FORM FOUR CLUSTER KCSE MODEL1

MATHEMATICS PAPER 2 QUESTIONS

SECTION I (50 Marks)

Answer all questions in this section in the spaces provided

1. Use mathematical tables to evaluate:

$$\left(\frac{0.0381 \log 3.142}{132.7}\right)^{\frac{1}{3}}$$

2. Make M the subject of the formula.

$$X = \frac{\sqrt{B(M^2 + A)}}{EBM}$$

3. $x = 2+\sqrt{7}$ and $y = 7+2\sqrt{7}$ evaluate giving your answer with a rational denominator the value of $\frac{x^2}{y-x}$

4. a) Expand $\left(1 - \frac{1}{4}x\right)^6$ up to the term in x^3. (2marks)

   b) Use your expansion in (a) above to estimate $\left(-1\frac{1}{2}\right)^6$, giving your answer as a mixed number. (2marks)

5. The matrix below is a singular matrix, find the values of X. $\begin{pmatrix} x-4 & 3 \\ 4 & x \end{pmatrix}$

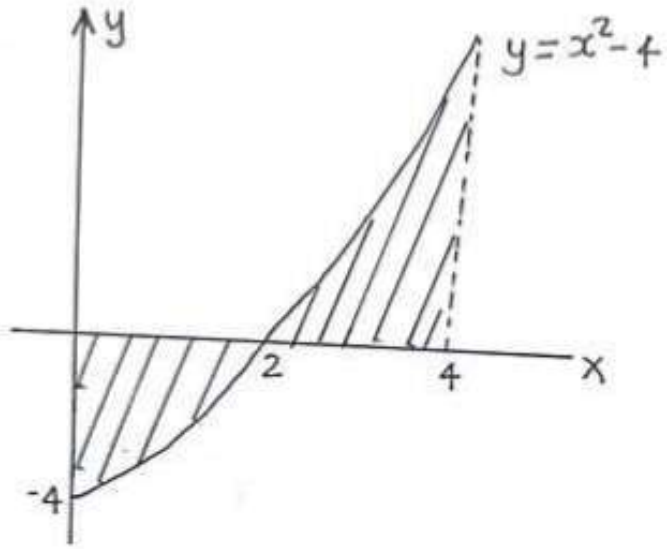
6. Find the percentage error in finding the area of a rectangle which measures 20cm by 30cm, given that there is 5% error in each of the measurement.

7. Solve the equation.

$$6\tan^2\theta - 5\tan\theta = 6 \quad for \quad -180^0 \leq \theta \leq 180^0$$

8. If $m \propto \frac{1}{\sqrt{n}}$ and that the difference of the value of m, when n= 16 and n= 100 is 0.3. Find the value of n when m= 5, (3marks)

9. Use the figure below to find the area enclosed by the curve $y=x^2-4$, the x- axis and the lines x = 0 and x= 4

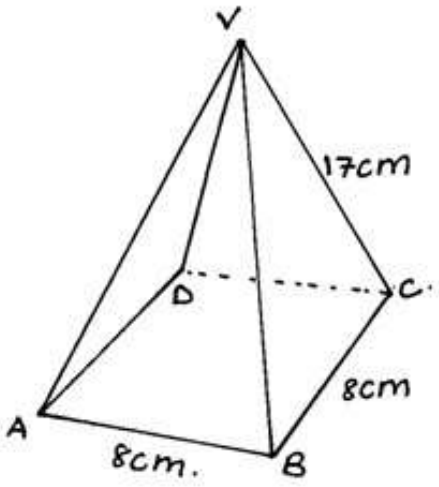


10. The product of the first three terms of a geometric progression is 729. If the first term is a and the common ratio is r,

    a) Express r in terms of a. (1mark)

    b) Given that the sum of the three terms is 39. Find the values of a and r. (3marks)

11. The figure below shows a square based right pyramid. Find the angle between a sloping face and the base.



12. Find the value of x in,

$$Log_2(x+3)-1=Log_2(2x+3)$$

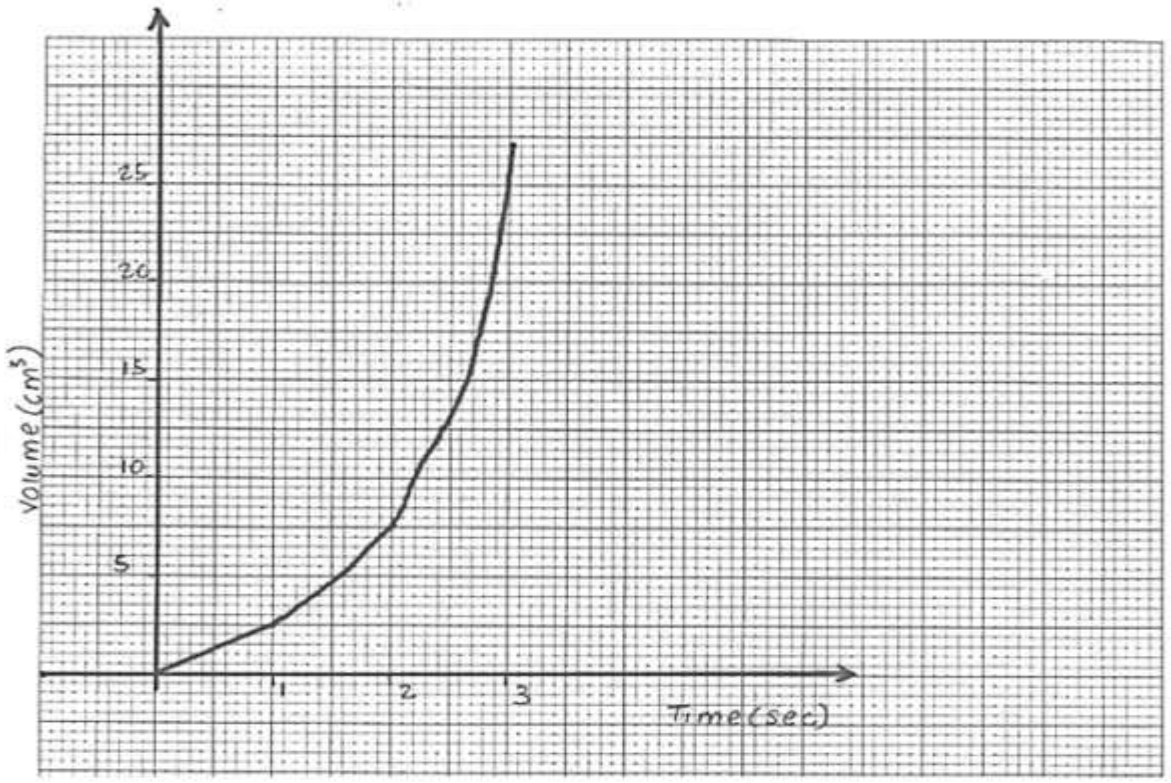
13. Two men can finish a certain job in 6 days. If one of them can take 10days to complete the same job. Find how long the other man can take to do the same job alone.

14. A triangle with an area of $12cm^2$ is mapped onto a triangle with area $60cm^2$ under a transformation whose matrix is

$$\begin{pmatrix} -K & -4K \\ K & 1 \end{pmatrix}$$

Find the value of K.

15. The graph below shows how the volume was changing with respect to time. Determine the rate of change in volume at t = 2 seconds.



16. Solve the simultaneous equations below. a + b=3

    2a+2b=3ab

SECTION II (50 Marks)

Answer only five questions in this section

17. The taxation rates for income earned in a certain year were as follows.

Income K£p.a	Tax rates Kshs per £
1 – 4512	2
4513-9024	3
9025-13536	4
13537- 18048	5
18049 – 22560	6
Over 22560	6.5

After a personal relief of ksh 1162 per month, Mrs Koech paid tax amounting to Ksh 72954 that year.

a) How much tax should she have paid if she did not have the personal relief. (2marks)

b) Find her taxable income in K£ that year. (5marks)

c) If Mrs. Koech receives allowance amounting to 18% of the taxable income. Calculate her monthly basic salary in Ksh. (3marks)

18. An aircraft leaves A (450N, 960W) at 1.00pm and arrives at B (450N, 660W) at 5.00pm.

a) Calculate the average speed of the aircraft in knots. (2marks)

b) Two aircrafts P and Q leave B at the same time. P moves due East to C while Q moves via the North pole to C (450N, 1140E). If the two aircrafts are moving at 400 knots. Find the time taken to reach C by i) P (2marks)

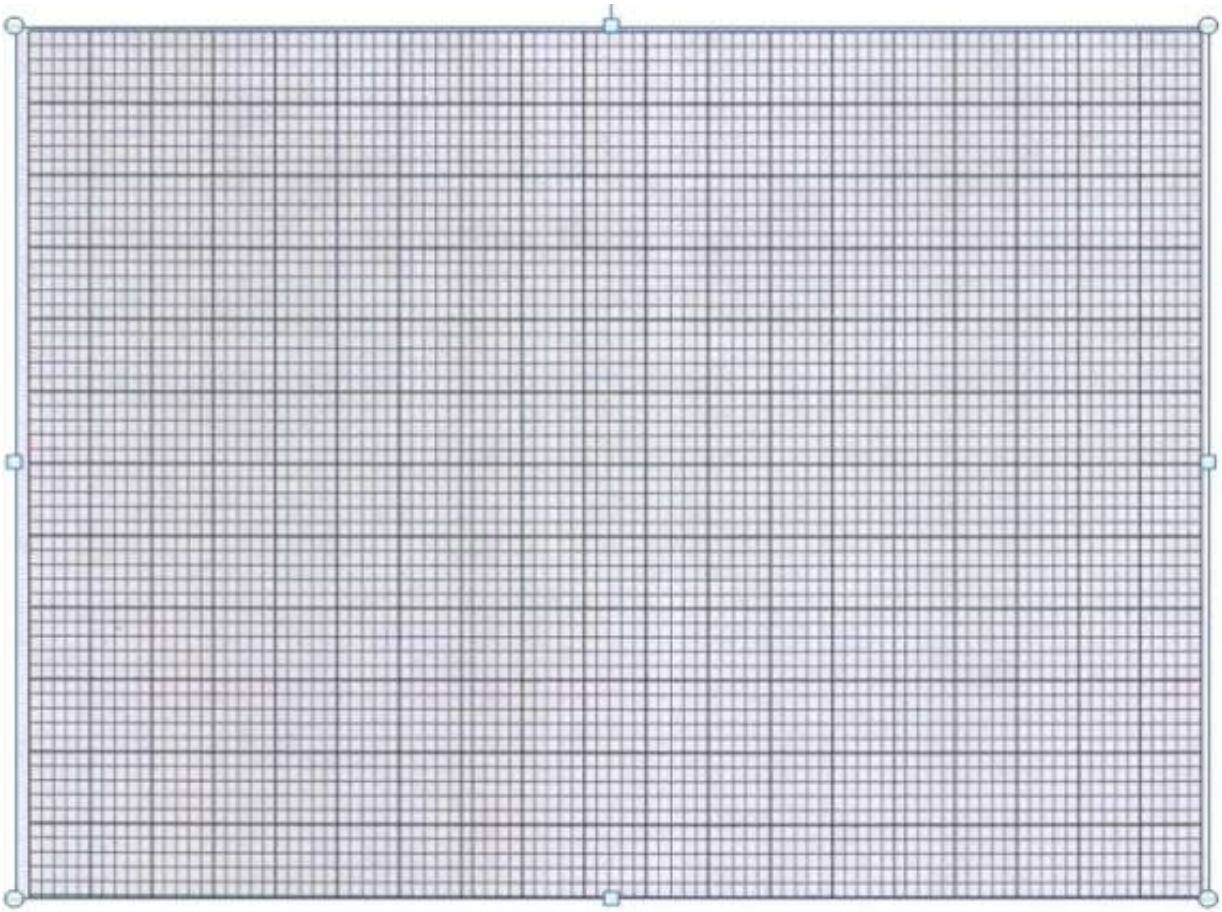
ii) Q (3marks)

c) What is the local time at B if the local time at town X(600N, 60W) is 1000hrs. (3marks)

19. A small scale farmer wishes to buy some peacocks and turkeys. A peacock costs shs.400 and a turkey costs sh. 300. The farmer has enough space for at least 15 birds and may spend atmost sh 6800. The number of turkeys should not exceed twice the number of peacocks.

a) By letting x and y represent the number of peacocks and turkeys respectively, write down all inequalities from the above information. (3marks)

b) Represent the inequalities on the grid provided. (6marks



c) From your graph; find the maximum number of animals he can buy? (1mark)

20. A student was given two sets of numbers. Set A = (even numbers between 0 and 9) and set B = (prime numbers between 0 and 10). The student chose a number at random from set A and also from set B. Given that the number chosen from set A is a and that chosen from set B is b, find the probability that:

    i) a>6 (1mark)

    ii) a= b (1mark)

    iii) (a+b) is odd (3marks)

    iv) a+b=13 (1mark)

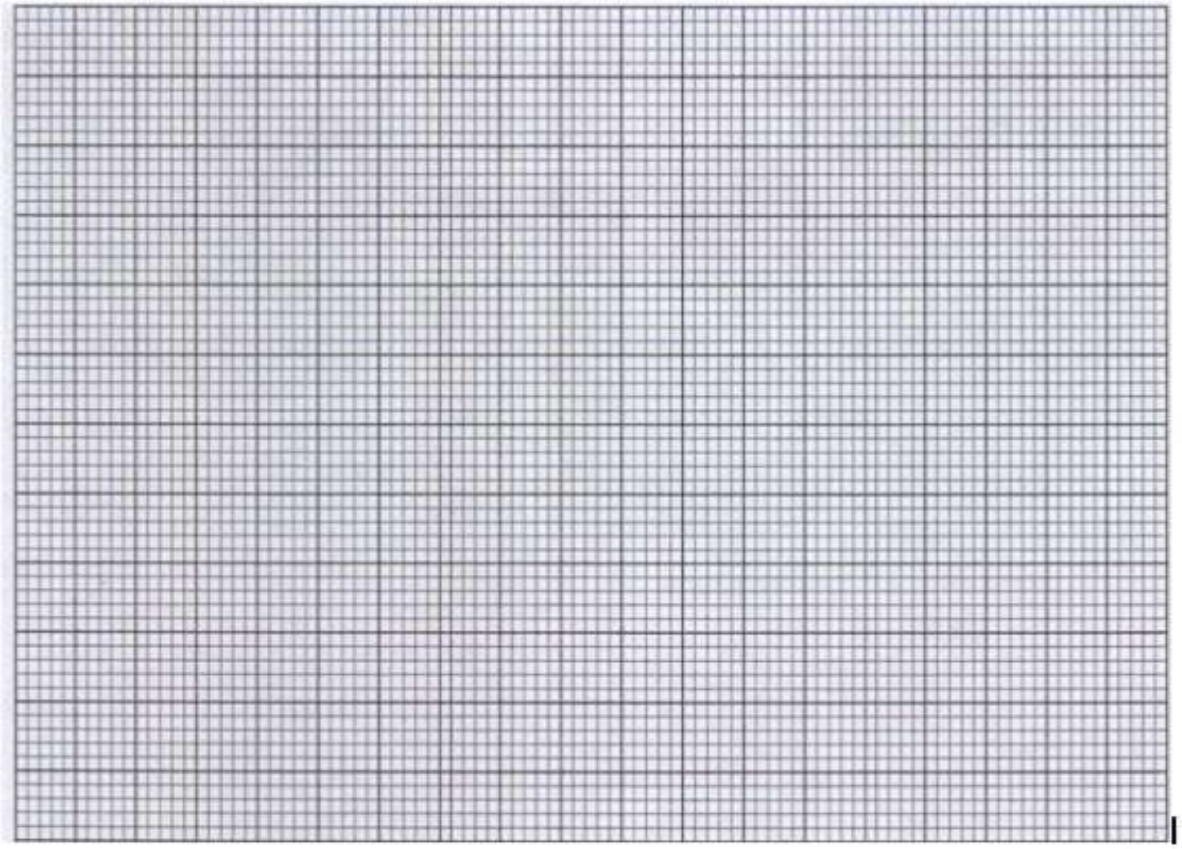
    v) ab>30 (3marks)

    vi) ab is a multiple of 4. (1mark)

21. a) Complete the table below for the curve $y=4x-x^3$ (2marks)

x	-3	-2	-1	0	1	2	3
y		0				0	

b) On the grid provided draw the graph of $y = 4x - x^3 \quad for -3 < x < 3$ (3marks)



c) Use your graph to find the roots of the curve $y=4x-x^3$ (1mark)

d) Determine the co-ordinate of the turning points of the curve. (1mark)

e) Use your graph to solve the equation $3x-x^3-2=0$ (3marks)

22. a) Using a ruler and compasses only, construct triangle XYZ such that XY =7cm, <YXZ =75^0 and XZ= 5cm. (3marks)

b) Locate a point P in triangle XYZ such that P is equidistant from X, Y and Z. (2marks)

c) Draw the locus of point S such that S is equidistant from P and passes through x, y and z shade the region enclosed by the locus of S outside triangle XYZ. (2marks)

d) By shading the unwanted region construct the locus of a point R inside triangle XYZ such that (1mark)

e) Find the area unshaded. (2marks)

23. The table below shows marks scored s by 80 form four students in a county mock.

Marks	No. of students
1 – 10	2
11- 20	20
21-30	25
31-40	15
41-50	7
51-60	X
61-70	6

a) i) Find the value of x. (1mark)

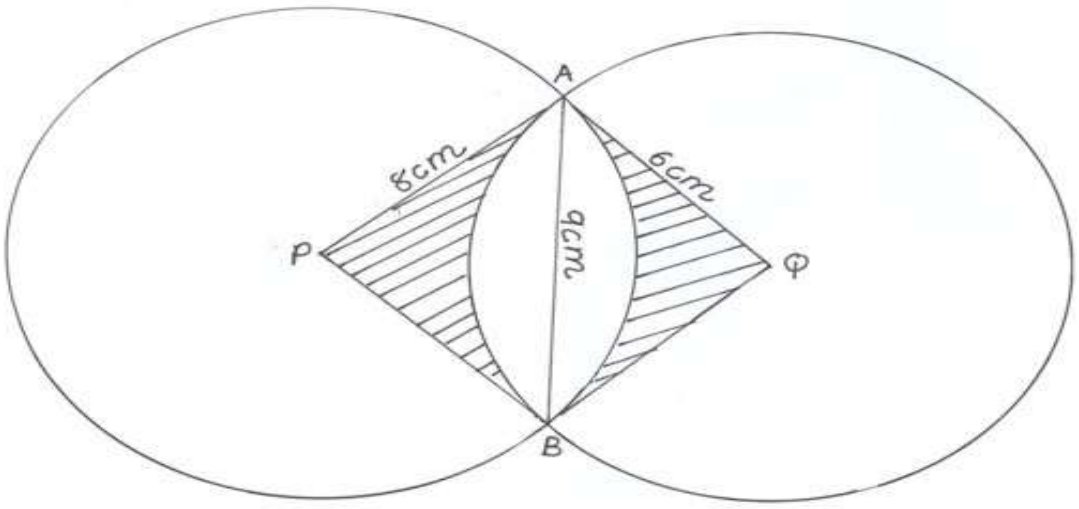
ii) State the modal class. (1mark)

b) Calculate the semi- interquartile range. (4marks)

c) Using an assumed mean of 25.5, calculate the standard deviation. (4marks)

24. The figure below shows two pulleys with centres A and B and of radii 10cm and 5cm respectively.

S, T, P and Q are contact points of the belts with the pulleys. The distance between the centres of the pulleys is 40cm. A belt is tied around the two pulleys as shown. $\left(Use\ \pi = \frac{22}{7}\right)$



Find

a) <PBA (2marks)

b) Length of PQ. (2marks)

c) Length of arc PUT (2marks)

d) Length of arc QRS. (2marks)

e) The total length of the belt. (2marks)