

Name.....Index No

SchoolCandidate's Signature

Date.....

121/2
MATHEMATICS
PAPER 2
JUNE- 2016
TIME: 2½ HOURS

CENTRAL YEARLY MEETING OF FRIENDS (CYMF) -2016
Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES

- Write your name, school and index number in the spaces provided above
- This paper contains two sections; **Section 1** and **Section II**.
- Answer all the questions in **section 1** and only **five** questions from **Section II**
- All workings and answers must be written on the question paper in the spaces provided below each question.
- Marks may be given for correct working **even if** the answer is wrong.
- Non programmable silent electronic calculators and KNEC Mathematical tables may be used **EXCEPT** where stated otherwise.
- Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
- Candidates should check carefully to ascertain that all the pages are printed as indicated and no questions are missing.

FOR EXAMINER'S USE ONLY

Section 1

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

Section II

GRAND TOTAL

Question	17	18	19	20	21	22	23	24	Total
Marks									

This paper consists of 16 printed pages. Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing.

SECTION 1(50MARKS)

Answer all questions in this section in the spaces provided.

1. Evaluate using Logarithms

(4mks)

$$\frac{(0.0021 + 0.0035)^{\frac{1}{2}}}{1.38 \times 27.42}$$

2. Rationalize the denominator

(2mks)

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

3. Make x the subject

(3mks)

$$P = \sqrt[3]{\frac{bx^2 - ax}{x}}$$

4. Expand the given binomial up to the term with x^4 : $(1+3x)^6$
Use your expansion to evaluate $(1-3)^6$ correct to 4 decimal places (4mks)

5. Solve the equation below using the quadratic formular method
 $3x^2-7x+2=0$ (3mks)

6. Solve for x (3mks)

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

7. The sum of the first 14 terms of an A.P =595, Given that the sum of the first 8 terms is 220, Find the first term and the common difference. (4mks)

8. Determine the centre and the radius of a circle given that the equation of the circle is $4x^2+4y^2-32x+16y-16=0$ (3mks)

9. Solve the equation for P (3mks)
 $\text{Log}_2(2p+3) - 2 = \log_2(p-2)$

10. Mrs. Amayo bought a plot of land valued at Ksh 226,500, If it appreciates at the rate of 14% p.a.
Determine the price of the plot after 5 years. (3mks)

11. Solve $2\sin^2x - 3\sin x + 1 = 0$ for $0^\circ \leq x \leq 360^\circ$ (3mks)

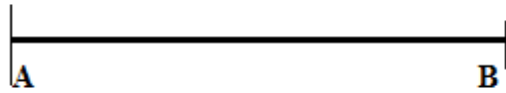
12. Nine men working 8 hours a day can weed a field in 15 days. How many hours a day must 27 men work in order to weed the same field in 5 days? (3mks)

13. Two towns are on the surface of the earth, at $(35^{\circ}\text{S}, 25^{\circ}\text{W})$ and $(35^{\circ}\text{S}, 17^{\circ}\text{E})$. Calculate the distance in kilometers correct to 1 decimal place, between the two towns. (Use earth's radius $R = 6370\text{km}$) (3mks)

14. A function is given as $y = 3 \sin (2x - 45^{\circ})$. State the period and the Amplitude of the wave. (2mks)

15. Jane bought a T.V set by paying a deposit of sh 2400 plus 15 equal monthly instalment of sh 500 each. The hire purchase price was 10% more than the marked price. What was the marked price. (3mks)

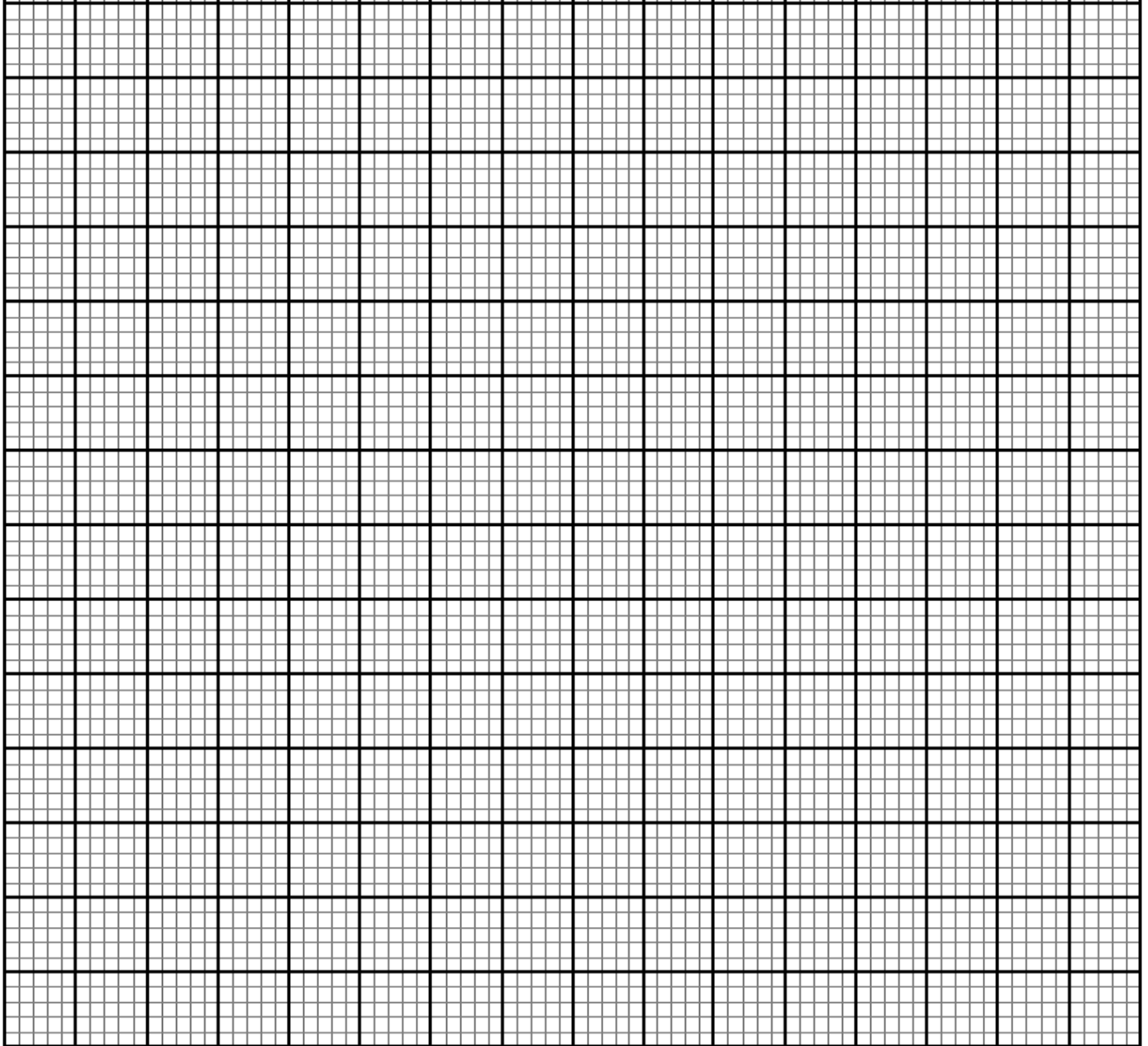
16. On the line segment AB shown below construct the locus of a point P such that $\angle APB$ is 60° on one side of AB. (3mks)



SECTION II (50 MARKS)

Answer only five questions in this section in the spaces provided

17. (a) Draw the graph of the function $y=2x^2+4x-3$ on the graph paper provided for $-4 \leq x \leq 2$. (5mks)

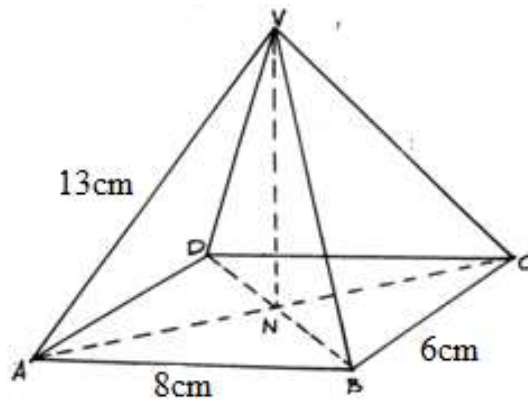


(b) Use your graph to solve the equations

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

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

18. The figure below represents a right pyramid on a rectangular base. $AV=13\text{cm}$, $AB=8\text{cm}$, $BC=6\text{cm}$



Calculate, correct to 1 decimal place.

(a) the length AC (2mks)

(b) the length VN (2mks)

(c) the angle between line AV and the base ABCD (2mks)

(d) the angle between plane VAD and the base ABCD (2mks)

(e) the angle between the plane VAB and the base ABCD

(2mks)

19. The table below shows marks obtained by 100 Form four students in a school in Kakamega county

% Marks	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
No of students	5	7	2x	10	19	4x	20	6	2	1

(a) Determine the value of x

(2mks)

(b) Using an assumed mean of 52, calculate;

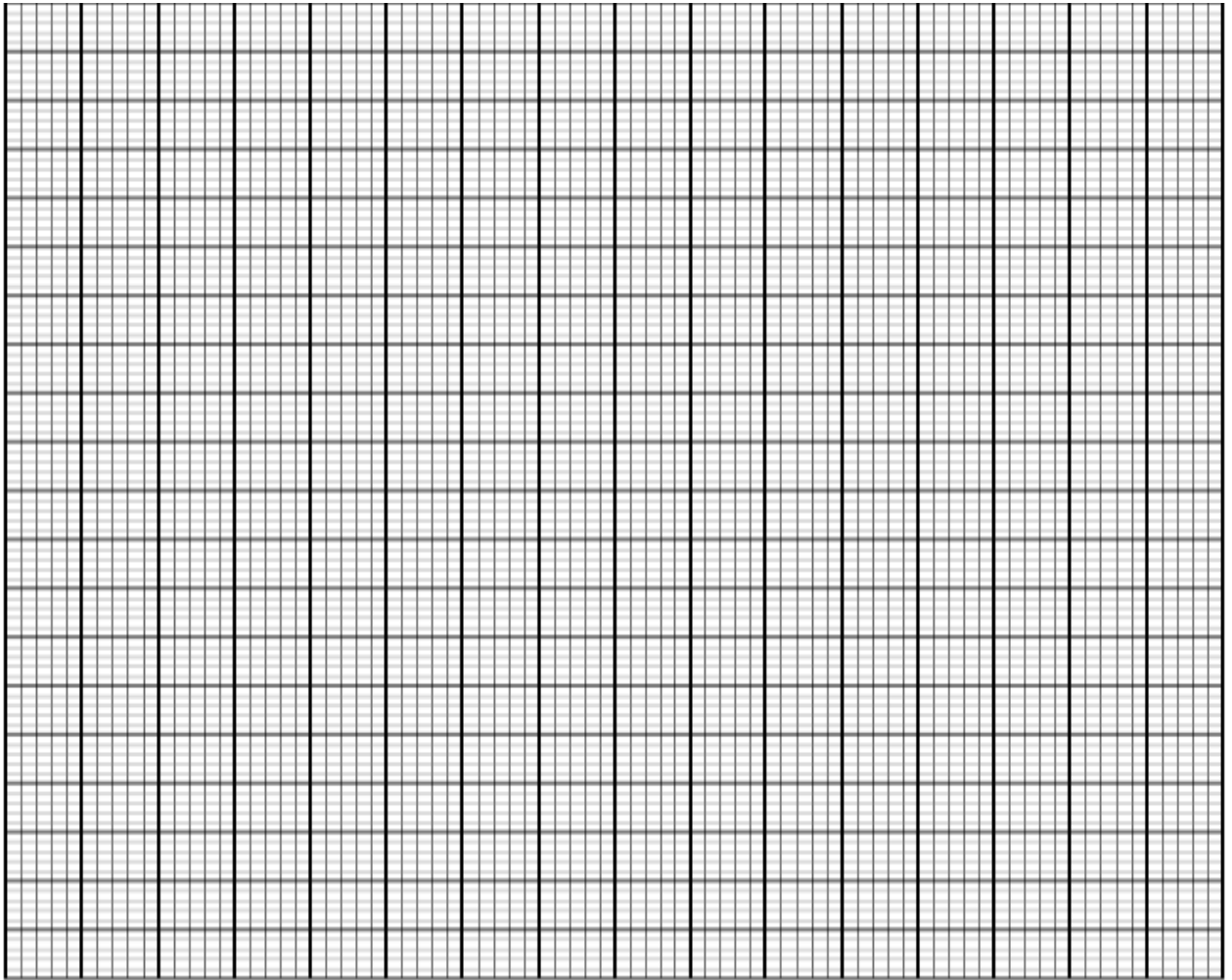
i) the mean

(6mks)

ii) the standard deviation

(2mks)

20. Triangle A (1,11)B(2,6)C(4,10) is mapped on to Triangle A¹(10,4)B¹(5,3) C¹(9,1) by transformation M



(a) Plot triangles ABC and A¹B¹C¹ on the grid provided. (2mks)

(b) Describe transformation M fully. (3mks)

(c) Triangle $A^1B^1C^1$ is further transformed to $A^{11}B^{11}C^{11}$ by a transformation.

$$N = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

(a) Determine the co-ordinates of $A^{11}B^{11}C^{11}$ (2mks)

(b) Plot the triangle $A^{11}B^{11}C^{11}$ (1mk)

(c) Describe transformation N fully (2mks)

21. The probability that Wanyama is selected to represent the school in Drama is $\frac{3}{5}$. If he is selected the probability of him going to Nairobi is $\frac{5}{7}$ otherwise if not, the probability of him going to Nairobi is $\frac{1}{6}$.

(a) Represent the above information on a tree diagram. (2mks)

(b) Find the probability that

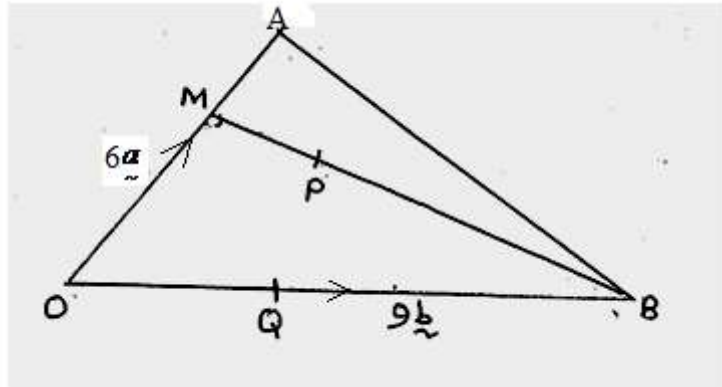
(i) he is selected and goes to Nairobi (2mks)

(ii) he is selected but does not go to Nairobi (2mks)

(iii) he is not selected but goes to Nairobi (2mks)

(iv) he goes to Nairobi (2mks)

22. In triangle OAB, $\vec{OA} = 6\vec{a}$ $\vec{OB} = 9\vec{b}$, M is the mid-point of OA and P lies on MB such that $MB = 5MP$.



(a) Express in terms of \vec{a} and \vec{b} the following vectors

(i) \vec{AB} (1mk)

(ii) \vec{MB} (1mk)

(iii) \vec{MP} (1mk)

(iv) \vec{AP} (3mks)

(b) Given that Q lies on OB such that $\vec{OQ} = 3\vec{b}$ express \vec{AQ} in terms of \vec{a} and \vec{b} . (1mk)

(c) Hence show that A,P and Q are collinear (3mks)

23. The relationship between two variables S and T is given by the equation $S=KT^n$ where K and n are constant

T	2	3	4	5	6	7
S	12.8	28.8	51.2	80.8	115.2	156.8

(a) Write down the linear equation relating to S and T (1mk)

(b) Complete the table above for the linear equation relating to S and T(to one decimal place) (2mks)

(c) Draw a suitable straight line graph to represent the data (3mks)

(d) Use your graph to determine the value of K and n (2mks)

(e) Find the value of S when $T = 3.5$ (2mks)

24. A particle moves along a straight line such that its displacement S metres from a given point is

$$S = t^3 - 5t^2 + 3t + 4 \text{ where } t \text{ is time in seconds. Find:}$$

(a) The displacement of the particle at $t=5$ (2mks)

(b) The velocity of the particle when $t=5$ (3mks)

(c) The value of t when the particle is momentarily at rest (3mks)

(d) The acceleration of the particle when $t=2$ (2mks)