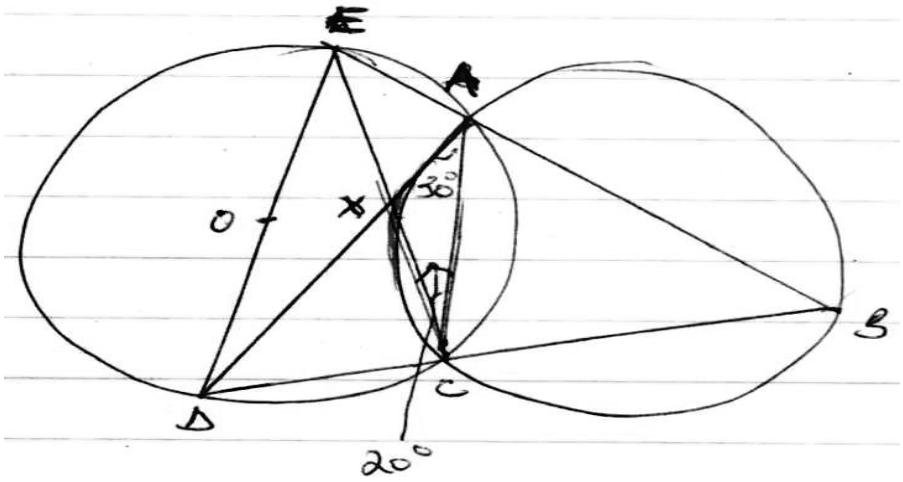
22. A metal R is an alloy of two metals X and Y. Metal X has a mass of 70g and a density of $16g/cm^3$. Metal Y has a mass of 19g and a density of $4g/cm^3$.

a. Calculate the density of the metal R. **(4mks)**

(b) 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)**

(c) 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 = 30^0 and ACE = 20^0.
Find the following angles, giving reasons for each answer.

(i) BAC **(2mks)**
(ii) ABC **(2mks)**
(iii) CED **(2mks)**
(iv) ADE **(2mks)**
(v) 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 90^0.

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 5 PAPER 2

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

(a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*
(b) ***Sign** and write **date** of examination in the spaces provided.*
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FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**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)**

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

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 $(2 + {}^{1}/_{5}x)^8$ 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)**

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

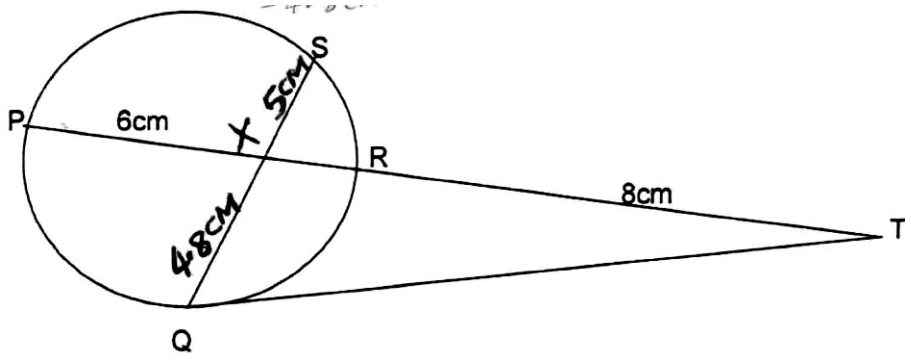
6. The n^{th} term of a sequence is $2n + 1$.

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 = 6cm, RT = 8cm, QX = 4.8cm and XS = 5cm.



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 machined B can do the same work in 9 hours. Machine A was set to do the work but after 3½ 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:
$3\cos^2 x + \sin x + 1 = 0$ For $0 \leq x \leq 360$ **(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 bands 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.

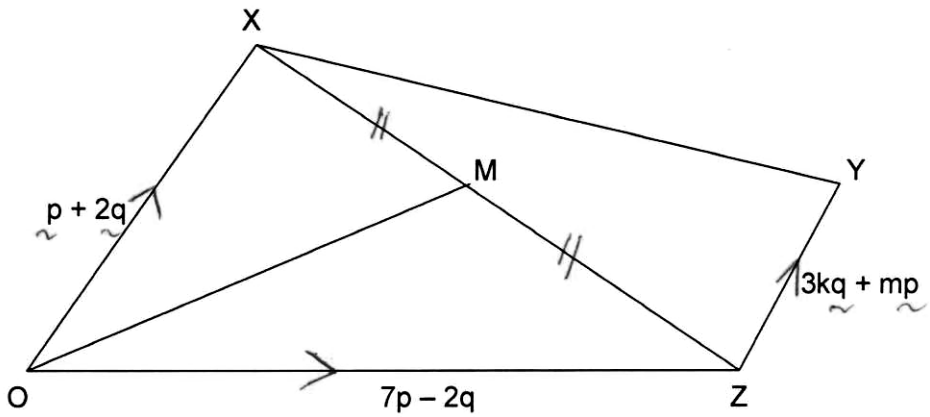
b. Calculate the employee's taxable pay in K£. **(2mks)**

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

d. 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)**

e. 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)**

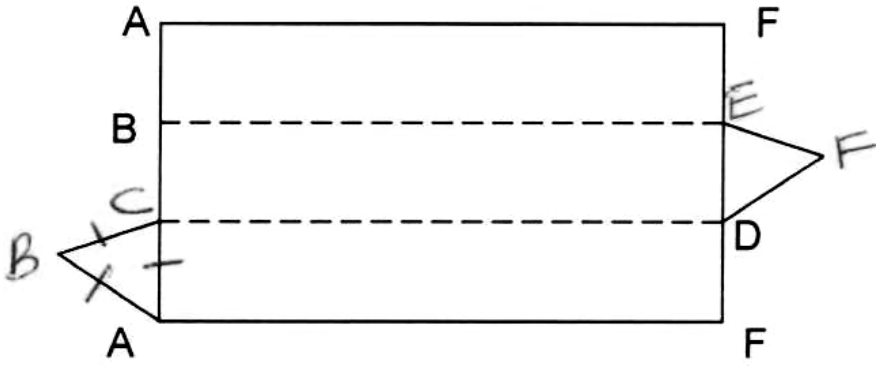
(ii) XM **(1mk)**

(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 = 5cm, AF = 10cm 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(45^0N, 20^0W) and Q(45^0N, 160^0E).

Find:

a. Shortest distance between the two towns in:-

iv. Kilometres (take radius of the earth as 6370km) **(3mks)**

v. Nautical miles. (Take $\pi = {}^{22}/_{7}$) 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.

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

vii. 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)**

(i) $O_1A_1B_1C_1$ is mapped onto parallelogram O $A_2B_2C_2$ by a rotation through 180^0 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)**

(b) 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:

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

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

©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)**

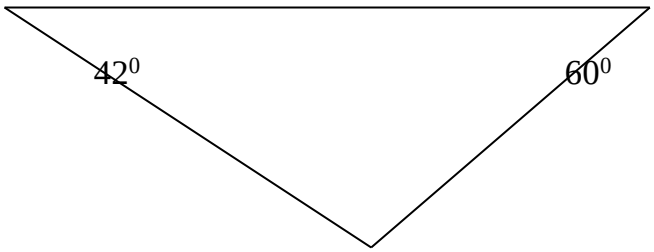
24. In a triangle ABC, AB = 17cm, BC = 28cm and AC = 34cm.
Find:-

a) BAC **(3mks)**

b) Using the angle BAC in (a) (i) above, find the area of triangle ABC. **(2mks)**

c) 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 42^0 with the horizontal and is 3.2m long. If the shorter string makes an angle of 60^0 with the horizontal, calculate its length. **(3mks)**



CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 6 PAPER 1

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

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SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION A (50 MARKS)

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

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

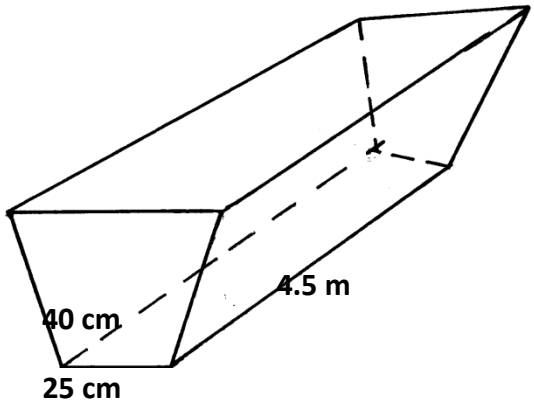
3. Without using table or calculators, evaluate $\sqrt{\dfrac{0.0032+0.0608}{1.44x0.4}}$ **(3mks)**

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

5. In a fundraising committee of 45 people, the ratio of men to women is 7:2. Find the number of women required to join the existing committee so that the ratio of men to women is changed to 5: 4. **(3mks)**

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

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

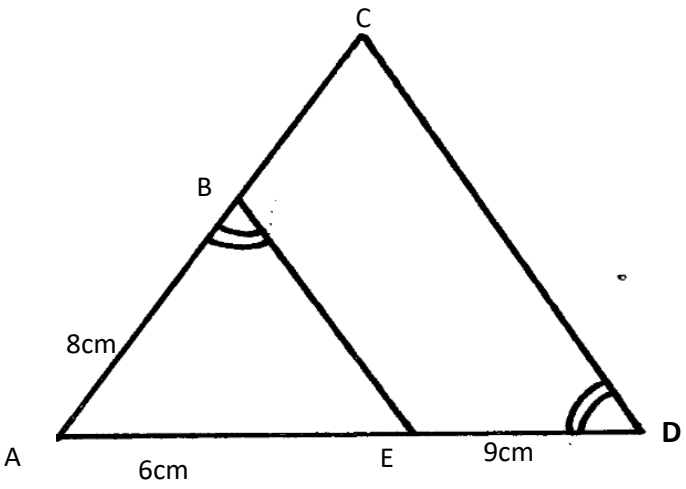


8. Jemima's team entered a contest where teams of students compete by answering questions that earn either 3 points of 5 points. Jemima's team scored 44 points after answering 12 questions correctly. How many five-points questions did the team answer correctly. **(3mks)**

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

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

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



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

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

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

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

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

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

A Japanese travelling from France to Kenya had 5000 Euros. He converted all the 5000 Euros to Kenya shillings at the bank. While in Kenya, he spent a total of Kshs. 289,850 and then converted the remaining Kenya shilling to Japanese Yen. Calculate the amount in Japanese Yen that he received. **(3mks)**

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

SECTION II

Answer only five questions from this section

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

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

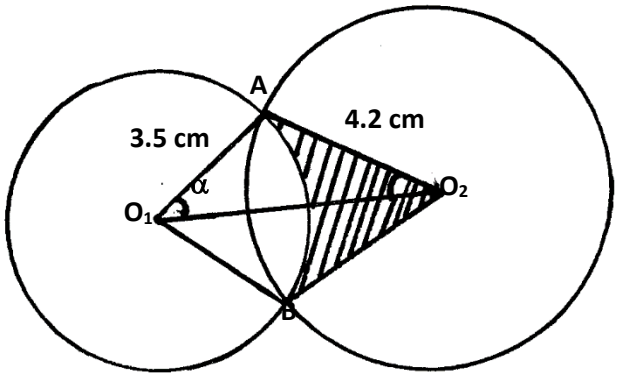
(b) From the diagram determine

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

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

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

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



Calculate

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

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

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

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

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

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

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

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

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

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

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

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

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

(d) On the grid provided draw a histogram to represent the distribution. **(3mks)**

Use the scales: 1cm to represent 5 units on the horizontal axis 2 cm to represent 5 units on the vertical axis.

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

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

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

$y > -3$

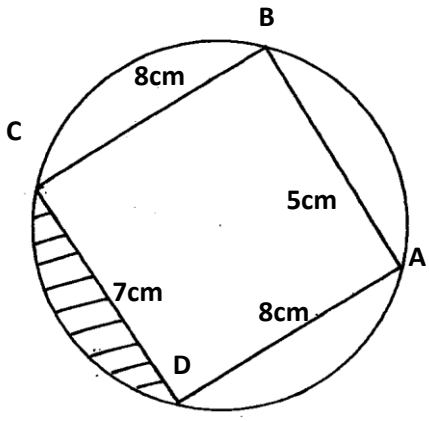
$4y \leq 5x + 20$

$2y < -5x + 10$

$4y \leq -3x - 12$

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

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



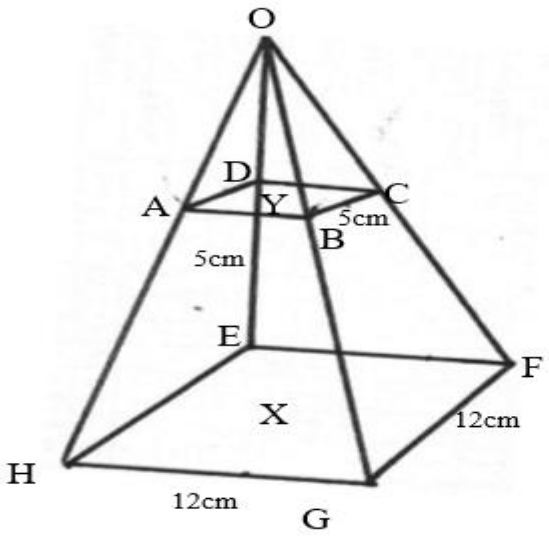
(a) Find the size of angle **ABC**. **(3mks)**

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

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

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

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



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

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

24. The table below shows the income tax rates

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

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

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

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

Calculate:

i) The total monthly deductions **(2mks)**
ii) Mr. Musango's net income p.m **(2mks)**

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 6 PAPER 2

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

(a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*
(b) ***Sign*** *and write **date** of examination in the spaces provided.*
(c) This paper consists of **TWO** sections. Section **I** and Section **II**.
(d) Answer **ALL** the questions in section **I** and only **FIVE** questions from Section **II**
(e) Marks may be given for correct working even if the answer is wrong.
(f) Non- programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION I

1. Use logarithms tables to evaluate

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

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

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

4. Make A the subject of the formula

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

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

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

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

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

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

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

$xy+6=0$

$x-2y=7$

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

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

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

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

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

Determine:

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

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

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

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

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

SECTION II

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

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

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

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

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

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

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

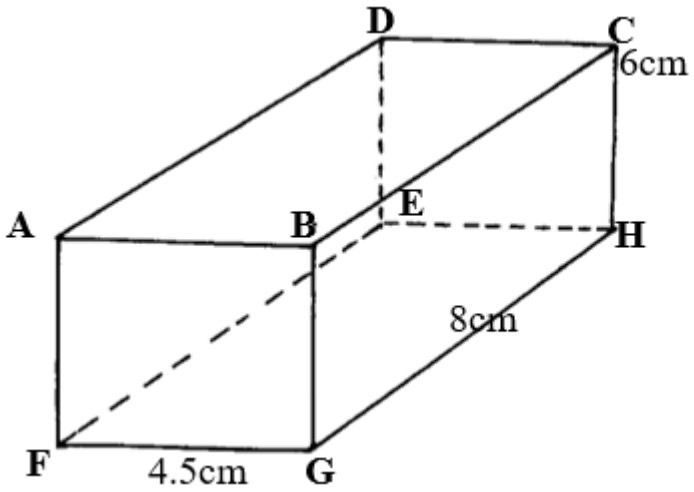
Using an assumed mean of 54.5, calculate the

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

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

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

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



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

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

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

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

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

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

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

(b) For the function $y = 2cos\ (x + 30)^0$

State:

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

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

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

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

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

(a) If one pen is picked from the box, what is the probability that it is

(i) Red. **(1mk)**

(ii) Not black. **(1mk)**

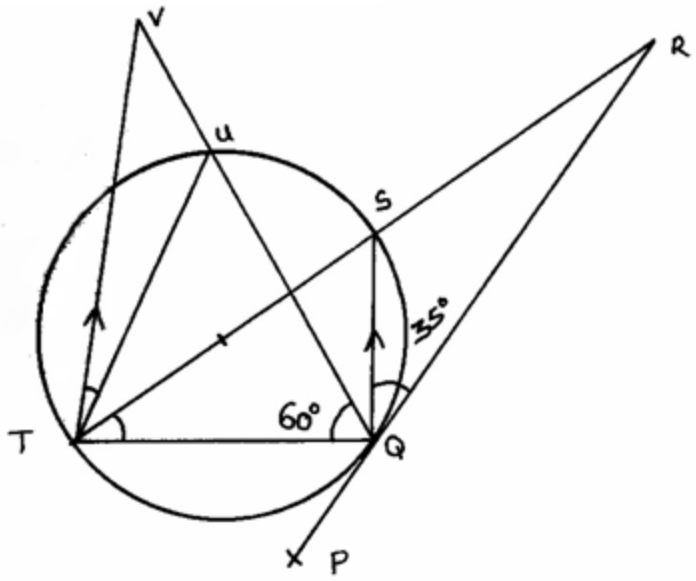
(a) The teacher asked a student to pick two pens from the box, one at a time, without replacement. Find the probability that

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

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

(b) If the first student was allowed to take away two blue pens and another student was asked to pick two pens without replacement. What is the probability that the second student picked pens of same colour? **(3mks)**

22. In the figure below, PQR is the tangent to the circle at Q. TS is a diameter and TSR and QUV are straight lines. QS is parallel to TV. Angle SQR = 35° and TQV = 60°.



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

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

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

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

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

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

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

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

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

i) < APB = 67.5° **1mk**

ii) area of triangle , APB = $9cm^2$ **3mks**

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

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

24. An arithmetic progression has the first term a and the common difference d.

(a) Write down the third, ninth and twenty – fifth terms of the progression. **(3 Mks)**

(b) The progression is increasing and the third, ninth and twenty-fifth terms form the first three

Consecutive terms of a geometric progression. If the sum of the seventh term and twice the sixth term of the arithmetic progression is 78.

Calculate

(i) The first term and the common difference **(5 Mks)**

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

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 7 PAPER 1

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

(a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*
(b) ***Sign** and write **date** of examination in the spaces provided.*
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FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION A (50MKS)

ANSWER ALL THE QUESTIONS IN THIS SECTION

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

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

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

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

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

5. Solve for X in

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

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

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

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

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

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

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

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

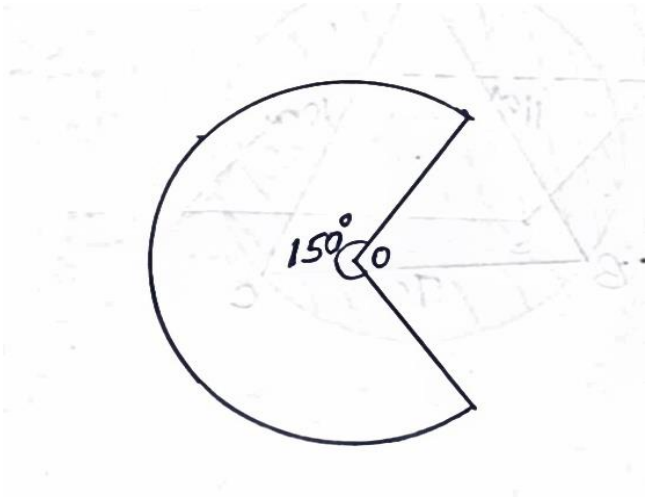
11. Give that A = $\begin{pmatrix}2 & 3\\ 1 & 4\end{pmatrix}$, $B\begin{pmatrix}-1 & 3\\ 2 & -1\end{pmatrix}$;find matrix C where AC = B **(3mks)**

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

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

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

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



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

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

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

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

SECTION II (50MKS)

Answer Any Five Questions In This Section

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

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

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

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

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

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

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

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

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

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

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

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

b) Hence calculate to 1 d.p.

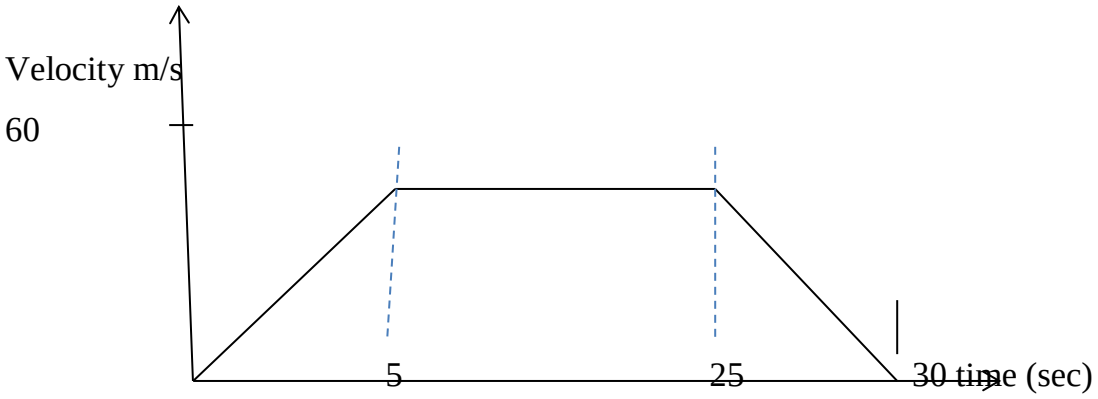
i) The length XP **(3mks)**

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

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

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

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



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

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

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

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

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

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

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

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

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

i) Mean mark

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

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

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

(3mks)

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

c) Use your graph to solve for x in

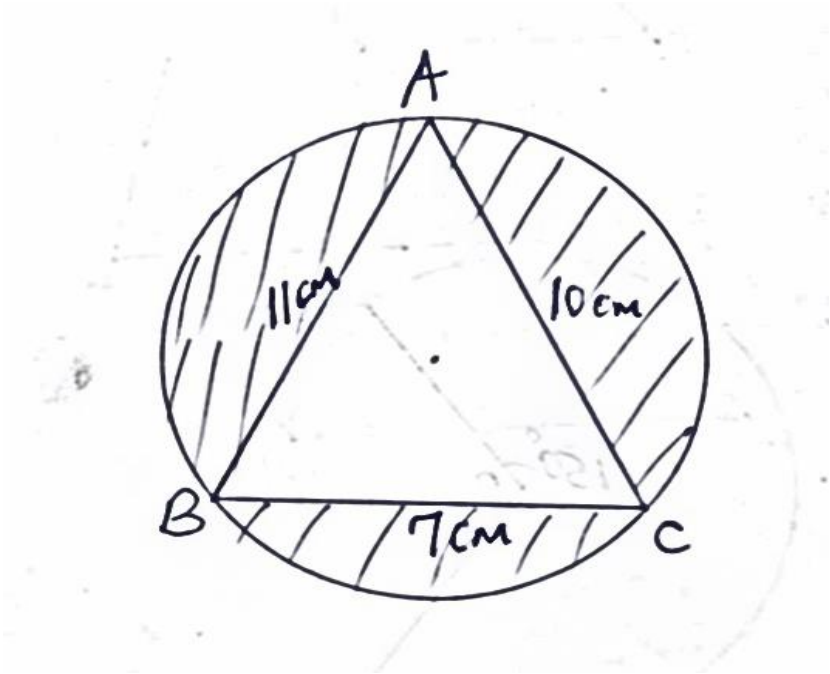
$x^2 + 3x-6 = 0$ **(2mks)**

d) State the;

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

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

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



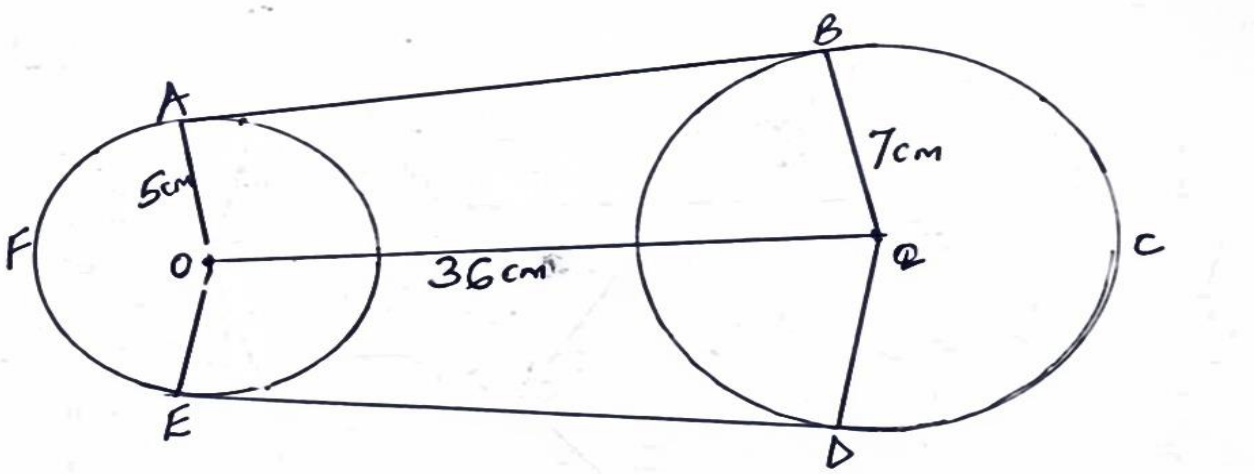
Calculate correct 1 d p ($use\ \pi = \frac{22}{7}$)

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

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

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

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



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

b) The length of the belt in contact with

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

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

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

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 7 PAPER 2

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

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FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION 1 (50 MARKS)

Answer all the questions in this section

1. Use a calculator to find V if $\frac{1}{V} = \frac{1}{23.9} - \frac{1}{38.45}$ **(2mks)**

2. Solve for X in **Log (7X – 3) + 2 Log 5 = 2 + Log (X+3)** **(3mks)**

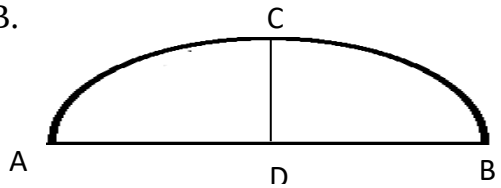
3. A quantity P is partly constant and partly varies as the square of Q. when Q = 2, P = 40 and when Q = 3, P = 65. Determine the equation connecting P and Q **(3mks)**

4. Expand $(1 - \frac{1}{2X})^6$ up to the fourth term; hence use your expansion to evaluate $\mathbf{0.996^6}$ correct to 4 decimal places. **(4mks)**

5. Simplify $\frac{\sqrt{5}+3}{\sqrt{5}-2}$. Give the answer in the form of $a + b\sqrt{c}$ where a, b and c are integers **(3mks)**

6. Given that **X-5**, **X-3** and **2X-3** are three consecutive terms of a geometric progression, find the possible values of X and the ratio **(2X+1):(X+2)** **(4mks)**

7. The figure below is a segment of a circle cut off by a chord AB. Line CD is a perpendicular bisector of chord AB.



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

8. By completing the square, solve for x in the equation $\mathbf{2x^2 - 6 = x}$. **(3mks)**

9. Given that $\mathbf{y = \frac{b - bx^2}{cx^2 - a}}$ make x the subject **(3mks)**

10. The base and height of a right-angled triangle are 4cm and 5cm respectively. Calculate the percentage error in its area. **(3mks)**

11. Given that $\mathbf{P} = \begin{pmatrix} 5 & 3 \\ 6 & 4 \end{pmatrix}$, find ;

    a. Its inverse **(1mk)**

    b. The value of x and y if $\mathbf{P}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ **(3mks)**

12. The equation of a circle is given by $x^2 + y^2 + 6x - 10y - 30 = 0$. Determine the radius and center of the circle **(3mks)**

13. Find the value of X which satisfies the equation $5^{2x} - 6\times5^x + 5 = 0$ **(3mks)**

14. A scooter mixes oil and petrol in the ratio 5:19. If petrol costs Ksh. 130 per liter and oil costs Ksh. 250 per liter, find the cost of a liter of the mixture. **(2mks)**

15. Solve the pair of equations simultaneously **(4mks)**

$2x - y = 3$

$x^2 - xy = -4$

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

(3mks)

SECTION II (50 MARKS)

Attempt any five questions in this section

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

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

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

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

(2mks)

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

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

a. Given that R = 480 when S = 150 and T = 5, write an equation connecting R, S and T

(3mks)

b. Find,

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

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

19. The table below shows income tax rates

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

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

(i) Monthly personal relief of Ksh. 1,056
(ii) Monthly insurance relief at the rate of 15% of the premium paid
Okumu paid a monthly premium of Ksh. 2,500 towards his life insurance policy

Calculate

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

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

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

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

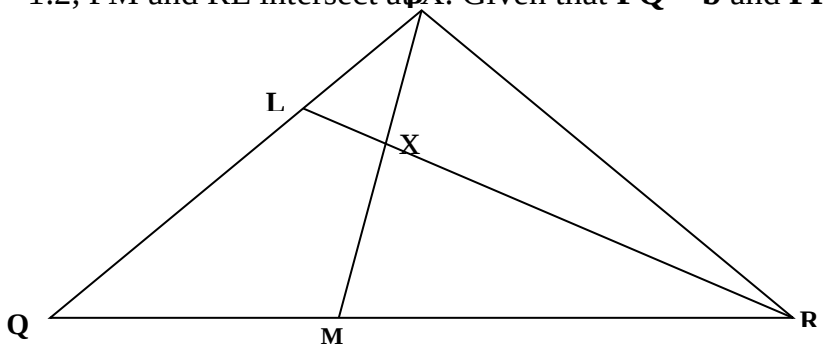
a. Find T **(3mks)**

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

(attach graph paper)

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

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



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

i. **QR** **(1mk)**

ii. **PM** **(1mk)**

iii. **RL** **(1mk)**

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

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

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

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

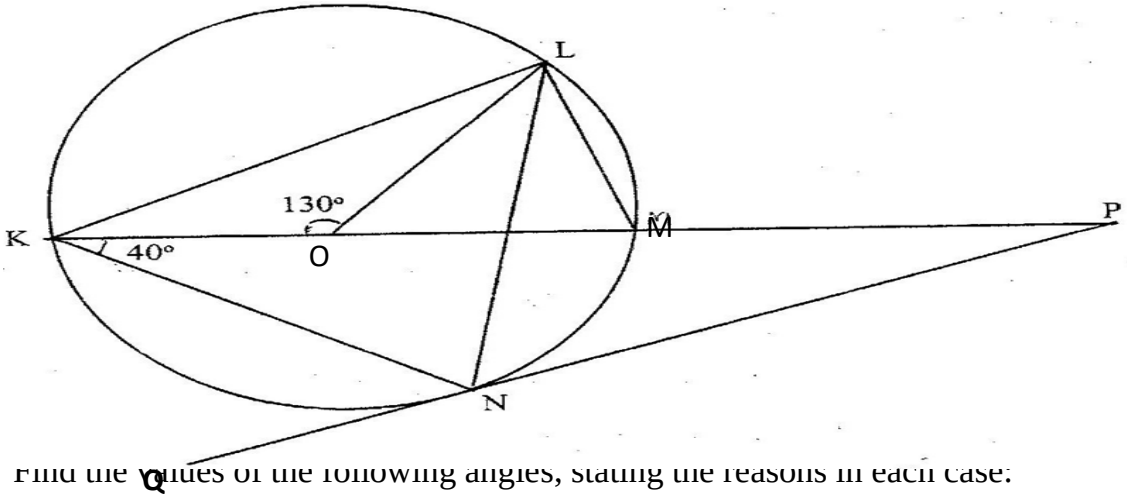
b. Find the probability that, a motorcyclist at any given time

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 8 PAPER 1

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

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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. Evaluate $\frac{-4\{(-4+-15\div5)+-3-4\div2\}}{84\div-7+3--5}$ **(3 marks)**

2. Simplify completely the expression: $\frac{6x^2y^2-20xy+16}{2x^2y^2-8}$ **(3 marks)**

3. Given that $\cos\theta = \frac{3}{5}$, find $\sin\theta - \tan(90^0 - \theta)$ without using tables or calculator.

(2 marks)

4. Under an enlargement, the images of points A(3,1) and B(1,2) are $A^1(3,7)$ and $B^1(7,5)$. Without construction, find the centre and the scale factor of enlargement. **(4 marks)**

5. List all the integral values of x that satisfy the inequalities; **(3 marks)**

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

6. A bus travelling at an average speed of x km/h left station at 8.15 am. A car, travelling at an average speed of 80km/h left the same station at 9.00 am and caught up with the bus at 10.45 am. Find the value of x. **(3 marks)**

7. The interior angle of a regular polygon with 3x sides exceeds the interior angle of another regular polygon having x sides by 40^0. Determine the value of x. **(3 marks)**

8. Use squares, cubes and reciprocals tables to evaluate, to 4 significant figures, the expression:

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

9. From a point 20m away on a level ground the angle of elevation to the bottom of the window is 27^0 and the angle of elevation of the top of the window is 32^0. Calculate the height of the window. **(3 marks)**

10. Solve for x in the equation: $5^{3y+3} + 5^{3y-1} = 125.2$ **(4 marks)**

11. Mr. Kanja, Miss Kanene and Mrs. Nyaga have to mark a form three mathematics contest for 160 students. They take 5 minutes, 4 minutes and 12 minutes respectively to mark a script. If they all start to mark at 9.00 am non-stop, determine the earliest time they will complete the marking. **(4 marks)**

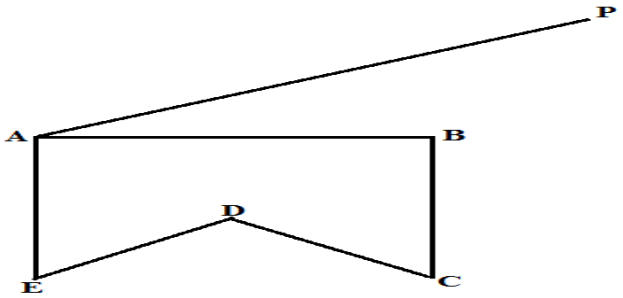
12. Evaluate $4.\dot{4}\dot{1} - 0.\dot{2}\dot{1}$ **(2 marks)**

13. Two similar cylinders have diameter of 7cm and 21cm. If the larger cylinder has a volume of $6237cm^3$, find the heights of the two cylinders. (take $\pi = \frac{22}{7}$) **(3 marks)**

14. The cost of providing a commodity consists of transport, labour and raw materials in the ratio 8:4:12 respectively. If the transport cost increases by 12%, labour cost by 18% and raw materials by 40%, find the percentage increase of producing the new commodity. **(3 marks)**

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

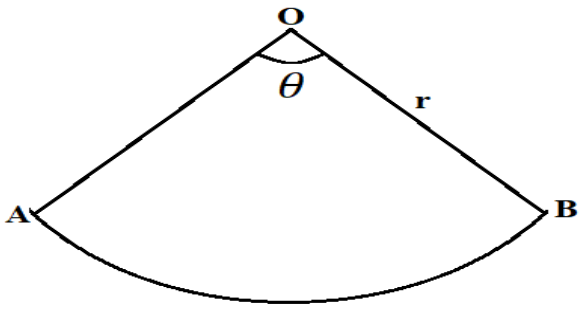
16. In the figure below ABCDE is a cross-section of a solid. The solid has a uniform cross-section. Given that AP is an edge of the solid, complete the sketch showing the hidden edges with a broken lines. **(3 marks)**



SECTION II (50 Marks)

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

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



a) Calculate;

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

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

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

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

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

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

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

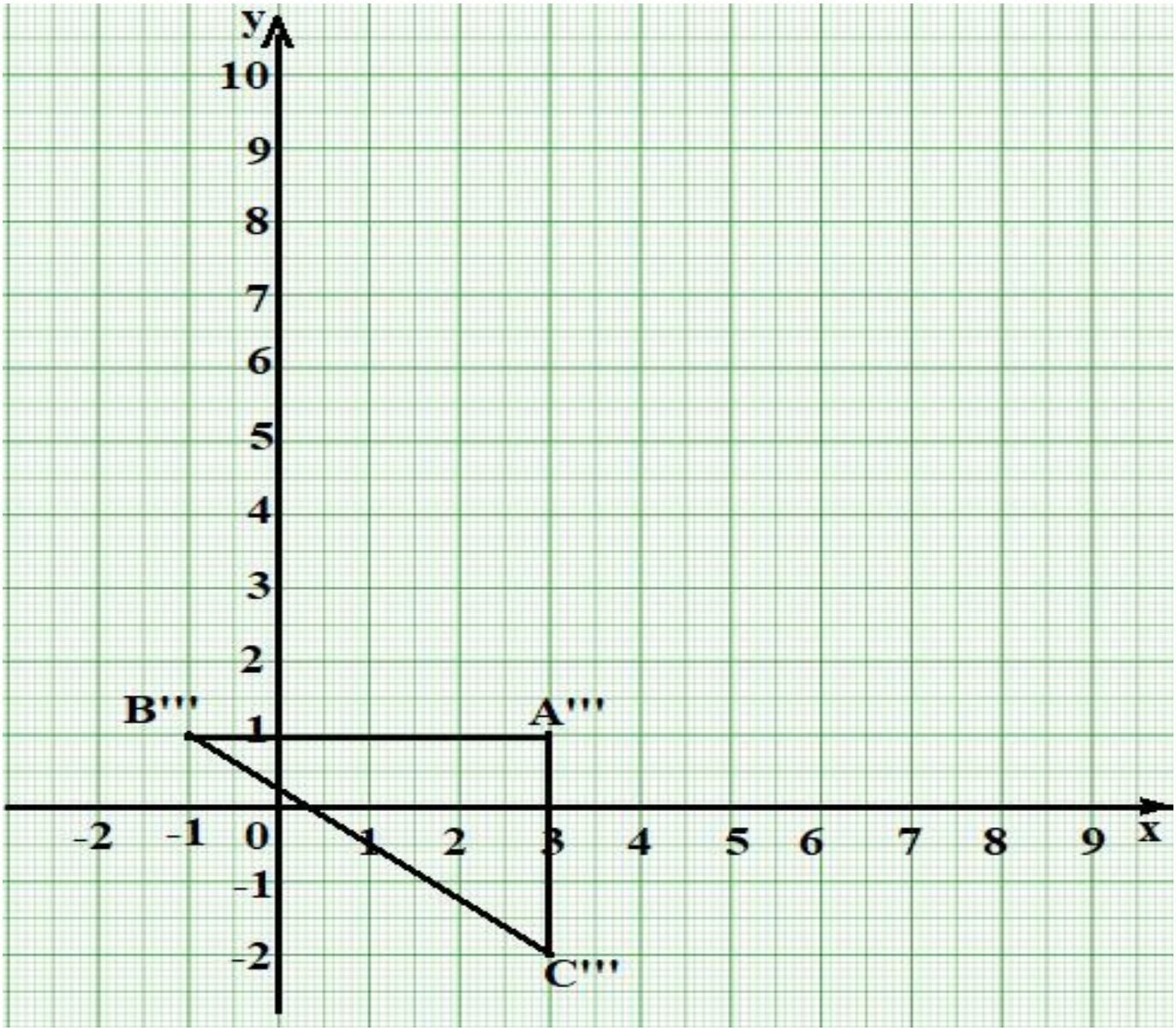
b) Use matrix method to find the cost of producing 1 kg of chocolate bars and 1 kg of eclaires in factory A. **(5 marks)**

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

19. The vertices of triangle ABC are A(6,2), B(8,2) and C(6,0).

a) On the grid provided below, draw triangle ABC. **(1 mark)**

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



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

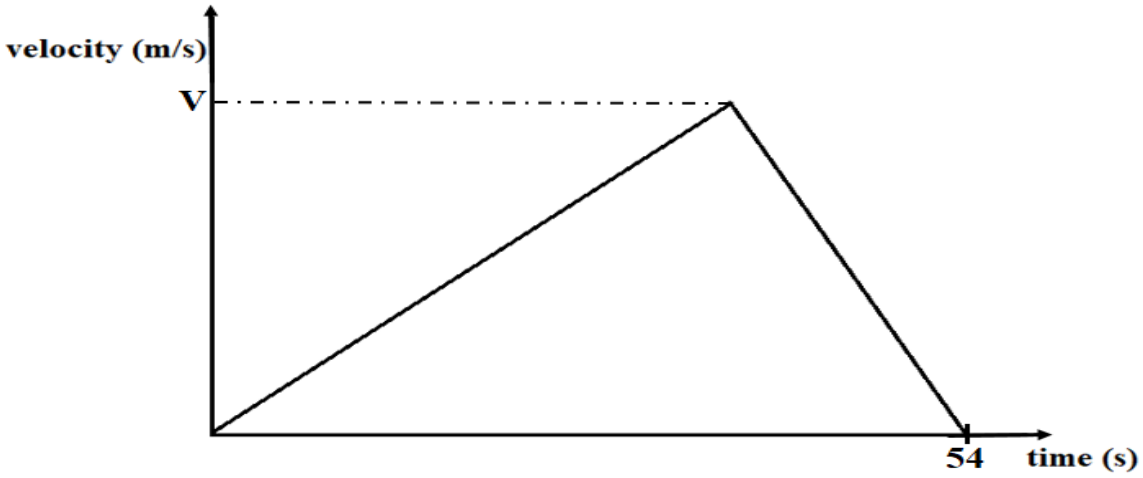
c) By construction, find and write down the co-ordinates of the centre and angle of rotation which can be used to rotate triangle A"B"C" onto triangle A'''B'''C''' shown on the grid above. **(3 marks)**

d) State any pair of triangles that are:

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

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

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



a) If it covered a distance of 810 metres;

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

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

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

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

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

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

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

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

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

c) Use the histogram to:

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

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

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

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

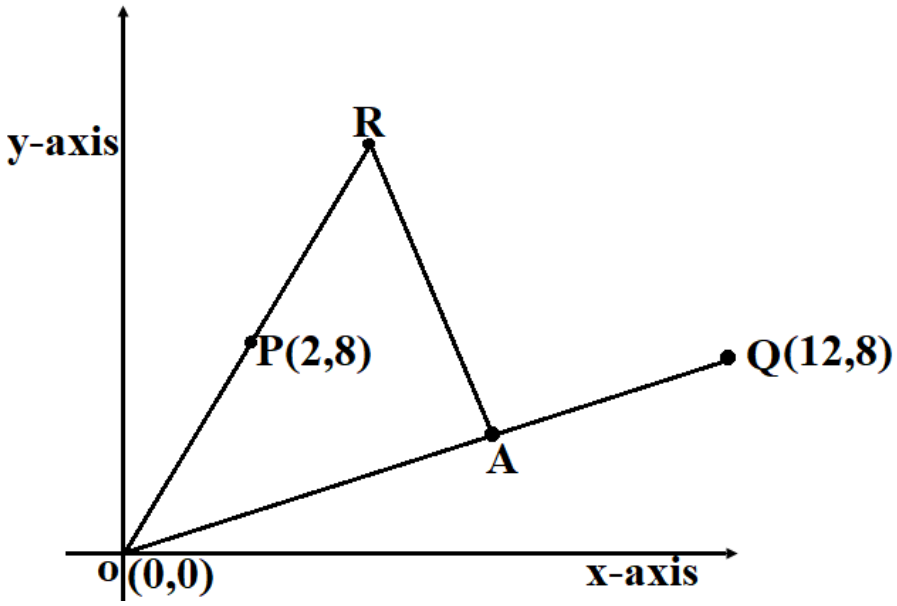
(b) A second line L_2 is perpendicular to L_1 at Z. Find the equation of L_2 in the form $ax + by = c$, where ,b and c are integers. **(3 marks)**

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

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

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

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



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

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

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

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

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

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

b) From the scale drawing determine:

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

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

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

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 8 PAPER 2

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

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SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION 1 (50 MARKS)

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

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

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

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

4. Simplify **(3 marks)**

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

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

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

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

8. Without using a calculator or mathematical tables, express

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

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

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

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

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

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

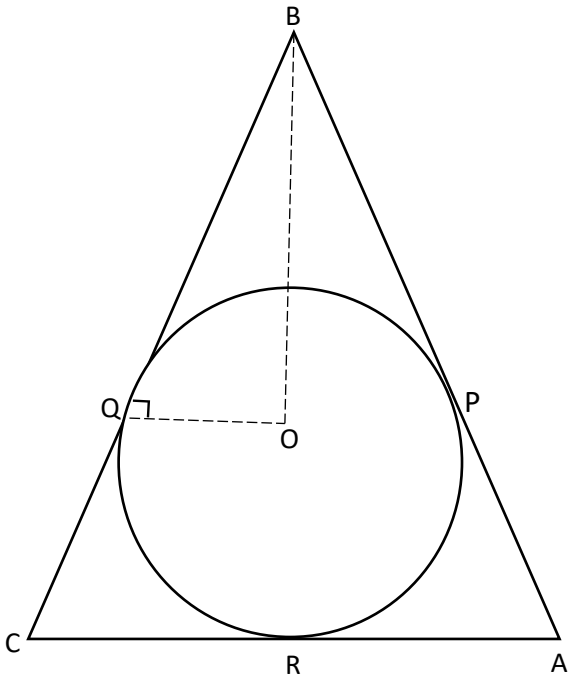
13. Under a transformation represented by a matrix $\begin{pmatrix} 5X & 2 \\ -3 & X \end{pmatrix}$, a triangle of area 10cm^2 is mapped onto a triangle whose area is 110cm^2. Find x **(3 marks)**

14. Find the distance between the centre 0 of a circle whose equation is $2x^2 + 2y^2 + 6x + 10y + 7 = 0$ and a point $B(-4,1)$. **(3 marks)**

15. Solve for x in the equation:

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

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



SECTION II (50 MARKS)

Answer Only Five Questions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

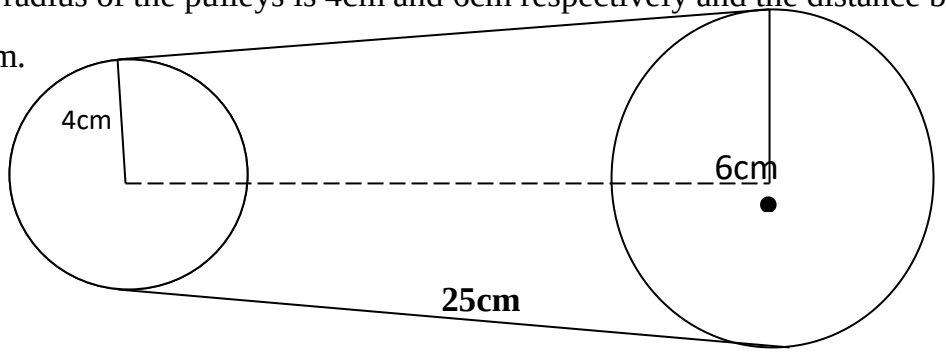
(c) Another sequence has the terms

-13, -16, -19, ……-310.

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

21. The figure below shows a belt passing round two pulleys of centres A and B.

The radius of the pulleys is 4cm and 6cm respectively and the distance between the centres is 25cm.



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

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

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

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

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

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

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

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

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

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

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

(b) Using an assumed mean of 44.5 calculate

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

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

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

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

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

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

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

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

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

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

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

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 9 PAPER 1

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

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FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION 1 (50 MARKS)

1. Without using a calculator evaluate:-

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

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

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

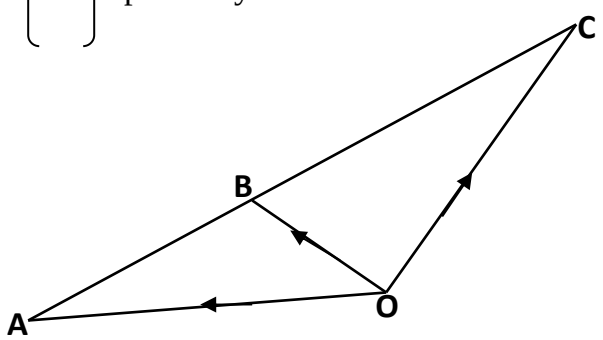
4. A bus left Kitale at 8.00 a.m. and travelled towards Lodwar at an average speed of 80 km/h. At 8.30 a.m a car left Lodwar towards Kitale at an average speed of 120km/h. Given that the distance between Kitale and Lodwar is 400km. Calculate the time the two vehicles met. **(3 mks)**

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

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

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

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

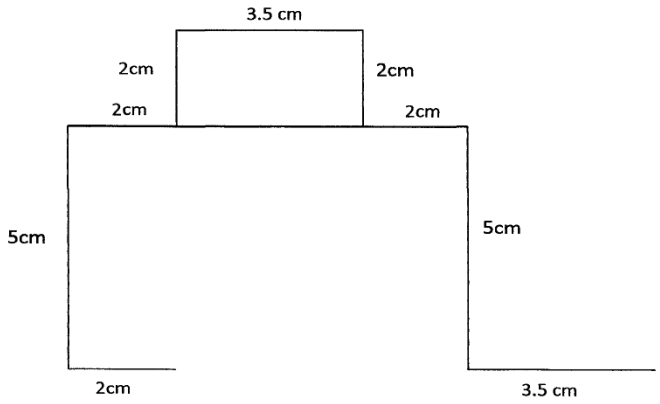


Given that B is a point on AC such that AB = ½ BC. Use vector method to determine the coordinates of C. **(3 mks)**

8. Simplify:-

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

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



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

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

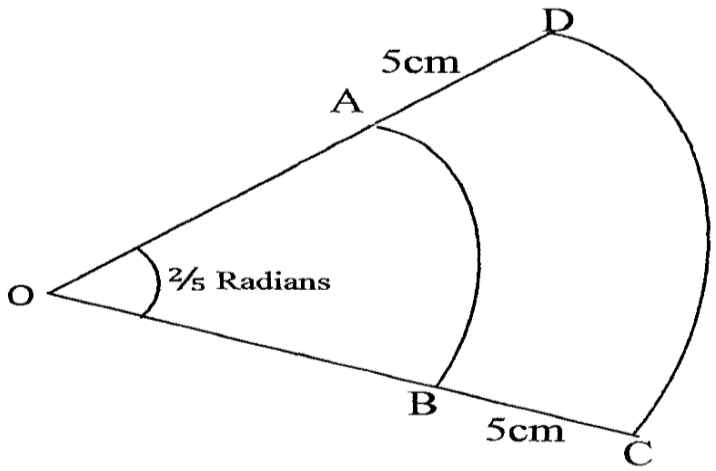
12. Factorise Completely:-

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

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

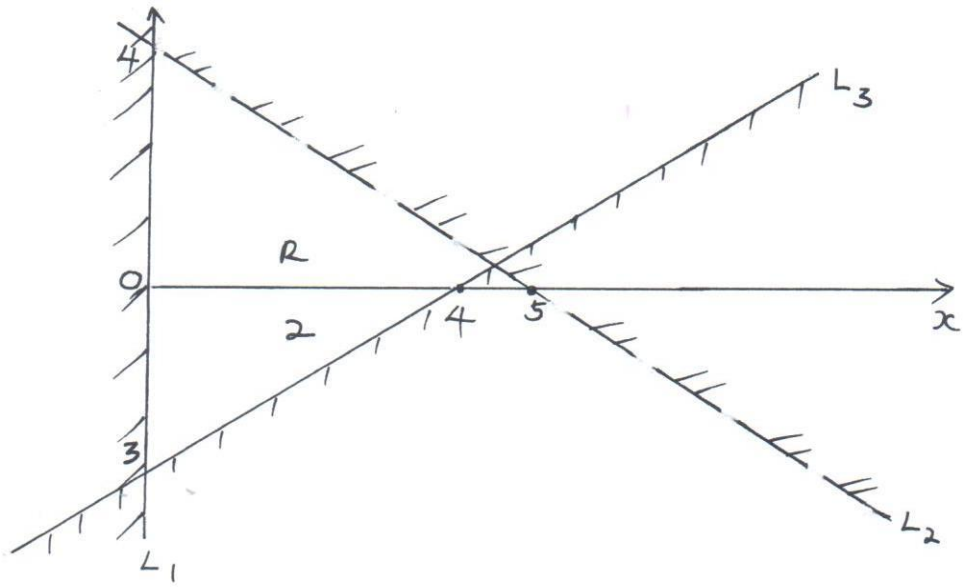
14. A solid consists of a cone and a hemisphere. The common diameter of the cone and the hemisphere is 12 cm and the slanting height of the cone is 10 cm. Calculate correct to two decimal places, the surface area ofthe solid. **(3 mks)**

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



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

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



SECTION II

Answer only five questions from this section

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

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

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

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

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

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

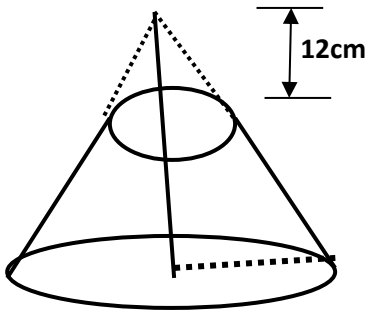
Calculate**:**

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

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

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

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



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

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

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

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

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

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

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

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

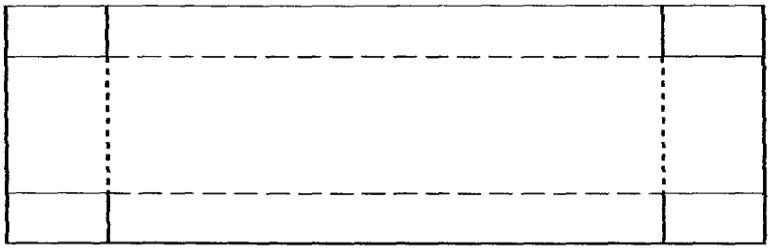
b) Use the scale drawing to find the:

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

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

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

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



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

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

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

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

22. (a) On the Cartesian plane below, draw the quadrilateral PQRS with vertices

P(4,6), Q(6,3), R(4,4), and S(2,3) **(1 mk)**

(b) Draw P′Q′R′S′ the image of PQRS under the transformation defined by the translation vector $T = \begin{pmatrix} -7 \\ -6 \end{pmatrix}$. Write down the coordinates of P′Q′R′S′.

(2 mks)

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

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

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

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

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

Calculate:

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

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

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

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

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

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

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 9 PAPER 2

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

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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)

Attempt all questions.

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

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

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

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

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

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

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

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

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

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

10.

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

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

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

are such that AB = A + B

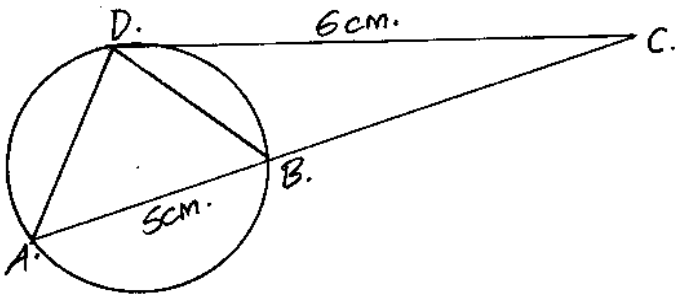
Find a, b, and c. **(3mks)**

12. Simplify **(3mks)**

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

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

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



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

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

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

SECTION II (50 MARKS)

Answer any five questions in this section.

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

Taxable Income K£	Rate (shs per K£)
1 – 1500	2
1501 – 3000	3

3001 – 4500	5
4501 – 6000	7
6001 – 7500	9
7501 – 9000	10
9001 – 12000	12
Over 12000	13

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

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

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

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

(4 mks)

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

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

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

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

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

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

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

(2mks)

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

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

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

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

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

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

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

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

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

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

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

(d) Balls of same colour. 2mks

(e) Two white balls 2mks

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

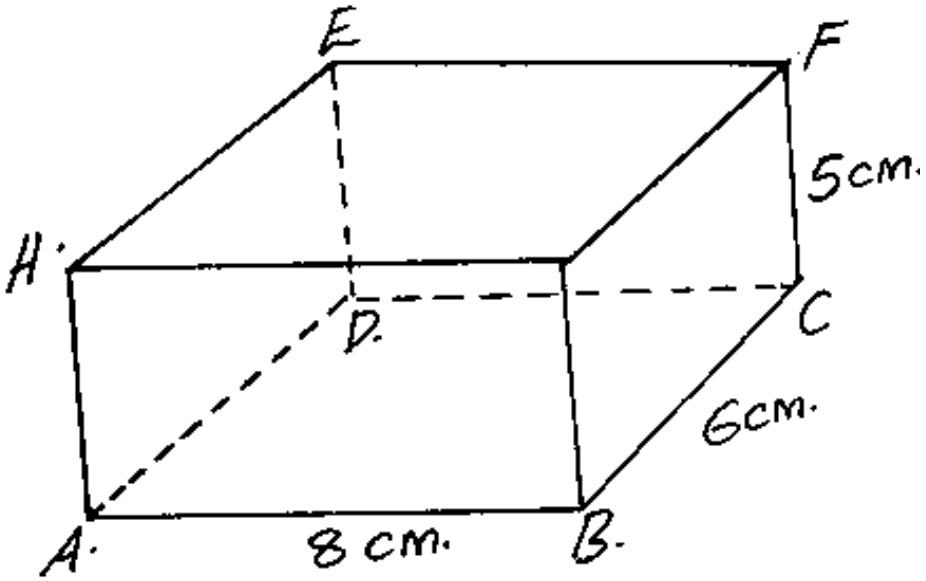
$$y = 10+3x - x^2 \text{ for } -2 \leq x \leq 5$$

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

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

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

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



Determine (a) the length

(i) AC **(2mks)**

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

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

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

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

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

He has a maximum of $24m^2$ of floor space and a maximum of 36 men available. In addition he is not allowed to hire more machines of type B than of type A.

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

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

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

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 10 PAPER 1

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

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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)

1. Evaluate without using mathematical table or calculator.

$$\frac{0.021 \times 0.246 \times 1.75}{11.48 \times 0.014}$$

Expressing the answer as a fraction in it's simplest form. **(2 marks)**

2. The sum of all but one of the internal angles of pentagon is 400^0. Find the number of degrees in the remaining angle. **(2 marks)**

3. (a) Find the L.C.M of $(x—1)$, $x^2 - 1$ and $x^2 + 2x + 1$ **(1 mark')**

(b) Hence or otherwise simplify **(2mks)**

$$\frac{1}{x + x2 + 2x + 1} \quad \frac{x-1}{-1}$$

4. Mariga on arrival to Kenya to play for the country against Sychelles converted 6000 Euros into Kenya shillings. During his three day's stay he spent Ksh. 260,000.He converted the remaining amount into US dollars. How many US dollars did he get?

(Use the exchange rate below)

	Buying	Selling
1 US dollar $	96.20	96.90
1 Euro C	112.32	112.83

(3mks)

5. The gradient of the of the curve $y = ax^2 + bx$ at the origin is equal to 8. Find the value of a and

(b) if the curve has a maximum turning point at $x = 4$ **(4mks)**

6. Find the value of Find the value of **(3 marks)**

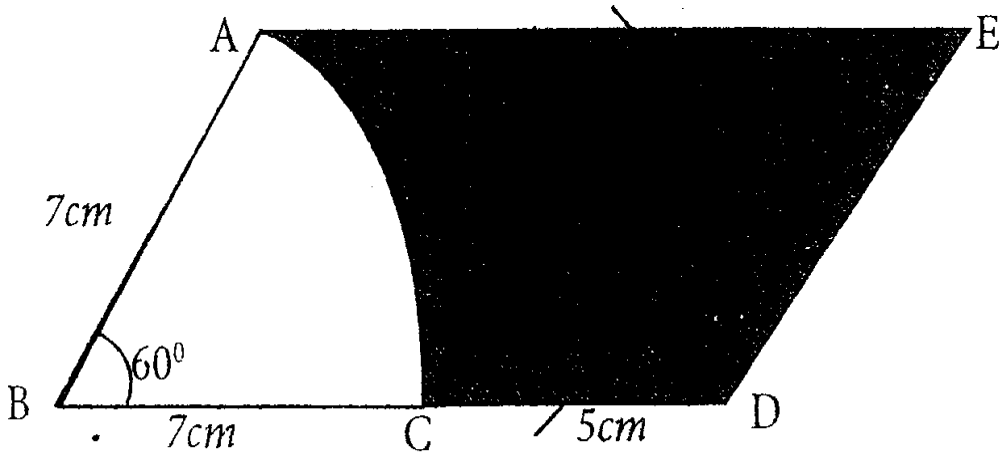
$$\sqrt{4}2 \times \sqrt{32x\sqrt{2}}$$

7. A cylindrical iron pipe is 2.lm long and 12cm in external diameter, the metal is 1cm thick and its density is 7.8g,/cm^3. Taking pie as 3 ½ find its mass. **(3 ½ Marks)**

8. A right angled isosceles triangle has area of 4 square units. Find he perimeter of the triangle leaving your answer in surd form. **(3 marks)**

9. In the figure below, AC is an arc of a circle centre B, angle ABD = 60^0, AB =BC=7cm and CD=5cm. If AE is parallel to BD and AB is parallel to ED.

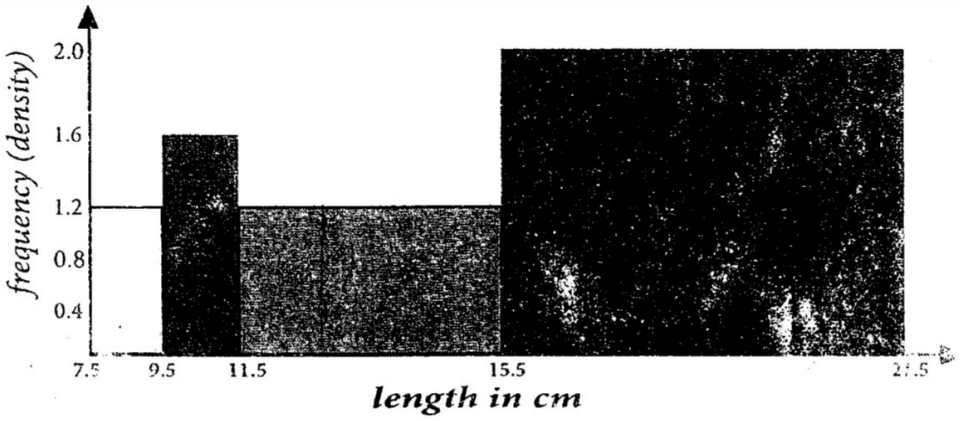
Calculate the area of the shaded region. **(3 marks)**



10. A two digit number is such that the difference between the ones digit and the tens digit is 2. If the two digits are interchanged, the sum of the new and the original number is 132.

Find the original number. **(3 marks)**

11. The figure below shows a histogram.



Complete the frequency distribution table below. **(4mks)**

Length x cm	Class width	Frequency density	Frequency
$7.5 \leq x < 9.5$		1.2	24
$9.5 \leq x < 11.5$			
$11.5 \leq x < 15.5$			
$15.5 \leq x < 21.5$			

12. Construct a line PQ 7.5cm. Using a line inclined 30° at point P to line PQ, locate point R which divides line PQ in the ratio 2:3. **(3 marks)**

13. A father was three time as old as his son fifteen years ago and four times as old as his son nineteen years ago. When was the father twice as old as the Son? **(4 Marks)**

14. Calculate the area of the segment cut off from a circle of radius 10cm by a chord which subtends an angle of 2.1c at the centre. **(4 marks)**

15. A submarine sails due North from point A for 170km to a point B. 1 changes its course to N 52^0 W and sails to a point c If C is N 18° W of A., calculate the distance from C to A. **(3 Marks)**

16. The position vector S of points A and B are **a** and **b** respectively. Determine the modulus Of **AB** if **a** = 2**i** + 4**j** ± 3**k** and **b**= 2**i**÷3**j** **(3marks)**

SECTION II

17. Ruhu, Toru, and Lwamawa contributed a total of Kshs. 8041950.00 for their joint campaigns ahead of 2012 general elections. The ratios of their contributions were Ruhu to Toru 5:4 and Lwamawa to Toru 2:3.

a) How much did each contribute? **(4 Marks)**

b) Ruhu further contributed Kshs. 875,000.00 towards the campaigns kitty. in response, Toru and Lwamawa increased their contributions in the ratios 10:9 and 11:6 respectively. How much did Toru and Lwamawa further contribute **(3 marks)**

c) The three agreed that if they win elections they would share the 15 cabinet positions amongst them in the ratio of their contributions. How many cabinets positions did Lwamawa get? **(3 Marks)**

18, Use ruler and a compass only for all constructions in this questions.

a) Construct a triangle ABC such that angle BAC ___7°, AB 7cm and BC= 8cm.

(2 marks) 75

b) Construct a perpendicular from B to meet AC at M. Measure BM and hence calculate the area of triangle AC. **(3 marks)**

c) Construct a line DE parallels to AC and mid-way between AC and B to meet BM at D. With DM and MC as sides, construct a rectangle DECM **(2 marks)**

d) A point P lies inside the rectangle and close to M than E. It is also nearer side AC than AB. Shade the region in which P lies. **(3 mark)**

19. A rectangular tank whose internal dimensions are 2.04m by 1.68m by 26.4 m is seven – eighth full of milk

a) If the tank is made of metal of thickness 3mm. Calculate the external volume of the tank in m^3 when closed. **(3 Marks)**

b) Calculate the volume of milk in the tank in cubic metres. **(2 marks)**

c) The milk is to he packed in small packets. Each packet is in the shape of a right - Pyramid on an equilateral triangular base of side 19.2cm. The height of each packet is 13.6 cm. Full packets obtained are sold at Kshs. 35 Per packet. **Calculate;**

i) The volume of milk, in cubic centimeters contained in each packet to 4 significance figures. Hence find the number of full packets**. (4 marks)**

ii) The exact amount that will he realized from the sale of all the packets of milk. **3 marks)**

20. a) If P,Q and R are the points (2,-4), (4,0) and (1,6) respectively. Use the vector method to find the co-ordinates of points S given that PQRS is a Parallelogram **(3 marks)**

b) The positions vectors of point A and B are a and b respectively. C is another point with Positions vector $\mathbf{c} = {}^{3}/_{2}\,\mathbf{b} - ½\,\mathbf{a}$. **(1mk)**

Express in terms of **a** and **b**

i) $\overrightarrow{AC}$

ii) $\overrightarrow{AB}$. Hence show that A,B and C are collinear **(3marks)**

jjj) Determine the ratio A B:BC **(1 mark)**

c) Find the co—ordinates of the point Q which divides the line PR in ratio 3 :2 given the co – ordinates of P and Q are (3,-1) and (4,3) respectively.

21. The distance between town Manchester and Barcelona is 60 km.A car and a lorry travel from Manchester to Barcelona. The average speed of the Lorry is 20 km/h, less than that of the takes the car. The Lorry takes $1\ ^1/_6$ hrs more than the car to travel from Manchester to Barcelona.

a) If the speed of lorry is x km/h, find x. **(5mks)**

b) The lorry left Manchester town at 7:15 am. The car left Manchester town later and overtook the lorry at 11:15 am.

i) Calculate the time the car left town Manchester **(3 marks)**

ii) Distance yet to he covered by y lorry as the car arrives at Barcelona. **(3 marks)**

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

a) Plot these points on the grid provided below. **(1 mark)**

b) Triangle $P^1Q\ ^1R^1$ is the image of a triangle PQR under an enlargement scale factor ½ and centre (2,2). Write down the coordinates of triangle $P^1Q\ ^1R^1$ and plot on the same grid. **(2 marks)**

c) Draw triangle $P^{11}Q^{11}R^{111}$ the image of triangle $P^{11}Q^1R^1$ under a positive quarter turn about the point (1,1)

d) Draw a triangle $P^{111}Q^{111}R^{111}$ the image of triangle $P^1Q^{11}R^{11}$ under reflection in the line y = l. (3 marks)

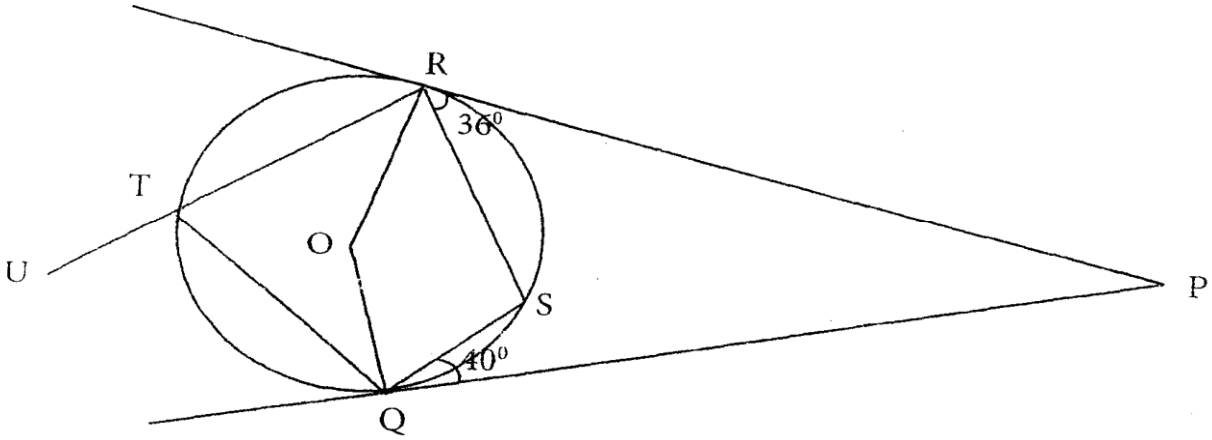
e) Describe fully a single transformation which maps triangle $P^{11}\ Q^{11}R^{11}$ onto triangle $P^1\ Q^1\ R^1$

23. a) Find the equation of the perpendicular bisector of the line AB where A is (3,9) and B is (7,5) in the form ax + by ± c = 0. **(4 marks)**

b) The perpendicular bisector of line AB in (a) above intersects the line joining the points (2,4) and (-3,1) at C. Find the co-ordinates of C.

c) The line through (2,4) and (-3,1) makes an angle θ with the positive X-axis. find the value of $6.^{\theta}$ (3mks)

24. In the figure below, 0 is the centre of the circle. PQ and PR are tangents to the circle at P and R respectively Angle PQS = 40^0 and angle PRS 30° RTU is a straight line. (3mks)



Find with reasons the angles

1) QRS **(2marks)**

ii) RTQ **(2 marks)**

iii) RPQ **(2 marks)**

iv) Reflex angle QOR **(2 marks)**

v) TRO given that TR =TQ (2 marks)

CROSSCOUNTRY MOCKS

MATHEMATICS

TRIAL 10 PAPER 2

TIME: 2 ½ HOURS

NAME…… INDEX NO……

SCHOOL…….. SIGN……..…

DATE……..

INSTRUCTIONS TO CANDIDATES.

(a) *Write your **NAME, SCHOOL** and **INDEX NUMBER** in the spaces provided above.*
(b) ***Sign*** *and write **date** of examination in the spaces provided.*
(c) This paper consists of **TWO** sections. Section **I** and Section **II**.
(d) Answer **ALL** the questions in section **I** and only **FIVE** questions from Section **II**
(e) Marks may be given for correct working even if the answer is wrong.
(f) Non- programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	**TOTAL**

GRAND TOTAL

SECTION A (50 MARKS)

All Questions In This Section

1. If A = 2.3, B = 8.7 and C = 2.0. Find the percentage error in $\frac{A+B}{C}$ **(3 mks)**

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

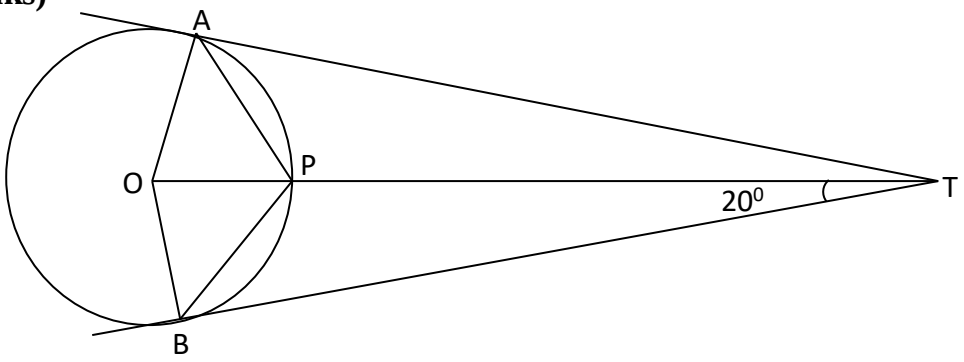
3. Starting from seven minutes to noon the minutes hands of a clock moved so that the clock is showing 27 minutes to one.

(a) Find the angle through which the minute hand moved. **(2 mks)**

(b) Given that the minute hand is 6.37cm long. Find the length of the arc it describes in that time. **(2 mks)**

4. In the figure below TA and TB are tangents to the circle centre O. Given that $\angle ATB = 20^0$. Find $\angle PAT$.

(3 mks)



5. In a school the form three students are 90. The ratio of boys to girls is 7:2. Find the number of girls required to join the existing class so that the ratio of boys to girls is 5:4. **(3 mks)**

6. A wire 180cm long was used to make a model of a triangular-based prism. The cross-section has side of length 10cm each. Calculate the volume of the resulting prism. **(4 mks)**

7. Find the value of x given that $\text{Log}_2 (x^2 - 2) - \text{Log}_2 (\frac{1}{2} x + 5) - 1 = 0$ **(3 mks)**

8. Write down the first four terms of the expression of $(2 - \frac{1}{4}x)^9$ in ascending powers of x giving your answer in simplest forms. Hence find the value of $(1.975)^8$ to the nearest 3 d.p. **(3 mks)**

9. Determine the centre and the radius of the circle given by equation. **(3 mks)**

$x^2 + y^2 - 6x + 4y - 12 = 0$

10. (a) Draw line MN = 7cm and show the locus of a point P which is such that $\angle MPN = 90^0$. **(1 mk)**

(b) On the locus of P in the diagram in (a) above, construct the locus of T which is such that it is equidistant from M and N. **(2 mks)**

11. A box contains 3 red balls, 7 blue balls and 2 green balls. A ball is taken at random. What is the probability of it being neither red nor green. **(2 mks)**

12. In an examination there are two papers each with total marks of 50. To pass the examination a candidate must score at least 20 marks on each paper and at least 50 marks on the two papers combined. If x and y represent marks on paper I and paper II respectively. Write down three inequalities representing the above information. **(3 marks)**

13. The gradient of a curve at the point (x,y) is $5x + \frac{3}{x^2}$ if it passes through (1,2). Find its equation. **(4 mks)**

14. A ship sails due North from latitude 20^0S for a distance 1440nm. Find the latitude of the point it reaches. **(3 mks)**

15. Find x if Cos $x = \frac{\sqrt{3}}{2}$ for $-180^0 \leq x \leq 180^0$. **(3 mks)**

16. Given that $\underset{\sim}{x} = 3\underset{\sim}{i} + 2\underset{\sim}{j} - 4\underset{\sim}{k}$, $\underset{\sim}{y} = 3\underset{\sim}{i} + 5\underset{\sim}{j} - 2\underset{\sim}{k}$ and $\underset{\sim}{z} = -4\underset{\sim}{i} + 3\underset{\sim}{j} + 5\underset{\sim}{k}$ and that $\underset{\sim}{p} = 4\underset{\sim}{x} - 2\underset{\sim}{y} + 3\underset{\sim}{z}$. Find the magnitude of p to 4 S.F **(4 mks)**

SECTION II (50 Marks)

Answer any Five Questions in this section

17. An amount of money was shared among five businessmen. Njoroge, Mwanzia, Ahamed, Wanyama and Kiprotich. Njoroge got $\frac{3}{8}$ of the total while Mwanzia got $\frac{2}{5}$ of the remainder. The remaining amount was shared equally among the other three of which each received KSh. 600.

(a) How much was shared among the five. **(3 mks)**

(b) Determine how much Mwanzia got. **(2 mks)**

(c) Njoroge, Mwanzia and Kiprotich invested their money and earned a profit of KSh. 1200. A third of the profit was left to maintain the business and the rest was shared according to their investment. Calculate how much each got. **(5 mks)**

18. Three consecutive term of a geometric progression are 3^{2x+1}, 9^x and 81 respectively.

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

(b) Find the common ratio. **(1 mk)**

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

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

19. The equation of a curve is given by $y = 3\cos x - 4\sin x$.

(a) Complete the table below correct to 1 d.p (2 mks)

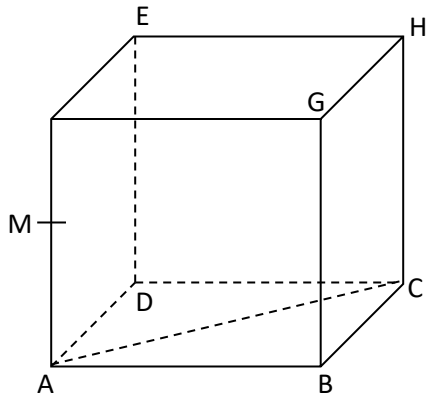
x	0	30	60	90	120	150	180	210	240	270	300	330	360
y	3			-4			-3			4			3

(b) On the grid provided, draw the graph of $y = 3\cos x - 4\sin x$ for $0 \leq x \leq 360$ (4 mks)

(c) Use your graph to solve. $3\cos x = 4\sin x - 1$ **(2 mks)**

(d) Find the range of values of x for which $3\cos x - 4\sin x + 4 < 0$ **(2 mks)**

20. The figure below shows a cube of side 10cm. M is the midpoint of AF.



Find

(i) length HM **(2 mks)**

(ii) the angle HM and ABCD. **(4 mks)**

(iii) angle between HM and MC **(4 mks)**

21. P varies directly as the square of Q and inversely as R.

(a) (i) Given that P = 2 when R = 5 and Q = 4, find the equation connecting P Q and R. **(2 mks)**

(ii) If P = 4.5 and R = 5. Find the positive value of Q. **(3 mks)**

(b) If Q increases by 5% and R decreases by 10%. Find the percentage change in P. **(5 mks)**

22. A particle moves such that its displacement S metres after t seconds from a fixed point is given by $S = 3t^3 - 6t^2 + 4t + 5$. Determine

(a) The displacement of the particle at t = 2. **(1 mk)**

(b) The velocity of the particle when t = 3. **(3 mks)**

(c) The displacement of the particle when the particle was momentarily at rest. **(3 mks)**

(d) The acceleration of the particle when t = 1.5 seconds. **(3 mks)**

23. A number of students were asked to cut 30cm length of binding wire without measuring. Later 100 pieces are collected and measured correct to the nearest 0.1cm and the data filled on the table below.

Length (cm)	28.0–28.4	28.5-28.9	29.0-29.4	29.5-29.9	30.0-30.4	30.5-30.9	31.0-31.4	31.5-31.9
	5	8	30	x	10	20	10	4

(a) Calculate the value of x **(1 mk)**

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

(c) Using 29.7 as working mean, calculate

(i) the mean. **(4 mks)**

(ii) the standard deviation. **(4 mks)**

24. Two quantities p and n are connected by the equation $P = AK^n$, where A and K are constant. The table below shows corresponding values of n and p.

n	2	4	6	8	10
P	9.8	19.4	37.4	74.0	144.4

(a) State the linear equation connecting p and n. **(2 mks)**

(b) On the grid provided, draw a suitable straight line. **(6 mks)**

(c) Use your graph to estimate the value of A and K. **(2 mks)**

THE END

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