

NAME.....INDEX NUMBER.....

SCHOOL.....CANDIDATE'S SIGNATURE.....

122/1

MATHEMATICS ALT B

PAPER 2

2 ½ HOURS

**Kenya Certificate of Secondary Education**

**MATHEMATICS ALT B**

**PAPER 2**

**2 ½ HOURS**

**INSTRUCTIONS TO CANDIDATES**

- a) Write your name and index number in the spaces provided above.
- b) Sign and write the date of examination and school in the spaces provided above.
- c) This paper consists of TWO sections: Section I and sections II
- d) Answer ALL the questions in section I and any five questions in section II
- e) ALL answers and working must be written on the question paper in the spaces provided below each question.
- f) Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
- g) Marks may be given for the correct working even if the answer is wrong.
- h) Non – programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise .
- i) This paper consists of 16 printed pages.
- j) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

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

**SECTION 1 (50 marks)**

Answer all questions in this section in the spaces provided .

1. Make X the subject of the formula (3mks)

$$p = \left( \frac{x^2 y}{z + x^2} \right)^{-1/2}$$

2. Given that  $a = 10^{1.5}$ ,  $b = 0.07642$  and  $C = \sin 116^\circ$  evaluate  $\frac{ac}{b}$  correct to 4 s.f. (2mks)

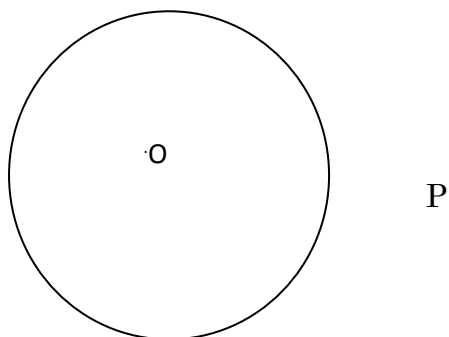
3. The equation  $4x^2 + 3x - C = 0$  has one of its roots as  $-2$ . Find the value of A, hence determine the value of other root. (3mks)

4. Given that  $A = \begin{pmatrix} 4 & 10 \\ 0 & 14 \end{pmatrix}$ ,  $C = \begin{pmatrix} 2 & 6 \\ 12 & 4 \end{pmatrix}$  and  $D = A - C$  (2mks)

Determine matrix D. (2mks)

5. The volume of a solid varies jointly as height and the square of its base radius . Given that the constant of proportionality is  $\frac{22}{21}$ , find the base radius of a similar solid whose height is 5.6 cm and volumes is 42 .768 cm<sup>3</sup> (3mks)

6. The figure below shows a circle centre O, and an external point P.



- a) Construct two tangents from P to touch the circle at points A and B (3mks)

b) Measure  $\angle APB$

(1mk)

7. Use matrix method to solve the simultaneous equations

$$3x - y = 5 \text{ and } 2y = 5x - 9$$

(3mks)

8. The position vectors of A and B are  $\mathbf{i} + 6\mathbf{j}$  and  $3\mathbf{i} + 4\mathbf{j}$  respectively . Find vector AB in terms of  $\mathbf{i}$  and  $\mathbf{j}$

(2mks)

9. To estimate the height of a flag post , a metre rule was placed vertically at the foot of the flag post. The shadow of the metre rule was 38.6 cm long while that of the flag post was 3.45m. Determine the height of the flag post to the nearest metre (2mks)

10. If a cupboard is to be bought by hire purchase , the buyer pays a deposit equal to 10% of the cash price 12 equal monthly instalments. John bought the cupboard by hire purchase

and ended up paying a total of sh. 3,240, which was 20% above the cost price . Determine the monthly instalments . (4mks)

11. The 1<sup>st</sup> 2<sup>nd</sup> and the 6<sup>th</sup> term of an increasing arithmetic progression are consecutive terms of a geometric progression . If the first term of A. P is 2, find the common difference of A.P (4mks)

12. In an experiment, it was observed that cells doubled after every hour. Initially there were 3 cells.

a) How many cells were there 5 hours later? (1mk)

b) Determine the time it took for the cells to multiply to 768 . (3mks)

13. The cost of a 2kg packet of maize flour was ksh 90 in October 2008, Ksh 72 in January 2009 and ksh 95 in March 2009,

a) Find the ratio of decrease in price between October 2008 and January 2009. (1mk)

b) Calculate the percentage increase in price between January and March 2009 (2mks)

14. The starting salary of Mr. Collins was Ksh. 45000 per month. At the beginning of his second year of service his salary was increased by ksh. 7200 and by a similar percentage at the beginning of his third year of service. Calculate the total amount of money Mr. Collins earned in his third year of service. (4mks)

15. The table below shows the age distribution of members of a school drama group.

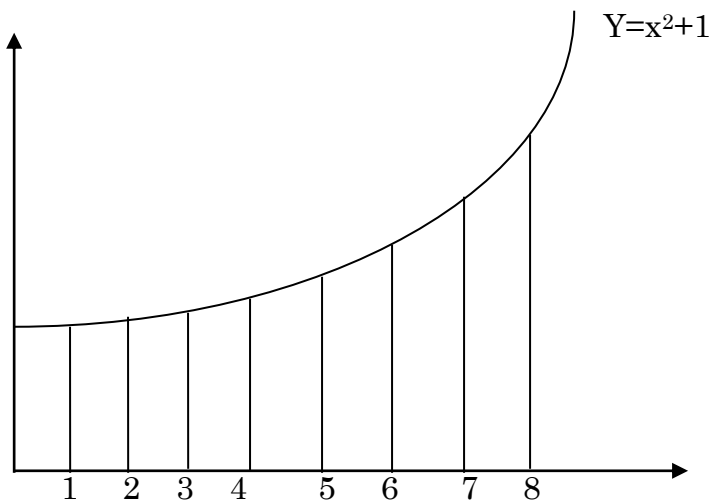
Age	13	14	15	16	17
Frequency	1	3	10	9	4

a) State the modal age (1mk)

b) Calculate the mean age

(2mks)

16. The figure below shows a graph of  $y=x^2+1$



Use the trapezium rule with 8 strips to determine the area bounded by the curve, the line  $x = 2$ ,  $x = 6$  and the x-axis (4mks)

**SECTION II (50 Marks)**

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

17. Two bags, A and B contain red and blue balls. Bag A contains 2 blue and 3 red balls while bag B contains 3 blue and 2 red balls. A bag is picked at random, two balls are picked without replacement. Find the probability of picking:

a) Balls of the colour

b) A red ball followed by a blue ball

c) At least a blue ball

d) One red ball

e) At least a red ball.

18. Mary took a bank loan of ksh 240,000 at a compound interest rate at 16 % p.a . She invested the whole amount in shares of the same bank which were on offer. The shares started depreciating immediately at the rate of 2% every two months. After 1 ½ years , she instructed the bank to sell the shares and recover the loan.

a) i) How much money did Mary owe the bank at the time she instructed it to sell the shares. (2mks)

ii) How much money did Mary still owe the bank after the sale of the shares? (3mks)

b) Peter took a similar loan as Mary from the same bank and bought a second hand car. The value of the car depreciated at the rate of 15% every six months. If peter sold the car after 1 ½ years to offset the ban, who between peter and mary made a greater loss and by how much? (5mks)

19. The following are transactions carried out by a school PTA in the month of January 2009.

January 1<sup>st</sup> Balance at bank ksh 10000

17<sup>th</sup> Withdrew ksh 8000 and paid for the organization of a charity walk

18<sup>th</sup> collected the 360000 from the walk in cash.

19<sup>th</sup> Deposited ksh 360000 into the account.

25<sup>th</sup> Raised ksh 400000 from a fund drive in cash.



26<sup>th</sup> Withdrew ksh 5000 from the account and paid for the funds drive expenses.

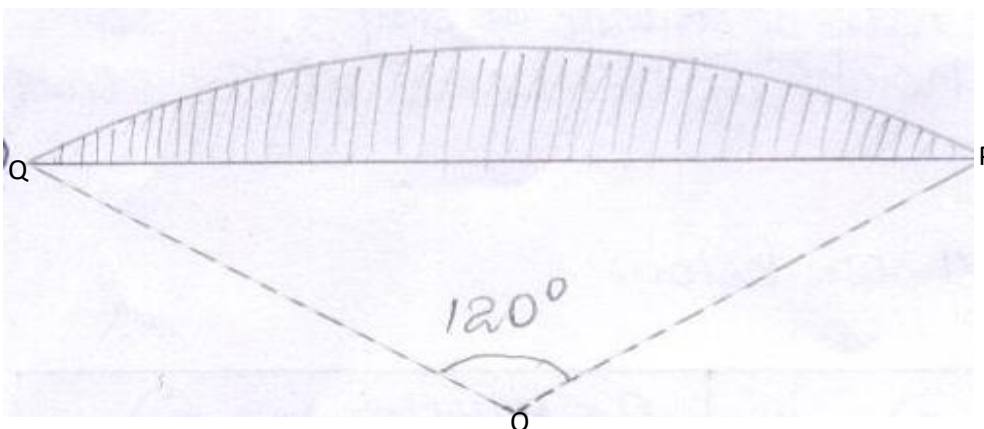
28<sup>th</sup> Purchased a water pump at ksh 630000 by cheque .

28<sup>th</sup> Paid ksh 20000 for insurance of the pump by cheque.

Record the above transactions in a double column cashbook.

(10mks)

20. The figure below is a cross –section of a bump built in a horizontal road before a children’s crossing line. The cross- section is in the shape of a segment of a circle radius 49cm with centre O.(Hidden in the underground)



iven that the centre angle  $QOP = 120^\circ$

Calculate:

a) The distance over the bump from Q to P;

(2mks)

b) The area of the cross-section of the pump;

c) The volume in cubic metres of the material used to construct the bump if the road is 5m wide . Give your answer correct to two significant figures. (4mks)

21. The price (P) of a second hand car varies partly as the engine capacity (c) and partly as the inverse of its age (A) . The price of an eight year old car of capacity 1200cc is ksh 520000, while that of a six year old car of capacity 1500cc is ksh 690000?

a) Determine an equation connecting P, and A (5mks)

b) John and Fred bought cars of 2000cc each but John spent ksh. 320000 more than Fred whose car was 2 years older. How old was John's

22. a) A and B are points on the earth surface on the opposite ends of the diameter through the centre of the earth . A is located at (33°N,51°E).

i) Find the position of B (1mk)

ii) Calculate the distance between points A and B (2mks)

$$\left(\text{Take } R = 6370 \text{ km} \text{ and } \Pi = \frac{22}{7}\right)$$

b) Two cities lie on the equator at x ( $0^\circ, 32^\circ\text{E}$ ) and y ( $0^\circ, 45^\circ\text{E}$ ). Calculate the shortest distance between x and y to the nearest kilometer (3mks)

c) A helicopter leaves a wildlife station P ( $70^\circ\text{N}, 32^\circ\text{E}$ ) and flies due south at 700km/hr for 3 hours to station Q. Find the position of Q. (4mks)

23. In an experiment, four students measured heights of bean seedlings everyday, the values obtained by the class were averaged and recorded in a table as shown below.

Days	0	1	2	3	4	5	6
Average height (cm)	0.9	3.8	6.0	7.5	8.3	8.8	9.0

a) Use the values in the table to draw a graph of average height against days (4mks)

b) From the graph determine the average rate of change in height between days  $3\frac{1}{2}$  and  $5\frac{1}{2}$  (2mks)

c) What was the average height of beans at the start of the experiment (1mk)

24. Income tax rates are shown below

INCOME(K£p.a)	Rate (Kshs. Per £)
1 -4200	2
4201 - 8000	3
8001 – 12,600	5
12,601 – 16,800	6
16,801 and above	7

Ernest pays Kshs,4000 as PAYE . He has a monthly house allowance of Kshs. 10,800 and is entitled to a relief of Ksh.1,100 per month.

Determine:

i) His Gross tax p.a in kshs. (2mks)

ii) His payable income k£ p.a (4mks)

iii) His basic salary in kshs.p.m (2mks)

iv) His net salary in kshs. P.m (2mks)