

NAME.....

INDEX NO.....

SCHOOL.....

CANDIDATE'S SIGN.....

DATE.....

121/2

MATHEMATICS

FORM 4

MARCH/APRIL 2013

TIME: 2 1/2 HOURS

ELDOR ET EAST INTER - SCHOOLS TEST (EIST) - 2013

(Kenya Certificate of Secondary Education)

Instructions to Candidates

1. Write your name, class and admission number in the space provided at the top of this page.
2. This paper has two sections: Section I and Section II.
3. Answer all questions in Section I and any five questions in section II.
4. All answers and working must be written on the question paper in the space provided below each question.
5. Marks may be awarded for correct working even if the answer is wrong.
6. 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	16	Total

Section II

17	18	19	20	21	22	23	24	Total

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SECTION A (Answer ALL questions in this section)

1. Evaluate without using mathematical tables or calculator

$$\frac{450 \times \sqrt{0.36}}{27^{\frac{2}{3}} \div 81^{\frac{3}{4}}}$$

(3marks)

2. Given that $A = 4 + \sqrt{2}$ and $B = 2 + \sqrt{2}$ and that $\frac{A}{B} = c + d\sqrt{e}$ where c, d and e are constants. Find the values of c, d and e. (3marks)

3. An underground water tank is in the shape of a hemispherical bowl. Given that the volume of the tank is 19,404 litres, find the radius of the tank in metres. (3marks)

4. Solve for x in the trigonometric equation.

$$\text{Log}_2(3x + 1) = 2 + \text{Log}_2(x - 1)$$

(3marks)

5. The probability of a school winning in football is $\frac{2}{3}$ and winning in volleyball is $\frac{1}{4}$. Find the probability of winning at least one game.

(3marks)

6. The eleventh term of an A.P is four times the second term. If the sum of the first seven terms of the A.P is 175 find the;

i) the first term

(2marks)

ii) The common difference

(1mark)

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7. The data below shows the age of 10 students picked at random in a secondary school 6, 11, 13, 14, 8, 7, 12, 20, P and 9. If $\sum fx^2 = 1360$;

i) Determine the value of P (2marks)

ii) Find the standard deviation of the distribution. (2marks)

8. Solve the simultaneous equations (3marks)

$$x - 3y = 11$$

$$2x + y^2 = 13$$

9. The measurements $a = 6.3$, $b = 15.8$, $c = 14.2$ have maximum possible errors 1% , 2% and 3% respectively.

Find the maximum value of $\frac{ac}{b}$ (2marks)

10. The price of a new car is Sh. 800,000.00. If it depreciates at a constant rate to Sh. 550,000 within 4 years. Find the annual rate of depreciation. (3marks)

11. A tangent from an external point A (7,5) meets a circle centre O whose equation is $x^2 + 4x + y^2 - 5 = 0$ at point T, find the length of the tangent AT. (3marks)

12. Mwangi and Otieno live 60km apart. Mwangi leaves his home at 7.00a.m, cycling towards Otieno's house at 20km/h. Otieno leaves his home at 8.00a.m cycling towards Mwangi's house at 8km/h.

a) At what time did they meet? (2marks)

b) How far is the meeting point from Mwangi's house? (1mark)

13. Expand $(2 + x)^6$ upto the fourth term. (2marks)

Hence use the above expansion to evaluate $(1.96)^6$ correct to 4 d.p. (2marks)

14. Find the radius and centre of a circle whose equation is
 $4x^2 + 4y^2 + 56x - 104y - 152 = 0$ (3marks)

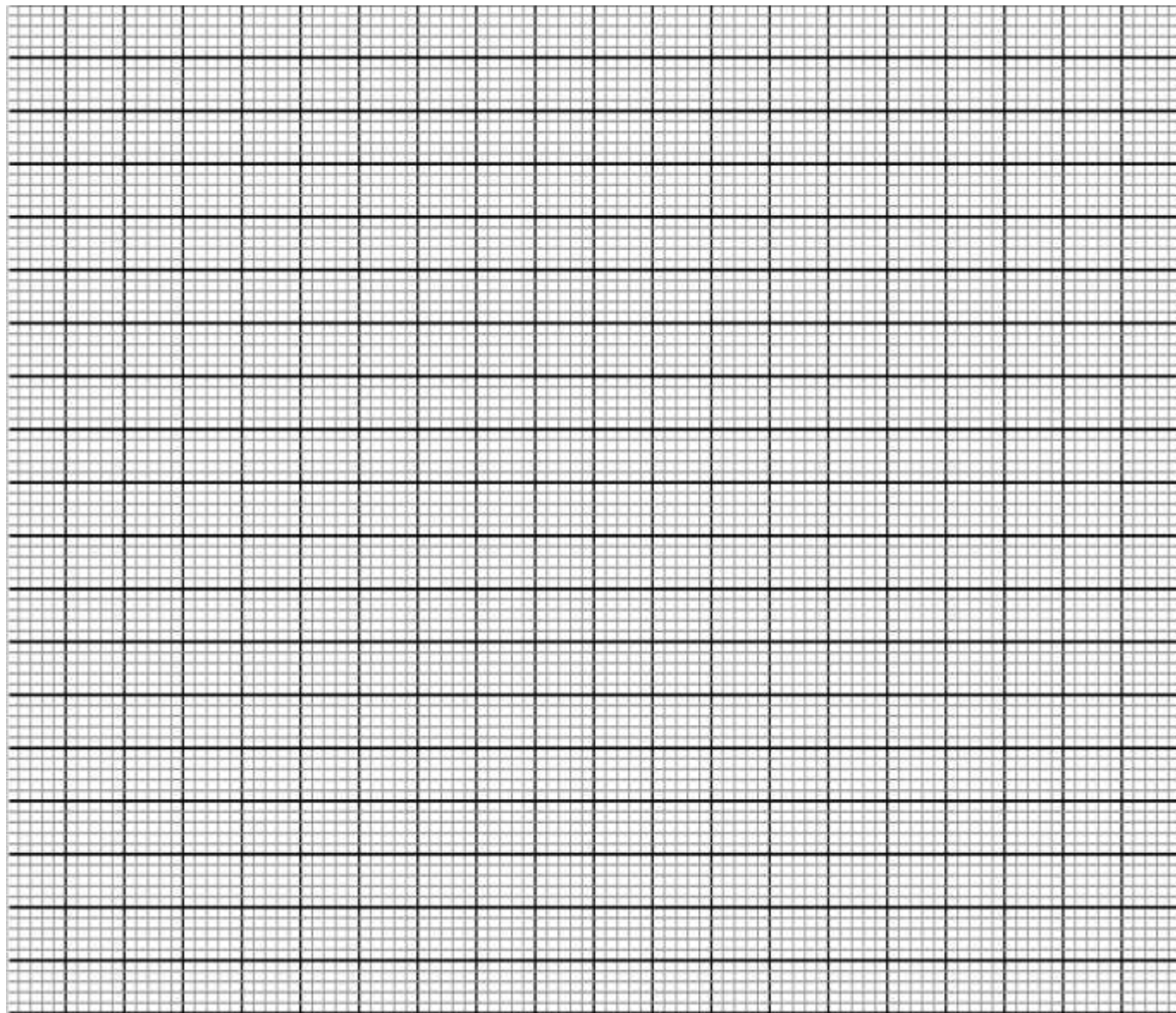
15. If P varies directly as R and inversely as the square root of Q. Find the percentage change in P if R is increased by 40% and Q decreases by 36% . (4marks)

16. Solve for x in $3^{-2x+1} - 10(3^{-x}) + 3 = 0$, without using tables.

(3marks)

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17. A quadrilateral ABCD has vertices A(4, -4), B(2, -4), C(6, -6) and D(4, -2).
- a) On the grid provided, draw the quadrilateral ABCD. (2marks)
 - b) $A'B'C'D'$ is the image of ABCD under positive quarter turn about the origin. On the same grid draw the image $A'B'C'D'$ and state its co-ordinates. (3marks)
 - c) $A''B''C''D''$ is the image of $A'B'C'D'$ under the transformation given by $T = \begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}$
 - i) Determine the co-ordinates of $A''B''C''D''$. (3marks)
 - ii) On the same grid draw the quadrilateral. (2marks)
 - d) Determine a single matrix that maps ABCD onto $A''B''C''D''$. (2marks)



18. The table below shows the income tax rates during a certain year.

Monthly Taxable income (K£)	Tax rate Sh. Per (K£)
0 – 506	2
507 – 1012	3
1013 – 1518	4
1519 – 2024	5
2025 – 2530	6
2531 – 3036	7
3037 – Above	7.50

A bank clerk earns a basic salary of Sh. 55,240 and a house allowance of Sh. 30,600 per month. She is also paid taxable allowance amounting to Sh. 15,760 per month.

a) Calculate:

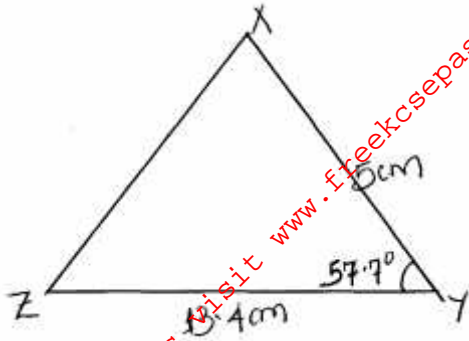
i) Her monthly taxable income in K£. (2marks)

ii) The gross tax payable. (6marks)

b) The clerk is entitled to a personal tax relief of Ksh. 1312 per month. Calculate her net monthly tax.

(2marks)

19. The figure below is a triangle XYZ, $ZY = 13.4\text{cm}$, $XY = 5\text{cm}$ and angle $XYZ = 57.7^\circ$.



Calculate

- a) Length XZ. (2marks)

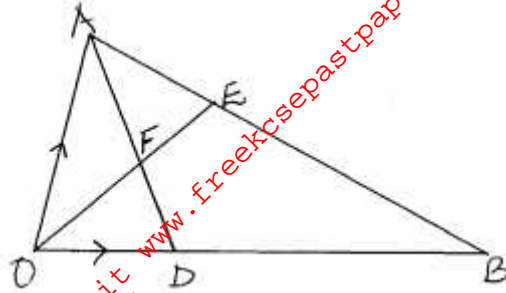
- b) Angle XZY. (2marks)

- c) The circumradius of triangle XYZ. (2marks)

- d) If a perpendicular is dropped from point X to cut ZY at M. Find the ratio MY : ZM. (2marks)

- e) Find the area of triangle XYZ. (2marks)

20. In the figure below, E is the mid point of AB. $OD:OB = 2:5$ and F is the point of intersection of OE and AD.



Given that $\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$ express in terms of \mathbf{a} and \mathbf{b} .

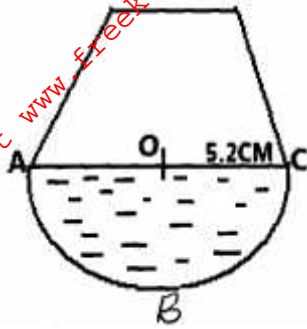
a) i) \vec{OE} (1mark)

ii) \vec{AD} (1mark)

b) Given further that $\vec{AF} = t\vec{AD}$ and $\vec{OF} = h\vec{OE}$ where t and h are scalars, find the values of the scalars t and h . (5marks)

c) Show that the points O, F and E are collinear. (3marks)

21. The diagram below shows a cross-section of a bottle. The lower part ABC is a hemisphere of radius 5.2cm and the upper part is a frustrum of a cone. The top radius of the frustrum is one third of the radius of the hemisphere. The hemisphere part is completely filled with water as shown in the diagram.



When the container is inverted, the water now completely fills only the frustrum part.

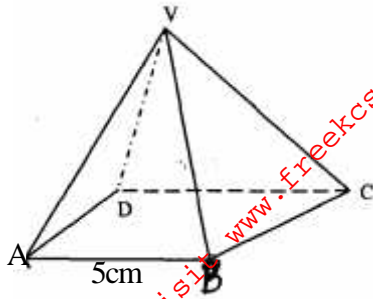
- a) Determine the height of the frustrum part.

(5marks)

- b) Find the surface area of the frustrum part of the bottle.

(5marks)

22. The figure below represents a square based pyramid with equilateral triangles, $AB = 5\text{cm}$.



Calculate the;

a) Height of the triangular faces. (2marks)

b) Length of AC. (2marks)

c) Angle between VA and ABCD. (2marks)

d) Angle between VAD and ABCD. (2marks)

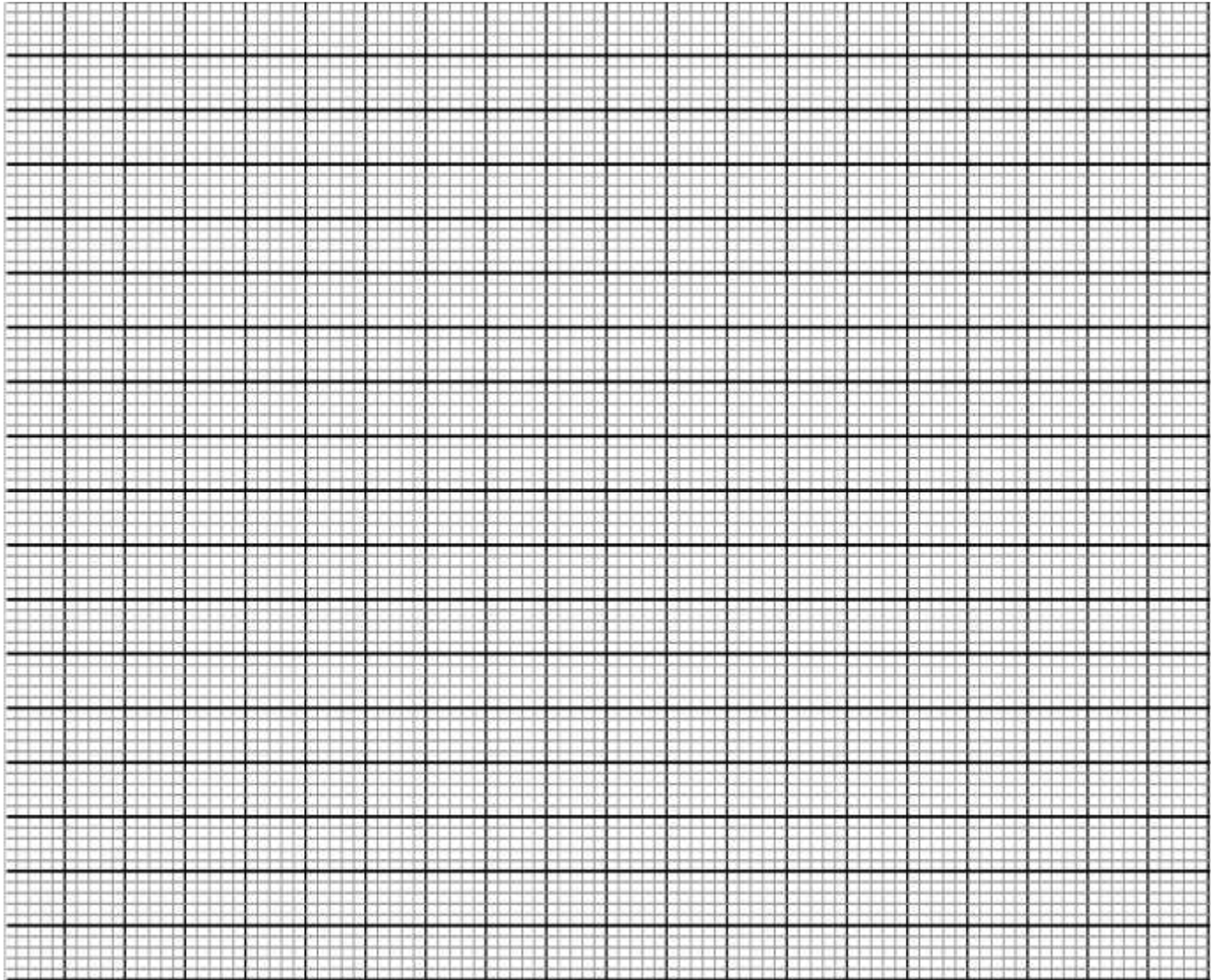
e) Angle between VAB and VBC. (3marks)

23. The table below show masses of 200 people from Kapsoya Village.

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

a) Draw a cumulative frequency curve for the above data.

(5marks)



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b) Use your graph to estimate;

i) The median mass. (1mark)

ii) The number of people whose mass lies between 70.5kg and 75.5kg. (2marks)

c) Find the following from your graph.

i) The lower quartile. (1 mark)

ii) The upper quartile. (1mark)

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24. a) Using a ruler and compasses only, construct triangle ABC such that $AB = AC = 4.3\text{cm}$ and angle $ABC = 30^\circ$. (3marks)
- b) Measure BC. (1mark)
- c) A point P is always on the same side of BC as A. Draw the locus of P such that angle BAC is always twice angle BPC. (2marks)
- d) Drop a perpendicular from A to meet BC at D. Measure AD. (2marks)
- e) Calculate the area of triangle ABC. (2marks)