

NAME:

INDEX NO:

CANDIDATE'S SIGNATURE.....

DATE:.....

121/2
MATHEMATICS ALT. A.
PAPER 2
JUNE / JULY 2013
2 ½ HOURS

Nakuru District Joint Kenya Certificate of Secondary Education Trial Examination 2013

MATHEMATICS ALT. A.
PAPER 2
2½ HOURS

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided above.
- Sign and write the date of examination in the spaces provided
- This paper consists of two sections: **Section I and Section II.**
- Answer all the questions in Section I and only five from section II
- All answer and working must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
- Marks may be given for correct working even if the answer is wrong.
- Non- programmable silent electronic calculators **and KNEC** Mathematical tables may be used except where stated otherwise.
- Candidates should check the question paper to ascertain that all the 24 questions are printed.

For Examiner's Use Only

SECTION I

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

SECTION II

17	18	19	20	21	22	23	24	Total

Grand
Total

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- This paper consist of 17 printed paper

SECTION 1 (50 MARKS)

Answer all the question in this section in the spaces provided

1. Evaluate $\frac{\log_{10} 50 + \log_{10} 2}{\log_{10} 25 \div \log_{10} 5}$ (3marks)

2 Given that $Q^2 = KQ^2 - PQ^2 + MR$; make Q the subject of the formula (3 marks)

3. Mercy weighed a block of wood in the laboratory measuring 6cm by 5cm and found it to be 315.2g.
Calculate the relative error in its density. (4 marks)

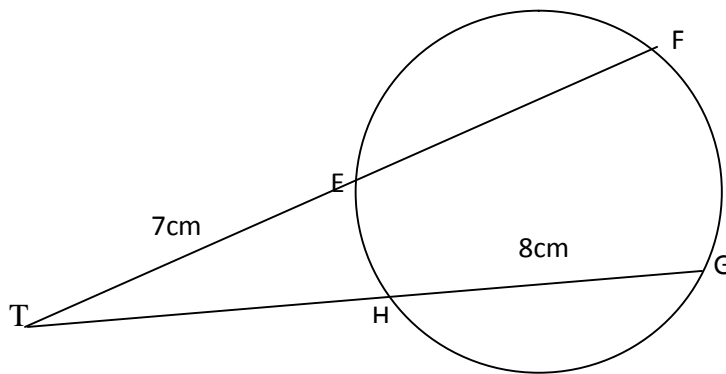
4. Solve for x

$$3 \sin (3x - 20^\circ) = -2$$

$$\text{for } 0^\circ \leq x \leq 180^\circ$$

(4 marks)

5. In the figure below, chords EF and HG are produced to meet at T. Given that EF = 6cm, TE = 7cm and HG = 8cm, Find the length GT (3Marks)



6(a) Expand and simplify $\left(2 - \frac{1}{3}x\right)^6$

(2 marks)

- (b) Use the first 3 terms of the expansion in part (a) above to find the approximate value of $(1.97)^6$ to 2 decimal places (2 marks)

7. Six men take 28 days working for 10 hours a day to pack 4480 parcels. How many more men working 8 hours a day will be required to pack 2500 parcels in 4 days ? (3 marks)

8. An urn contains beige and purple marbles. The probability of picking a beige marble is $\frac{2}{7}$. If there are 15 purple marble, find:-
(a) The number of marble in the urn (1mark)

- (b) The probability of picking a beige followed by a purple marble without replacement. (2 marks)

9. In a geometric sequence, the first term is 4 and the common ratio is 2. Given that the sum of the first n terms is $4^n - 4$, find n . (3 marks)

10. Simplify

(3marks)

$$\frac{\sqrt{14}}{\sqrt{14} - 2\sqrt{3}} - \frac{2\sqrt{3}}{14 + 2\sqrt{3}}$$

11. (a) A line passing through the points A(3,5) and B(-5, 11) is the diameter of a circle centre C
Determine

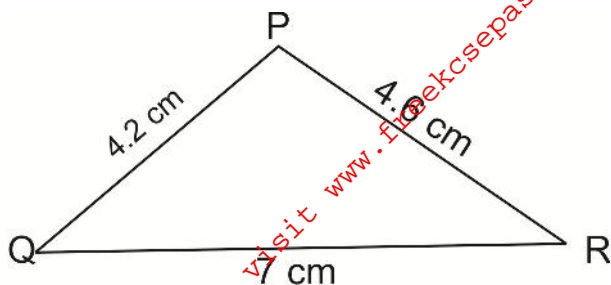
(a) The co-ordinates of C

(1mark)

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

(3marks)

12. The figure below represents a triangle P Q R



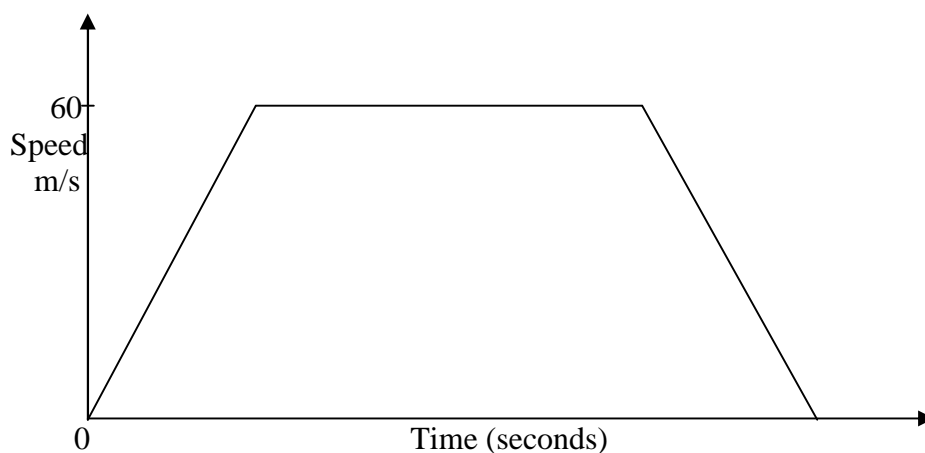
Using a ruler and a pair of compasses only, determine a point M on the line Q R, such that $Q M: M R = 2:3$ (3 marks)

13. An aircraft left town A and flew eastwards along latitude to town B (60°N , 35°E). If it took $5\frac{1}{2}$ hours at a speed of 910km/hr, find the position of A. (Take $\pi = \frac{22}{7}$, $R=6370$ km) (3 marks)

14. Triangle A'B'C' is the image of triangle ABC under the transformation represented by the matrix $\begin{pmatrix} 3 & 1 \\ 5 & 4 \end{pmatrix}$. If the area of triangle A'B'C' is 140 cm^2 . Find the area of triangle ABC. (3 Marks)

15. An electricity generator depreciates at the rate of 7% per annum. After three complete years, its value was Kshs,250,800. Find its value at the start of the three year period. (3marks)

16. The diagram below shows the speed-time graph for a matatu travelling between two estates. The matatu starts from rest and accelerates uniformly for 1 minute 20 seconds. It then travels at this constant speed of 60 m/s for $4\frac{1}{2}$ minutes and finally decelerates uniformly causing to a halt in 50 seconds. Find the distance travelled in Km (3 marks)



SECTION II (50 MARKS)

ANSWER ANY FIVE QUESTIONS IN THIS SECTION IN THE SPACES PROVIDED

17. In Nakuru County, a dress merchant bought suits at a cost of shs. 57,600 from a wholesaler. Had she bought the same number of suits from a supermarket, it would have cost her shs.480 less per unit. This would have enabled her to buy four extra suits for the same amount of money.

(a) Taking x to be the cost of a suit, determine:-

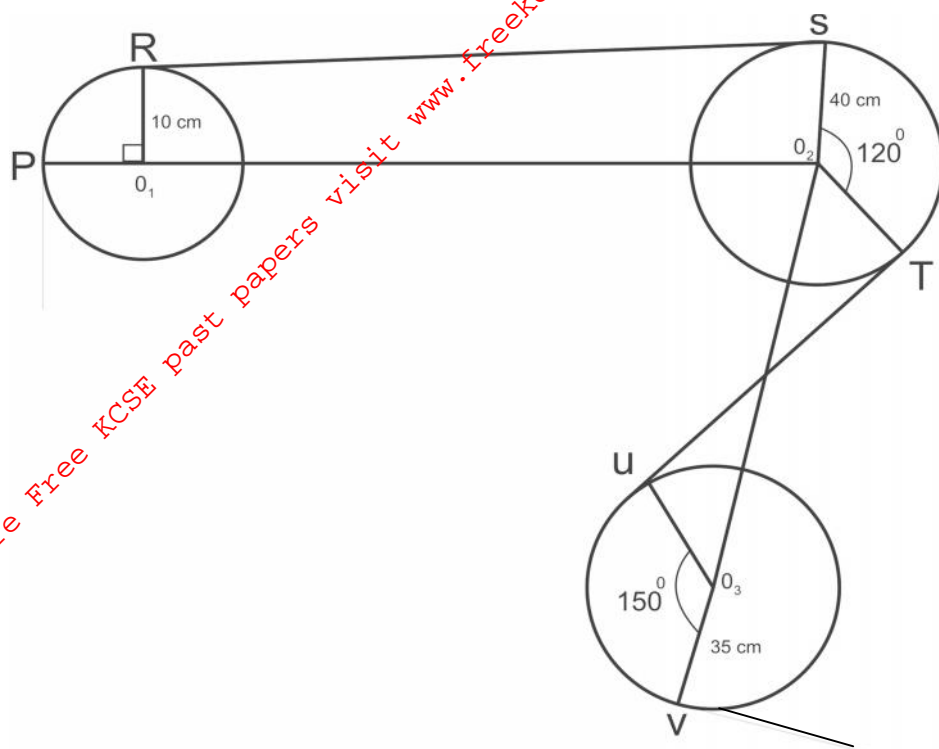
(i) the number of suits bought from the wholesaler in terms of x (1mark)

(ii) The number of suits bought from the supermarket. (1mark)

(b) Find the number of suits the dress merchant bought (5 marks)

(c) The merchant later sold each suit for shs.720 more than she paid for it. Determine the percentage profit she made. (3marks)

18. The figure below shows a section of pulley consisting of a belt P R S T U V. The centres of the three wheels are O_1 , O_2 and O_3 with radii 10cm, 40cm and 35cm respectively, $\angle PQR = 90^\circ$, $\angle SO_2T = 120^\circ$ and $\angle UO_3V = 150^\circ$, $O_1O_2 = 80\text{cm}$ and $O_2O_3 = 100\text{cm}$.



Calculate

- (a) The total length of RS and TU

(4 Marks)

- (b) The total length of the arcs RP, ST and UV

(5marks)

- (c) The length of the belt P R S T U V

(1mark)

- 19 (a) Complete the table below for the function $y = x^3 + 3x^2 - 6x - 2$ for the interval $-5 \leq x \leq 2$.

X	-5	-4	-3	-2	-1	0	1	2
y		6		14		-2		

- b) On the grid provided draw the graph of $y = x^3 + 3x^2 - 6x - 2$ for $-5 \leq x \leq 2$. Use the scale 2cm represents 1 unit on the x-axis and 2cm represents 5 units on y-axis. (2marks)
(3 marks)
- c) Use the graph to solve the equation $x^3 + 3x^2 - 6x - 2 = 0$ (1mark)

- d) By drawing a suitable straight line, on the same grid as (c) above, estimate the roots of the equation. $x^3 + 3x^2 - 7x - 4 = 0$ (4marks)

20(a) The volume, $V\text{cm}^3$ of a solid varies partly as r^2 and partly as r^3 where r is one of the dimensions of the solid.

When $r = 1$, $V = 54.6\text{cm}^3$ and

When $r = 2$, $V = 226.8\text{cm}^3$

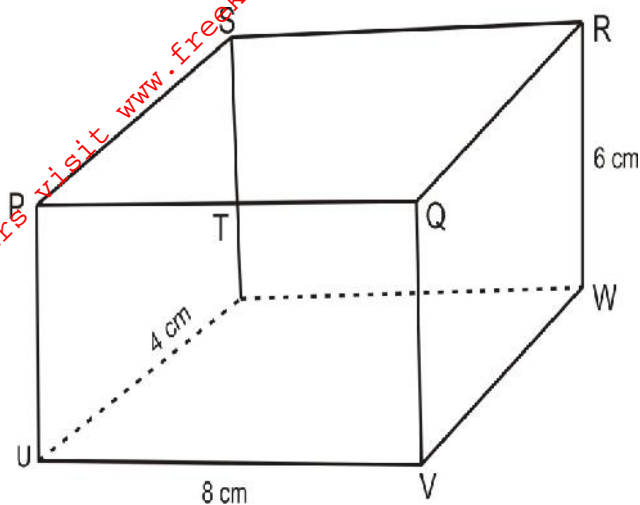
(i) Find the relation connecting V and r (3marks)

(ii) Calculate the volume of the solid when $r = 4$ (2 marks)

(iii) Find the value of r when the two parts of the volume are equal (2marks)

b) A quantity R is inversely proportional to the square of another quantity d . If $R = 2$ when $d = 3$, find R when $d = 4$ (3 marks)

21. The diagram below represents a cuboid $PQRSTU VW$ in which $SP = 4\text{cm}$, $PQ = 8\text{cm}$ and $QV = 6\text{cm}$



(a) Find the angle between the

(i) Line PQ and RW

(1 mark)

(ii) Line UR and the plane $URWT$

(4 mark)

(iii) Planes $PQWT$ and $PQRS$

(3 marks)

b) Determine the volume of the cuboid

(2 marks)

22. The table shows marks obtained by students in a mathematics paper.

Marks	10-14	15-19	20-24	25-29	30-34	35-39	40-44
No. of students	8	12	18	20	15	4	3

(a) On the grid provided draw an ogive

(3marks)

(b) From the curve, estimate

(4 marks)

(i) The Quartile deviation

(ii) The number of students in the middle 50%

(3 marks)

23 The following table shows values of the function $y = 3x^3 - 4x + 2$ for the range, $-1 \leq x \leq 3$.

(a) Complete the table

(2 marks)

X	-1	-1/2	0	1/2	1	1 1/2	2	2 1/2	3
Y	3 5/8	5 5/8	2	1				38 7/8	

(b) Using the mid - ordinate rule with 4 stripes, estimate the area bounded by the curve $y = 3x^3 - 4x + 2$, the lines $x = -1$, $x = 3$ and the x-axis

(2 marks)

(c) Calculate the actual area in (a) above

(4 marks)

(d) Determine the percentage error in the estimation of the area

(2 marks)

24. A relief organization has to transport at least 80 people and 18 tonnes of supplies to a site. There are two types of vehicles available, type A and type B. Type A can carry 900 kg of supplies and 6 people vehicle B can carry 1350 kg of supplies and 5 people. There are at most 12 vehicles of each type available. Let x represent the number of vehicles for type A and Y represent the number of vehicles of type B

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

(b) On the grid provided, draw all the inequalities in (a) above by shading the unwanted regions (4marks)

(c) Use the graph in (b) above to determine the smallest number of vehicles required at the site (2 marks)

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