

Name.....

Index No...../.....

School.....

Date

Candidate's Signature.....

121/2
MATHEMATICS
ALT .A
PAPER2
JULY / AUGUST, 2012
Time: 2 ½ Hours

KERICHO DISTRICT JOINT KCSE TRIAL EXAMINATION-2012
Kenya Certificate of Secondary Education (K.C.S.E)

121/2
MATHEMATICS
ALT .A
PAPER2
JULY / AUGUST, 2012
Time: 2 ½ Hours

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided at the top of this page.
2. Sign and write the date of the examination
3. This paper consists of two sections: Section I and Section II.
4. Answer ALL questions in section 1 and ONLY FIVE questions from section II
5. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
6. Marks may be given for correct working even if the answers are wrong.
7. Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

FOR EXAMINERS USE ONLY

Section I

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

Section II

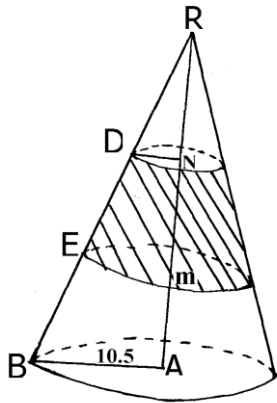
| | | | | | | | | |
|----|----|----|----|----|----|----|----|-------|
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | TOTAL |
| | | | | | | | | |

**GRAND
TOTAL**

This paper consists of 16 printed pages.

4. Three people, Kamau, Kimutai and Onyango are to share Ksh 44,000 among themselves in the ratio $a:b:c$ respectively. If $a = \frac{1}{2}b$ and $c = \frac{2}{3}b$, find how much Kimutai will receive more than Onyango. (3mks)

5. The diagram below shows a child's toy consisting of three solid plastic bricks fitting together to form a cone whose base radius $AB = 10.5\text{cm}$ and its height $AR = 24\text{cm}$



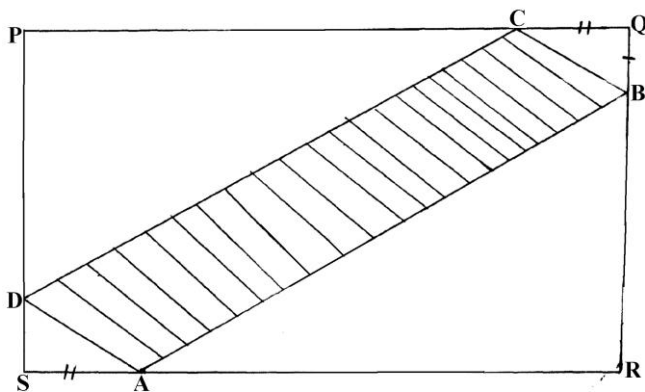
If $Am = MN = NR$ and the density of the plastic used is 0.3g/cm^3 find the mass of the shaded brick. (4mks)

6. Solve for x in the equation $2^{2x-1} + 4^{x+2} = 264$ (2mks)

7. Solve the equation : $\log_2(2+3x) + 3\log_2 2 = 2 + \log_2^{(2x+6)}$ (3mks)

8. Without using mathematical table or a calculator simplify $\frac{3\sqrt{5} + 6\sqrt{3}}{4\sqrt{3} + 2\sqrt{5}}$ (3mks)

9. In the figure below PQRS is a rectangle. PQ = 30 cm and PS = 10cm. The unshaded portions are cut off leaving a parallelogram ABCD



Given that line BQ = DS = xcm and line CQ = SA = 3 x cm; Find the value of x when the area of parallelogram ABCD is maximum. (4mks)

10. a) Expand the expression $\left(x + \frac{3}{x}\right)^5$ in ascending powers of x. (2mks)

b) Use the expansion upto the forth term to evaluate $(10.3)^5$ (2mks)

11. A ball allowed to drop from a height of 16m on to a floor rebounds to $\frac{3}{4}$ of it's previous height. Find the total distance the ball will have travelled when it hits the ground for the tenth times correct to four significant figures 1. (2mks)

12. The area of triangle ABC is 42cm^2 . The triangle ABC is transformed using the matrix $\begin{pmatrix} 4 & X \\ 2 & 3 \end{pmatrix}$ to obtained the image triangle $A^1B^1C^1$ whose area is 168cm^2 . Determine the value of x. (2mks)

13. Solve the equation $\left(\log_4 x\right)^2 - \frac{7}{2}\log_4 x = -3$ (4mks)

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14. A student's results in six mathematics's test were 24,28,32 x,48 and 50 in that order. If the median is 36, find the mean mark. (3mks)

15. Make x the subject of the formula $y = \frac{ax}{(x^2 + b)^{\frac{1}{2}}}$ (3mks)

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16. Given that p varies directly as the square of x and inversely as y and that y varies directly as the product of p and x.
Determine how P varies with x. (3mks)

SECTION II (50 MARKS)

Answer only FIVE questions in this section in the spaces provided.

17. The table below show income tax rate for the year 2010.

| Income in α per month | Rate in sh per pound |
|------------------------------|----------------------|
| 1 – 484 | 2 |
| 485 – 940 | 3 |
| 941 – 1396 | 4 |
| 1397 – 1852 | 5 |
| Over 1852 | 6 |

In the tax year of 2010 the tax of Kamau's monthly income was ksh 10880.50. If he is entitled to a tax relief of ksh 1156. Find

- i) Gross tax of Kamau. (2mks)

- ii) Taxable income per month in shillings. (6mks)

- b) Apart from basic salary Mr. Kamau earn also a house allowance of Ksh 12,000 a medical allowance of Ksh 3060 and a hardship allowance of Ksh 4635.

Find his basic salary per month. (2mks)

18. a) A plane leaves an airport A ($40^{\circ}\text{S}, 36^{\circ}\text{W}$) at 9.00 a.m and flies due north to air port B($50^{\circ}\text{N}, 36^{\circ}\text{W}$). Find the distance covered by the plane in kilometers
(Take $R = 6370\text{km}$) and $\pi = \frac{22}{7}$ (3mks)

b) After stopping for 30minutes to refuel at B the plane then flies due east, to airport C, 3500km from B. Find:

i) the position of c. (3mks)

ii) the local time the plane land at C if its average speed from A to C is 1200km/hr (4mks)

19. a) Using a ruler and pair of compasses only construct triangle ABC in which $AB = 6\text{cm}$, $BC = 5.5\text{ cm}$ and angle $ABC = 60^\circ$. Measure AC. (3mks)

b) On the same side of AB as C.

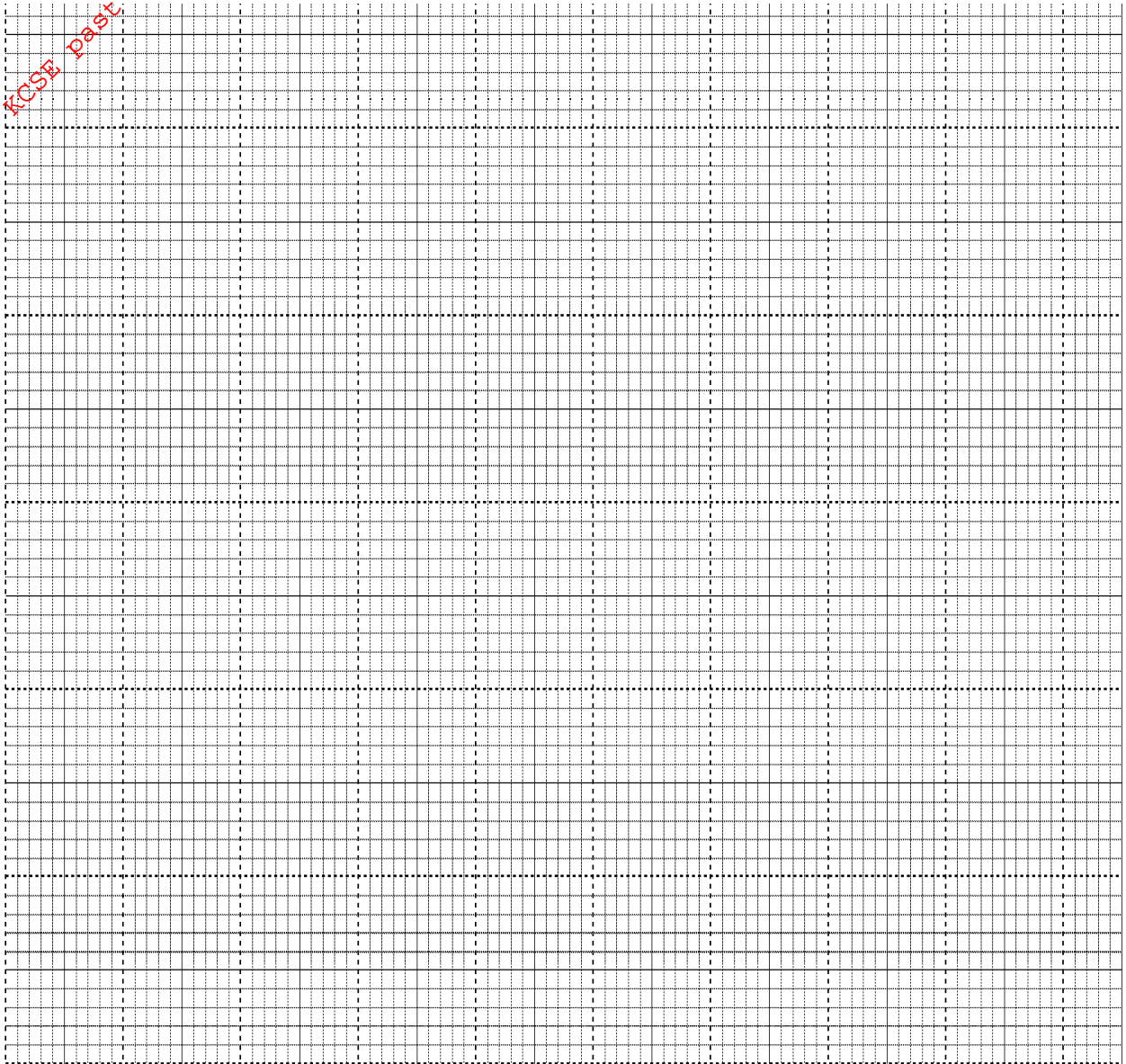
i) determine the locus of a point p such that angle $APB = 60^\circ$. (3mks)

ii) Construct the locus of R such that $AR = 3\text{cm}$ (1mk)

iii) Identify the region T such that $AR \geq 3\text{cm}$ and $\angle APB \geq 60^\circ$ by shading the unwanted part. (3mks)

20. a) Complete the table below giving your value correct to 2 decimal place. (2mks)

| X | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 |
|--------------------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| Sin x | 0.00 | 0.50 | | 1.00 | | 0.50 | 0.00 | -0.50 | | | -0.87 | | 0.00 |
| Cos $\frac{2}{3}x$ | 1.00 | | 0.77 | | 0.17 | | -0.50 | | -0.94 | -1.00 | | -0.77 | -0.50 |



- b) On the grid provided, draw the graphs of $y = \sin x^\circ$ and $y = \frac{2}{3} x^\circ$ for $0^\circ \leq x \leq 360^\circ$. (5mks)
- c) Use the graph to :-
- i) solve the equation $\sin x^\circ - \cos \frac{2}{3}x^\circ = 0$ (2mks)
 - ii) Determine the range of values for which $\sin x^\circ < \cos \frac{2}{3}x^\circ$ for the domain $0^\circ \leq x \leq 360^\circ$. (1mk)

21. Water flows through a cylindrical pipe of diameter 8.4cm at a speed of 50m / minutes

a) Calculate the volume of water delivered by the pipe per minute in litres. (3mks)

b) A cylindrical storage tank of radius 105cm is filled by water from this pipe and at the same rate of flow.
Water begins flowing into the empty storage tank at 9.30a.m and is full at 2.00pm.
Calculate the height of thin tank in metre square. (4mks)

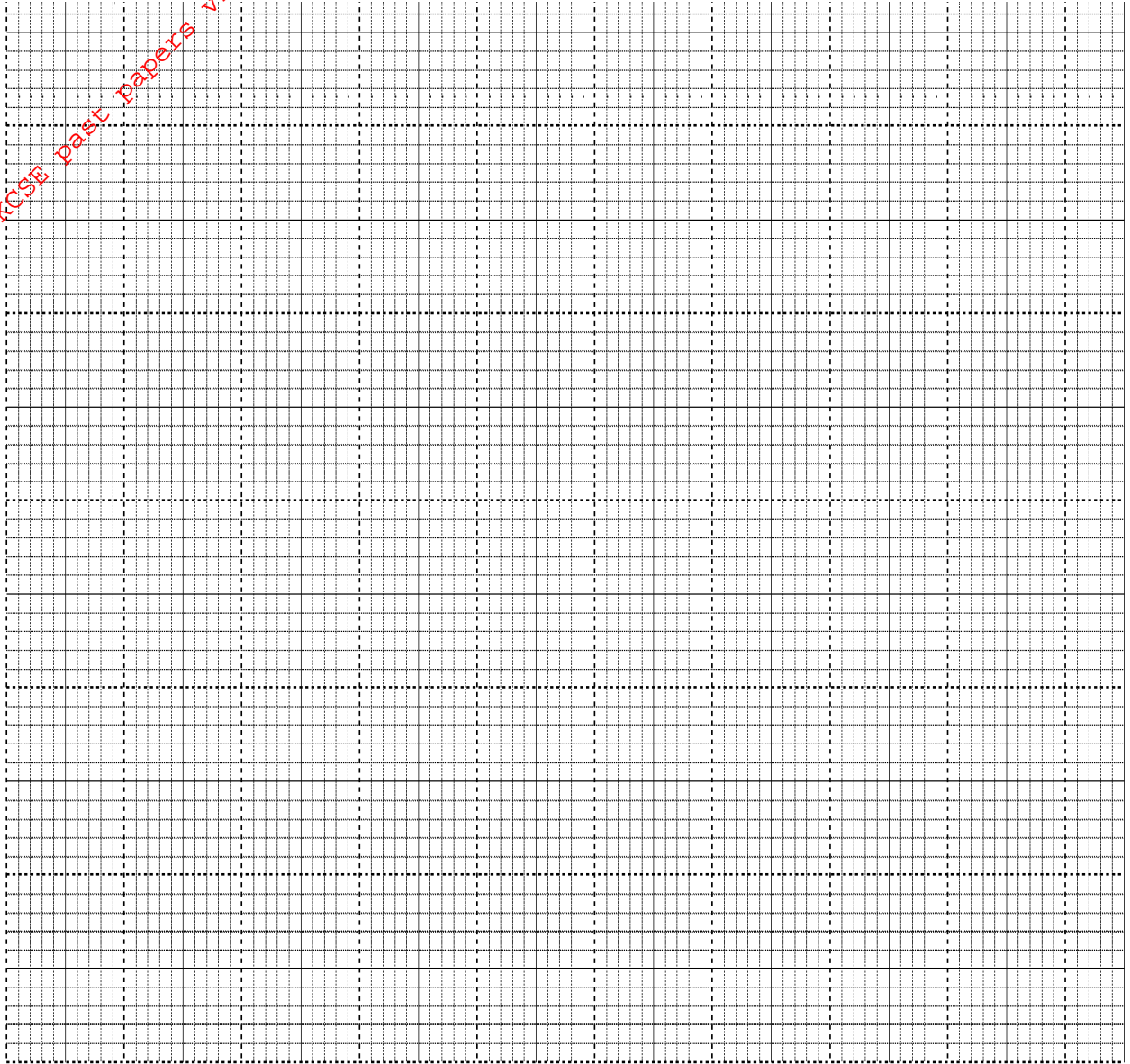
c) A family consumes the capacity of this tank in one month. The cost of water is sh 50 per thousand litres and fixed basic charge of ksh 1650. Calculate the cost of this family's water bill for a year.

22. In an experiment two quantities p and q were observed and the results obtained were recorded as given in the table below.

| | | | | | | |
|---|------|------|-------|-------|-------|-------|
| Q | 1 | 2 | 3 | 4 | 5 | 6 |
| P | 2.70 | 5.70 | 11.15 | 22.62 | 45.20 | 90.51 |

It is thought that p and q are connected by the formula $p = a(b + q)$ where a and b are constants

a) Draw a suitable straight line graph (5mks)



b) i) From the graph determine the values of the constant a and b. (4mks)
ii) Determine the value of p when q = 4.5 (1mk)

23. A bus left Mombasa and travelled toward Machakos at an average speed of 60km/h. After $2\frac{1}{2}$ hrs, a car left Mombasa and travelled along the same road at an average speed of 100km/h. If the distance between Mombasa and Machakos is 500km, determine:

a) i) The distance of the bus from Machakos 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 at which the car travelled in order to reach Machakos at the same time as the bus.

24. a) A curve whose gradient function is $\frac{dy}{dx} = x^2 + x - 6$ passes through point A(6,59)
Find its equation. (4mks)

b) i) Determine the nature of the stationary points on the curve in (a) above. (4mks)

ii) Sketch the curve. (2mks)

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