FORM FOUR CLUSTER KCSE MODEL8

MATHEMATICS PAPER 2 QUESTION

SECTION I (50 Marks)

Answer all questions

1. The top of a table is a regular pentagon. Each side of the pentagon measures 20.0cm, find the maximum percentage error in calculating the perimeter of the top of the table.

2. Mr. Wamalwa constructed a water tank and fitted three taps on it. Tap P and Q. Can fill the tank in 30 minutes and 25 minutes respectively. While tap R empties the tank in one hour. After how long will the tank be full if tap R is opened 5 minutes after taps P and Q.

3. Without using a calculator or mathematical tables express

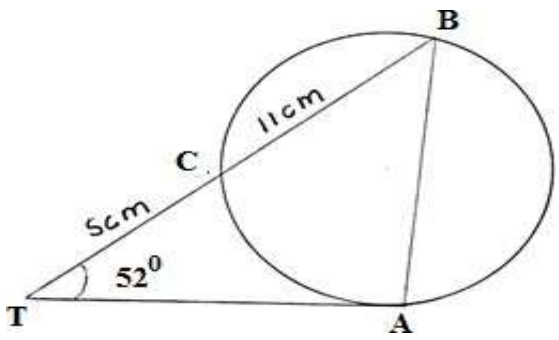
$$\frac{\sqrt{2}}{1-Cos\,30^0}$$

in a surd form and simplify by rationalizing the denominator.

4. The mass (M) of a copper metal rod varies jointly as its length (L) and the square of its radius (R). A rod 30cm long and radius 4.9cm has a mass of 6kg. Find the mass of a similar rod of length 25cm and radius 7cm.

5. Make b the subject of the formula $ab^2 = -bc-d$

6. In the figure below, AT is a tangent to the circle at A. Angle ATB = 52^0. BC =11cm and CT= 5cm. Calculate the length of AT.



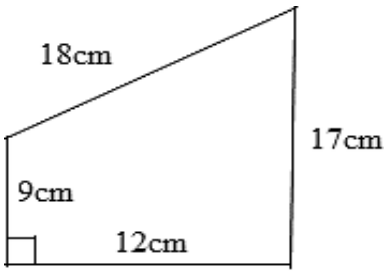
7. An employee of Bungoma county Government started on a salary of Ksh 60 000 per year and received a constant annual increment. If he is to earn a total of ksh 32, 400,000 by the end of the five years, calculate his annual increment.

8. Determine the quartile deviation for the following numbers.
3,9,2,1,4,6,8,5,1,2,7

9. Find the value of y in the question:

$$\log_{10}(3y+2)-1=\log_{10}(y-4)$$

10. Find the area of quadrilateral PQRS below:



11. Wambulwa can cultivate a piece of land in 7 hours while Nanjekho can do the same work in 5 hours. Find the time they would take to cultivate the piece of land when working together.

12. Two variables A and B are such that A varies partly as B and partly as the square root of B. Given that A =30 when B=9 and A=16 when B=14, find A when B=36

13. Kipkorir bought two grades of tea from a wholesaler. He mixed the two grades A and B in the ratio 4 : 3. If he bought grade A at sh 30 per kg and grade B at sh 27 per kg and was to make a profit of 30% what should be the selling price of 1kg of the mixture?

14. Find the radius and the coordinates of the centre of a circle whose equation is

$$2x^2 + 2y^2 - 3x + 2y = \frac{1}{2}$$

15. Find the equation of the normal to the curve

$$y = 2x^2 \text{ at } (-1, 4).$$

16. There are two baskets labelled P and Q. Basket P contains 5 red balls and 4 white balls. Basket Q contains 3 red balls and 7 white balls. A basket is chosen at random and 2 balls are drawn from it, one after the other without replacement. Find the probability that the two balls chosen are of the same colour.

SECTION II (50 Marks)

(Answer any FIVE questions in the spaces provided)

17. The cash price of laptop was kshs 60,000.On hire purchases terms, a deposit of kshs 7,500 was paid followed by 11 monthly installments of kshs 6,000 each.

    (i) Calculate:

    (a) The cost of a laptop on hire purchase terms. (2marks)

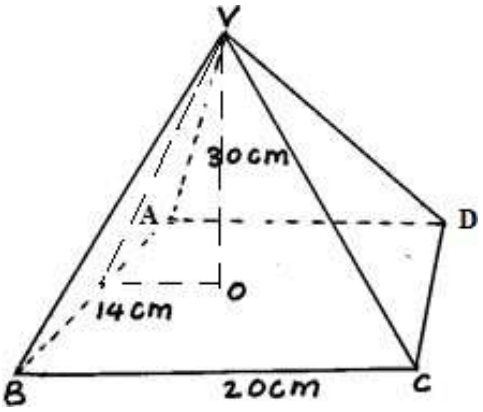
    (b) The percentage increase of hire purchase price compared to the cash price.(2marks)

    (ii) An institution was offered a 5%discount when purchasing 25 laptops of this kind on cash terms. Determine the amount of money paid by the intuition. (2marks)

    (iii) Two other institutions, X and Y bought 25 such laptops each. Institution X bought the laptops on hire purchase terms while Y bought laptops on cash terms with no discount by securing a loan from a bank. The bank charged 12% p.a compound interest for two years. Calculate how much more money institution Y paid than institution X. (4marks)

18. The figure below represents a rectangular based pyramid with base A B C D. Point O

in vertically below V and at the centre of ABCD.



Calculate.

a) The height, VO of the pyramid. (4marks)

b) The angle between edge VA and the base ABCD. (3marks)

c) The angle between planes VAB and ABCD. (3marks)

19. The table below shows values of x and some values of y for the curve $y = x^3+2x^2-3x-4$

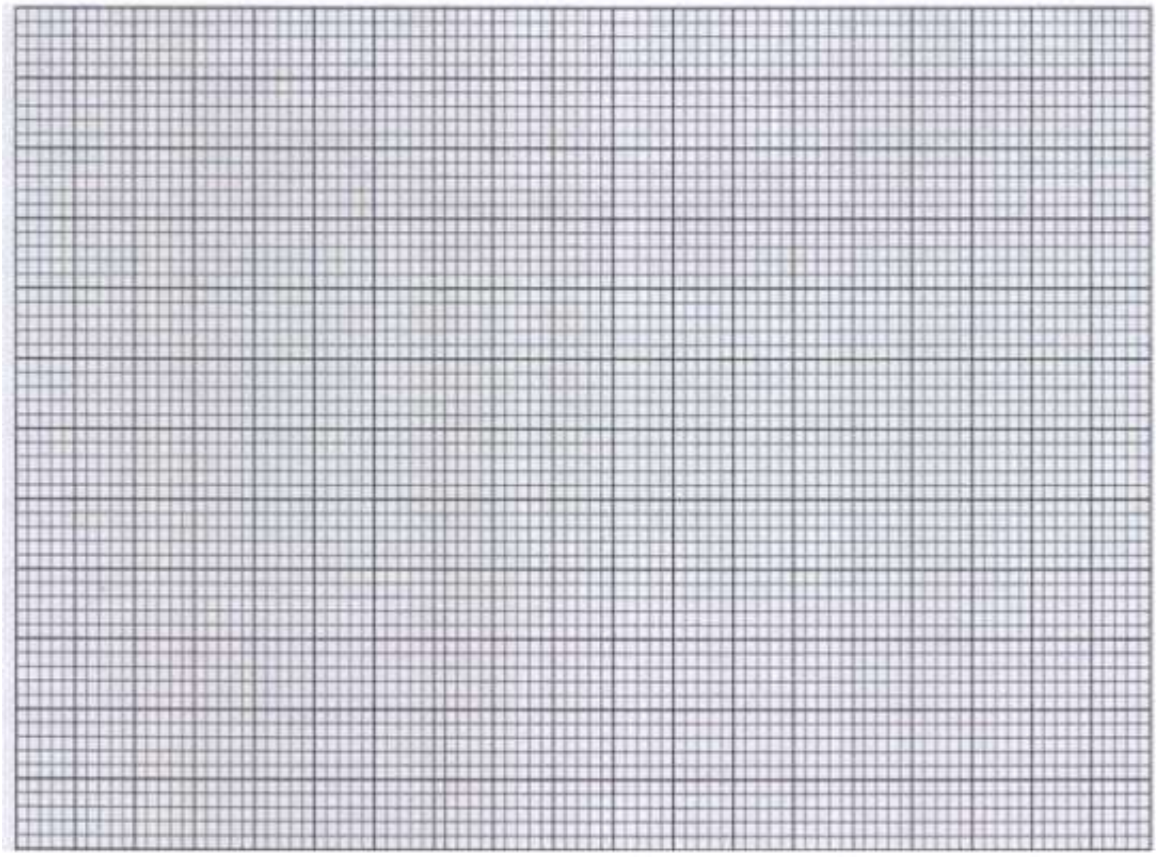
x	-3	-2.5	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2
y	-4.0	0.4		1.6	0		-4.0	-4.9			6

Complete the table by filling in the missing values of y, correct to 1 d.p (2marks)

(ii) On the grid provided, draw the graph of $y = x^3 + 2x^2 - 3x - 4$

Use the scale: 1 cm represents 0.5 units on x-axis. (3marks)

1 cm represents 1 units of y-axis.



(iii) Use the graph to:-

(a) Solve the equation $x^3 + 2x^2 - 3x - 4 = 0$ (3marks)

(b) Estimate the co-ordinates of the turning points of the curve. (2marks)

20. A bag contains blue, green and red pens of the same type in the ratio 8:2:5 respectively. A pen is picked at random without replacement and its colour noted.

(a) Determine the probability that the first pen picked is:

(i) Blue. (2marks)

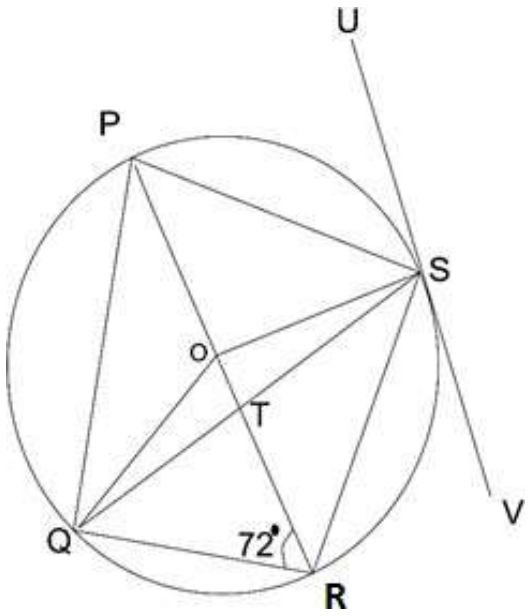
(ii) Either green or red. (2marks)

(b) Using a tree diagram determine the probability that:

(i) The first two pens picked are both green. (2marks)

(ii) Only one of the first two pens picked is red. (3marks)

21. In the figure below, PR is a diameter of the circle centre O. Points P, Q, R and S lie on the circumference of the circle. Angle PRQ=72^0, QS =QP and line USV is a tangent to the circle at S.



Giving reasons, calculate the size of:

(a) Angle QPR. (2marks)

(b) Angle PQS. (2marks)

(c) Angle OQS (2marks)

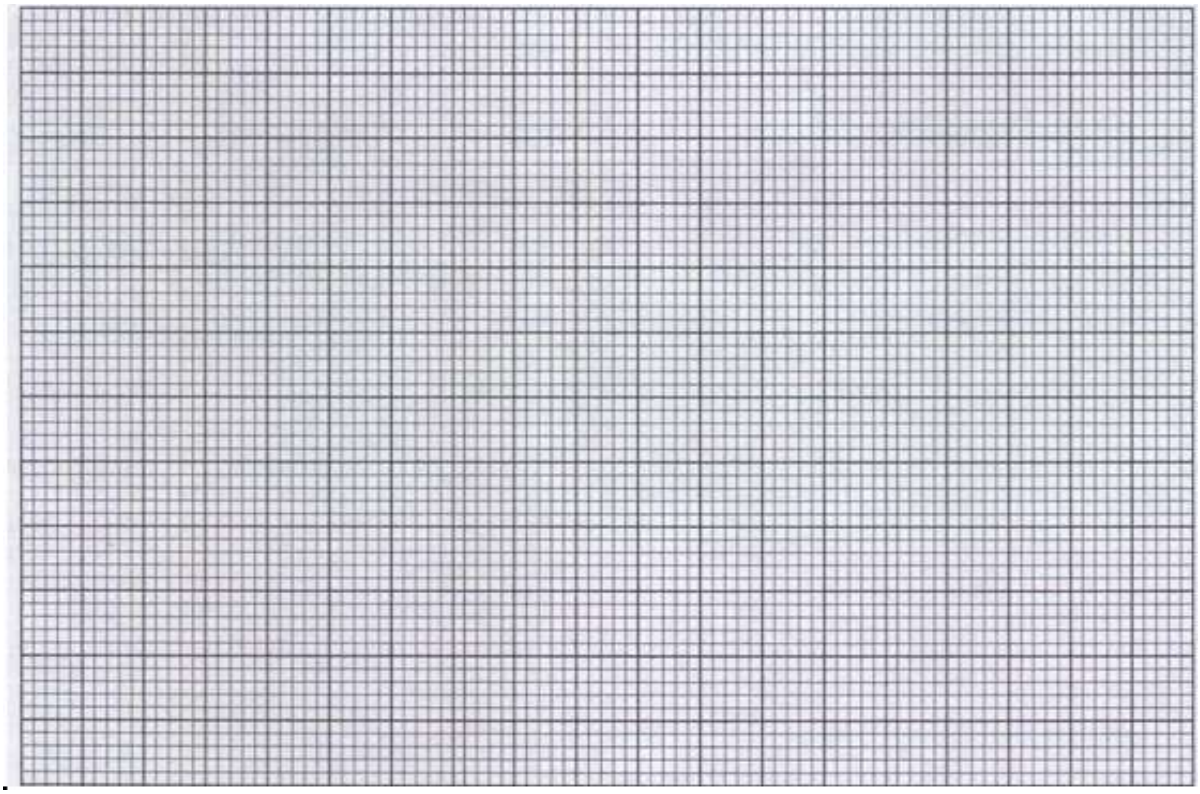
(d) Angle RTS (2marks)

(e) Angle RSV (2marks)

22. The table below shows the number of goals scored in handball matches during a tournament.

Number of goals	0-9	10-19	20-29	30-39	40-49
Number of matches	2	14	24	12	8

(a) On the grid provided, draw a cumulative frequency curve. (5marks)



(b) Using the curve drawn in (a) above, determine:- (i) The median. (1mark)

(ii) The number of matches in which the goal scored were not more than 37. (1mark)

(iii) The inter-quartile range. (3marks)

23. A parent has two children whose age difference is 5 years. Twice the sum of the ages of the two children is equal to the age of the parent.

(a) Taking x to be the age of the elder child, write an expression for:

(i) The age of the younger child. (1mark)

(ii) The age of the parent. (1mark)

(b) In twenty years' time, the product of the children's ages will be 15 times the age of their parent.

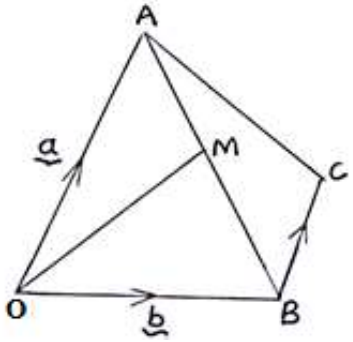
(i) Form an equation in x and hence determine the present possible ages of the elder child. (4marks)

(ii) Find the present possible ages of the parent. (2marks)

(iii) Determine the possible ages of the younger child in 20 years' time. (2marks)

24.

In a quadrilateral OACB, $\underset{\sim}{OA} = \underset{\sim}{a}$, $\underset{\sim}{OB} = \underset{\sim}{b}$, $\vec{OA}$ is parallel to $\vec{BC}$, $OA = 3BC$ and M is a point on AB such that AM : MB =3 :1



i) $\underset{\sim}{AB}$ (1mark)

ii) $\underset{\sim}{BM}$ (1mark)

iii) $\underset{\sim}{OM}$ (2marks)

b) Find the length of $\underset{\sim}{AB}$ using vector method, given that point A is given by (2, 3) and B by (4, -2). (3marks)

c) Show that O, M and C are collinear. (3marks)