MANGU MOCK TRIAL 3

MATHEMATICS

121/2
PAPER 2
TIME: 2½ HOURS

NAME…………………………………………………………………………………………

SCHOOL…………………………………………………   SIGN………………………

INDEX NO……………………………………………. ADM NO………………………

Kenya Certificate of Secondary Education.

INSTRUCTIONS TO DANDIDATES

1. *Write your name, index number and class.*
2. *The paper contains two sections: Section I and II*
3. *Answer ALL questions in section I and ONLY FIVE questions from section II.*
4. *All working and answers must be written on the question paper in the spaces provided below each question.*
5. *Marks may be awarded for correct working even if the answer is wrong.*

FOR EXAMINER'S USE ONLY
SECTION 1

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

GRAND TOTAL

SECTION II

17	18	19	20	21	22	23	24	25	TOTAL

ANSWER ALL QUESTIONS.

1. Given that $(2x+a)(x+1) = 2x^2 + bx - 3$ determine the values of a and b. **(2 mks)**

2. A bag contains 5 white balls, 3 black balls and 2 green balls. A ball is picked at random from the bag and not replaced. In three draws find the probability of obtaining white, Black and Green in that order. **(2mks)**

3. Christine deposited Kshs. 50,000 in a financial institution in which interest is compounded quarterly. If at the end of the second year she received a total amount of Kshs. 79,692.40, calculate the rate of interest per annum. **(3mks)**

4. Given that $\dfrac{2\sqrt{3}}{1+\sqrt{3}} - \dfrac{\sqrt{3}}{1-\sqrt{3}} = a + b\sqrt{c}$ find the values of a, b and c.　　　　**(4mks)**

5. Three quantities P,Q and R are such that P varies jointly with Q and the square of R. find the percentage decrease in P if Q is increased by 50% and R decreased by 20%.　　**(3mks)**

6. Solve for Θ　　　　　　　　　　　　　　　　　　　　　　　　**(3mks)**

$8\cos^2 \Theta - 2 \cos \Theta = 3$

For $0° \leq 0 \leq 180$

7. Find the percentage error in the perimeter of a regular pentagon whose side is 15.0cm.

(3mks)

8. a) Show that the circle with equation $(x - 3)^2 + (y - 4)^2 = 25$ passes through the origin.

(1mk)

b)Find the coordinates of another point (not the origin) where the circle cuts x-axis.   **(3mks)**

9. A survey carried out in a rural town on the number of young people who went for HIV test was shown in the table below:

% infected	36-39	40-43	44-47	48-51	52-55	56-59
No. of people	6	5	3	3	2	1

Calculate the quartile deviation of the data. **(4mks)**

10. Given that $y\dfrac{b-bx^2}{cx^2-a}$ make x the subject. **(3mks)**

11. Shopping centres X, Y and Z are such that Y is 12km south of X and Z is 15km from X,Z is on a bearing of 330° from Y. calculate the bearing of Z from X. **(3mks)**

12. a) Expand $(1 + \tfrac{1}{2}x)^7$ up to the term in x^3. **(2mks)**

b) Hence find the value of $(0.96)^7$ correct to 3 decimal places. **(2mks)**

13. Solve for x given that $\log(5x-10) - \log\left(\dfrac{x}{15}\right) = \log 40 - \log\left(\dfrac{x}{20}\right)$ where x is not equal to zero. **(3mks)**

14. There are two grades of tea, grade A and Grade B. Grade A costs sh 80 per Kg while Grade B costs sh 60 per kg. in what ratio must the two be mixed in order to produce a blend costing sh 75 per kg? **(3mks)**
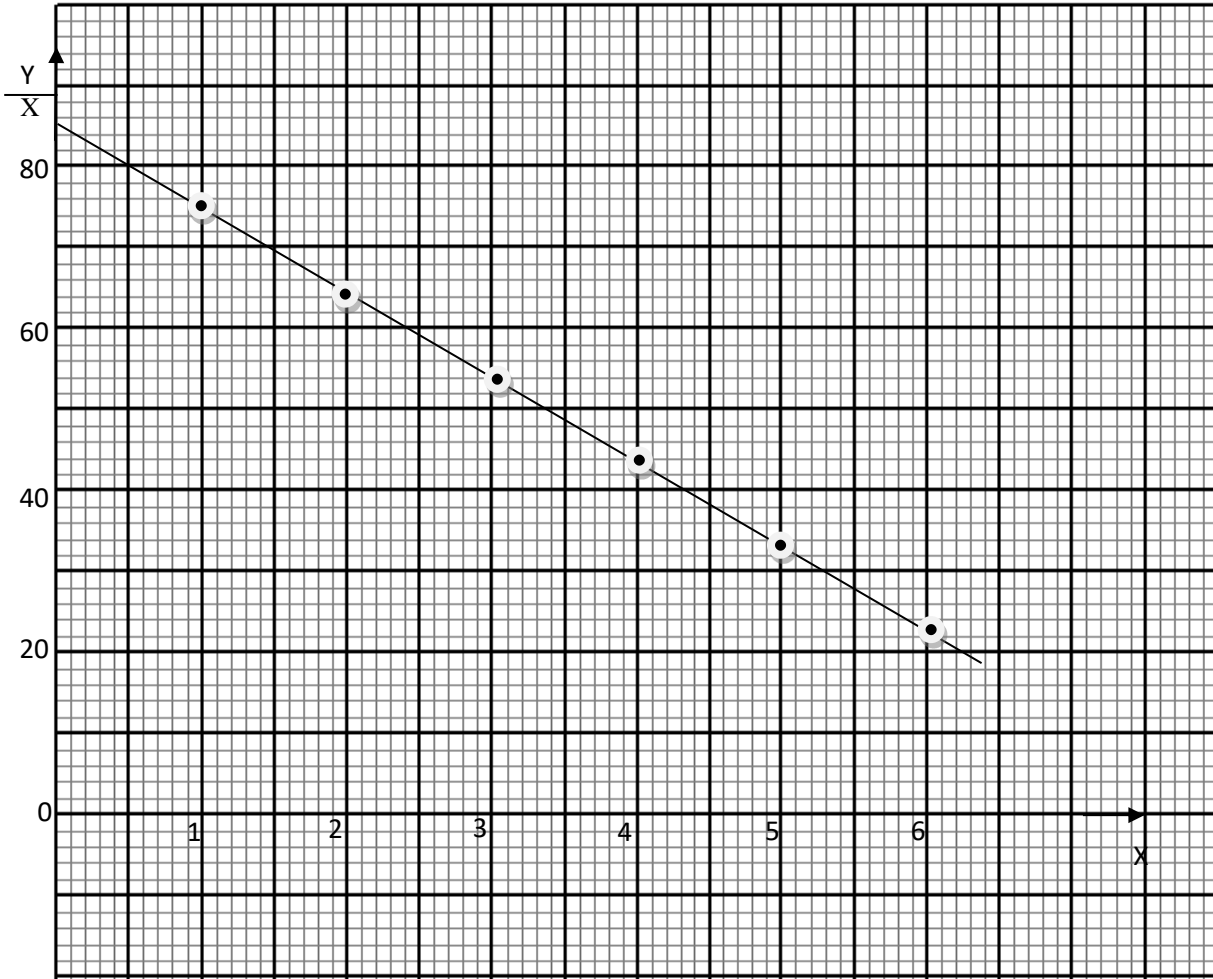
15. Use logarithm tables to evaluate. **(3mks)**

$$\frac{13.4 \times 9}{12 \times \log 4.82}$$

16. The graph below shows the linear relation between two variable X and Y connected by the expression $Y = pX^2 + qx$.

Using the graph, estimate, to the nearest whole number, the value of:

**i.** P   **(2mks)**

ii. q   **(1mk)**

17. Two towns A(60°N, 25°W) and B(60°N, 155°E) are both on the same parallel of latitude and also on the same great circle. A pilot can fly from A to B along the parallel of latitude or along the great circle over the North pole.

a) Giving your answers to the nearest kilometer, determine which route is shorter and by how long (Take earth's radius = 6370km and π=$^{22}/_7$) **(6mks)**

b) The average speed of the aircraft is 600km/hr. calculate to the nearest minute the time taken by the pilot using either route) **(4mks)**

18. ABCDV is a rectangular based pyramid with AB = 8cm, BC=6cm and VA =VB=VC=VD=13cm.
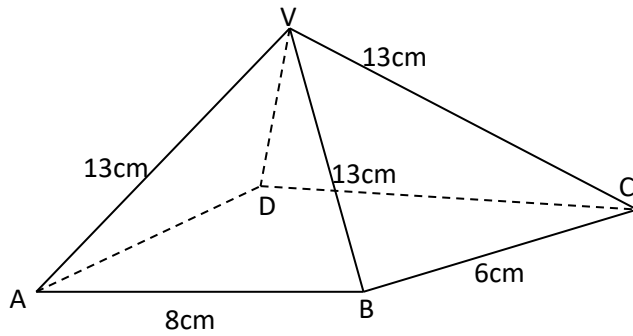
a) Draw the net of the solid. **(2mks)**

b) Calculate the height of the pyramid. **(2mks)**

c) A line is drawn from V through the mid points of BC and AD to V. Calculate the length of this line. **(3mks)**

d) Determine the angle the plane VBC makes with plane VAD. **(3mks)**

19. A particle moves in a straight line and passes a point Q when t=0 sec but velocity V= 5m/s, it accelerates at the rate of a m/s^2 given by the formula a = 6t+ 4 when t is time taken.

a) Express the velocity of the particle at t seconds in terms of t. **(2mks)**

b) What is the velocity at t= 3 sec? **(2mks)**

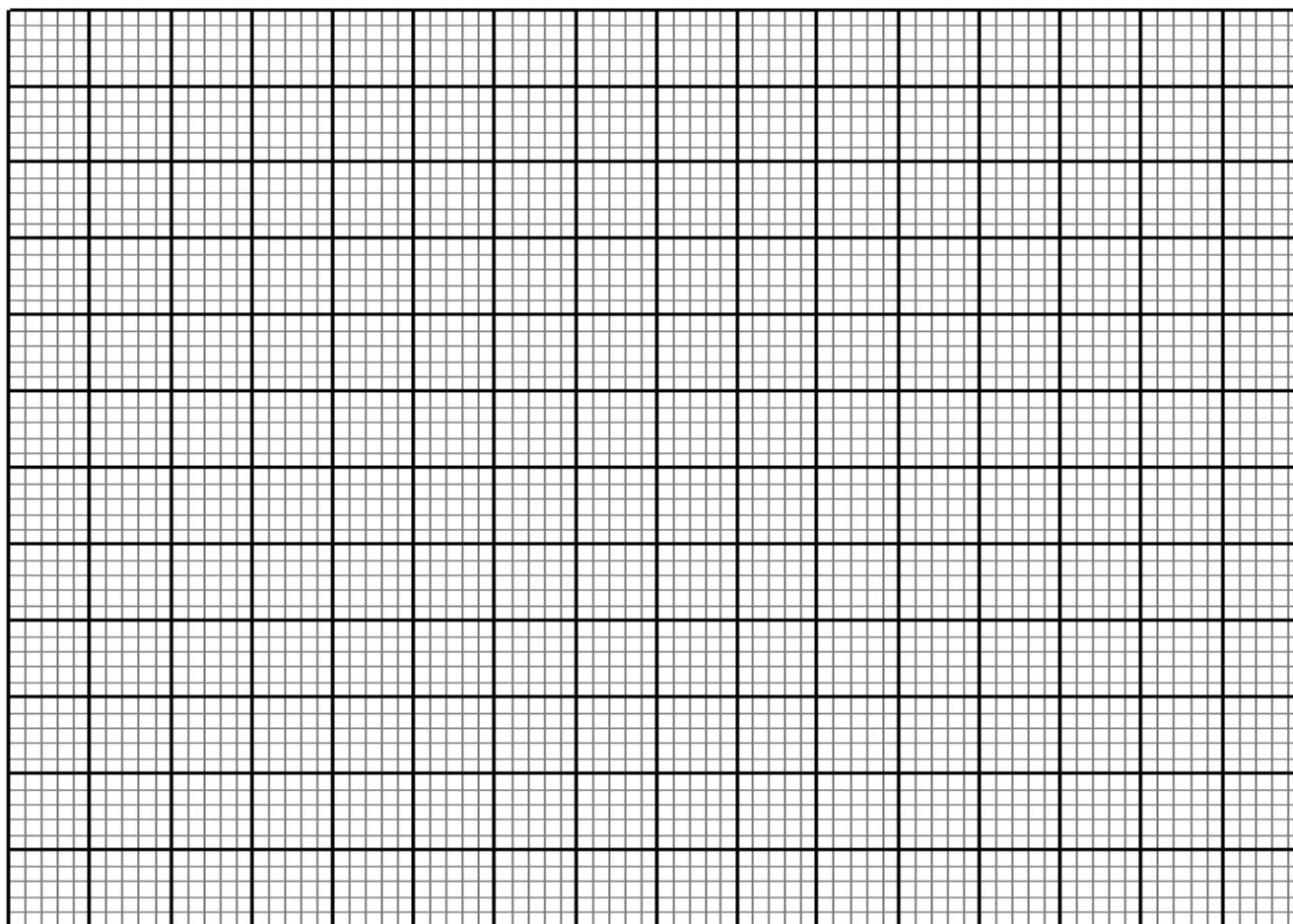**c)** Calculate the distance covered between t =1 and t=4. **(4mks)**

d) Find the acceleration when t = 2 seconds. **(2mks)**

20. a) Complete the table below for the functions $y = \cos x$ and $y = 2\cos(x + 30°)$ for $0° \le x \le 360°$

(2mks)

x	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
Cos x													
2cos (x+30°)													

b) On the same axis, draw the graph of $y = \cos x$ and $y = 2\cos(x + 30)$ for $0° \le x \le 360°$.   **(4mks)**

c) State the amplitude of the graph $y = \cos x°$.   **(1mk)**

ii) State the period of the graph $y = 2\cos(x + 30°)$ **(1mk)**

d) Use your graph to solve   **(2mks)**

$\cos x = 2\cos(x + 30°)$

21. Two tanks of equal volume are connected in such a way that one tank can be filled by pipe A in 1 hour 20 minutes. Pipe B can drain one tank in 3 hours 36 minutes but pipe C alone can drain both tanks in hours. Calculate:

a) The fraction of one tank can be filled by pipe A in one hour. **(2mks)**

b) The fraction of one tank that can be drained by both pipes B and C in one hour. **(4mks)**

c) Pipe A closes automatically once both tanks are filled. Assuming that initially both tanks are empty and all pipes opened at once, calculate how long it takes before pipe A closes. **(4mks)**

22. The table below shows income tax rates.

Monthly income in the Kenya shillings	Tax rates percentage (%) in each shilling
Up to 10164	10
From 10165 to 19740	15
From 19741 to 29320	20
From 29321 to 37040	25
From 37041 and above	30

In one year, Mr. Kamau's monthly earning was as follows:

Basic salary   20,000

House allowance 12,000

Medical allowance   2,808

Transport allowance   1,764

a) Calculate:

  i. Mr. kamau's taxable income.   **(2mks)**

  ii. Tax charged on Mr. Kamau's earning   **(4mks)**

   b) Mr. Kamau was entitled to the following tax reliefs:

  i. Monthly personal relief at the rate of 15% of the premium paid. If Mr. Kamau paid a monthly premium of Kshs. 2,500 and cooperative shares of Kshs. 5,000 per month, calculate his net salary.   **(4mks)**

23. The second, third and fourteenth terms of arithmetic progression are the three consecutive terms of a geometric progression. The 10th term of the arithmetic progression is 18. Find:

a) The first term and the common difference of the progression. **(4mks)**

**b)** The sum of the first 10 terms of the Arithmetic progression. **(2mks)**

c) The sixth term f the G.P. **(4mks)**

24. A certain uniform supplier is required to supply two types of shirts: one for girls labeled G and the other for boys labeled B. the total number of shirts must not be more than 400. She has to supply more of type G than of type B. however the number of type G shirts must not be more than 300 and the number of type B shirts must not be less than 80. By taking x to be the number of type G shirts and y to be the number of type B shirts.

a) Write down in terms of x and y all the inequalities representing the information above.

(4mks)

b) On the grid provided below draw the inequalities and shade the unwanted regions.　**(4mks)**
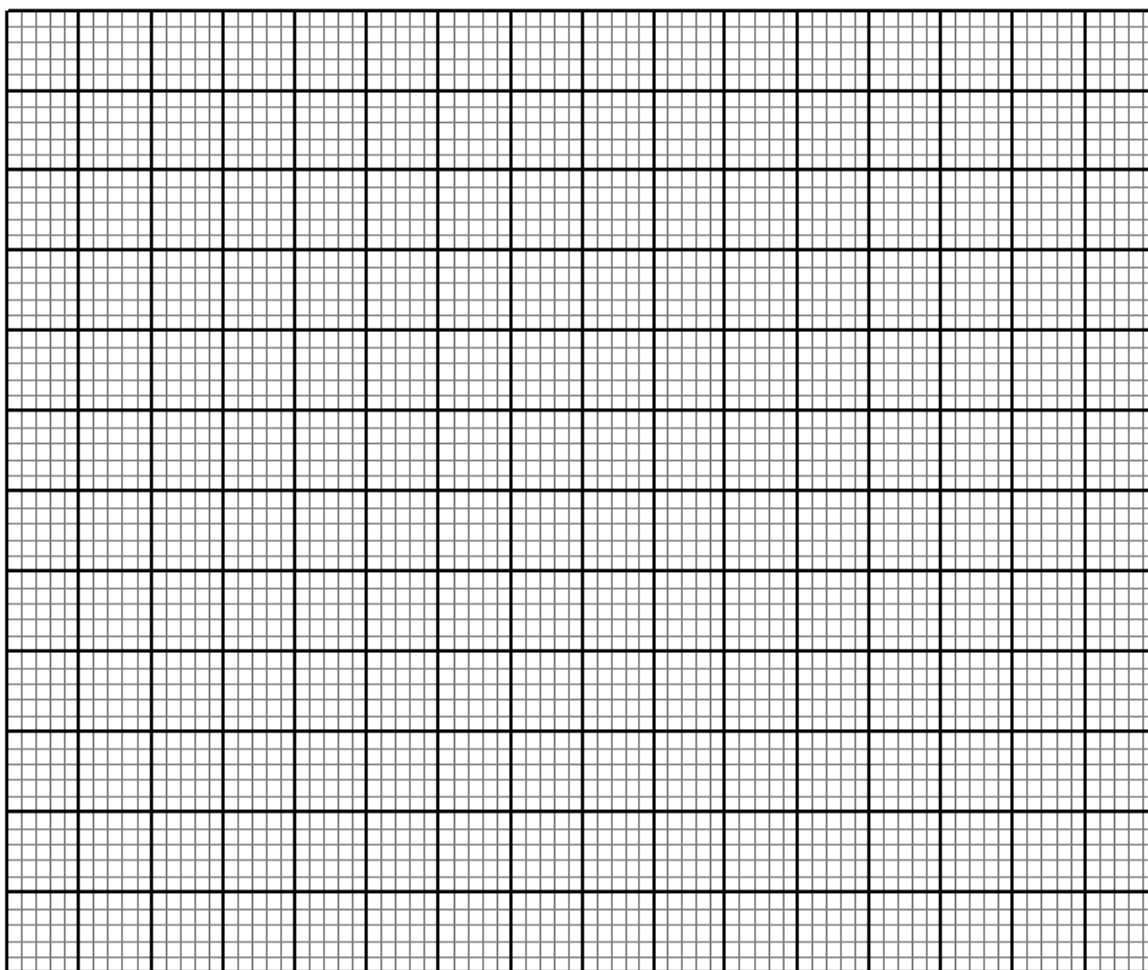
c) Given that type G costs shs. 500 per shirt and type B costs shs. 300 per shirt use the graph above to determine the number of shirts of each type that should be made to maximize the sales.　**(2mks)**