FORM 3 TERM 3 APRIL 2022
MATHEMATICS PAPER 2

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

   P= $\sqrt{\frac{x+2w}{4x+3R}}$

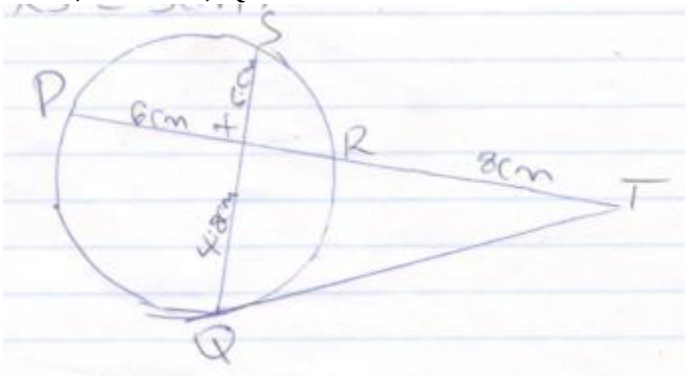
2. Simplify the following by rationalizing the denominator. (3mks)

   $\frac{8}{4-2\sqrt{3}}$

3. A quantity P is partly constant and partly varies inversely as square of t. p =6 when t=6 and p=18 when t=3. Find t when p=11. (3mks)

4. Solve for x in the equation; (3mks)
   $\text{Log}_8(x+6) - \log_8(x-3) = \frac{2}{3}$

5. In the figure below QT is a tangent to a circle at Q. PXRT and QXS are straight lines. PX =6cm, RT=8cm, Qx=4.8cm and Xs= 5cm.



   Find the length of;
   a. XR (2mks)

   b. QT (2mks)

6. Solve for x and y in the simultaneous equation below. (3mks)
   $xy + 6 = 0$
   $x - 2y = 7$

7. Solve for x. (3mks)
   $2x^2+x-36= 0$

8. Expand $(1+2x)^7$ up to the term in x^3, hence use the expansion to estimate the value of $(1.02)^7$ correct to four decimal places.
   (3mks)

9. Find the value of y for which $\begin{bmatrix} 3 & 4 \\ y & 6 \end{bmatrix}$ is a singular matrix. (3mks)

10. a) Find the inverse of the matrix $\begin{bmatrix} 4 & 3 \\ 3 & 5 \end{bmatrix}$. (1mk)

b) Hence solve the simultaneous equation using the matrix method. (3mks)

$4x+3y=6$

$3x+5y=5$

11. An item that costs sh. 24, 000 cash can be bought on hire purchase. A customer pays sh.6, 000 as deposit and then makes 6 monthly installments of sh.3, 500 each. Calculate the monthly rate of compound interest, giving your answer to 1 d.p. (3mks)

12. Barasa shared sh.360, 000 among his children Simiyu, Wasike and Nekesa I the ratio 1:3:5 respectively. How much did each receive? (3mks)

13. In the arithmetic series 1+4+7+10+…find the sum of the first 100 terms. (3mks)

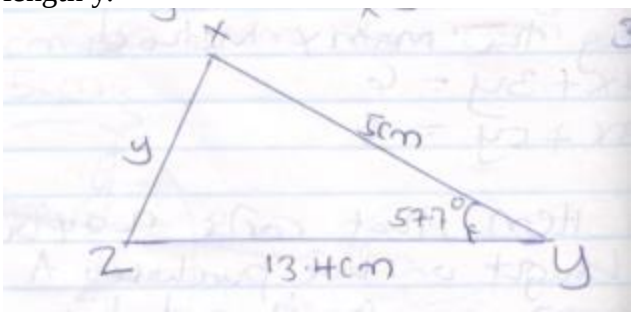
14. If $a=\begin{bmatrix}1\\2\\3\end{bmatrix}, b\begin{bmatrix}4\\-4\\5\end{bmatrix} and\ c=\begin{bmatrix}1\\0\\-5\end{bmatrix}. find\ 3a-2b+c.$ (3mks)

15. Make x the subject

(3mks)

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

16. The figure below shows a triangle xyz in which x=13.4cm, z=5cm and <xyz= 57.7^0. Find length y. (3mks)

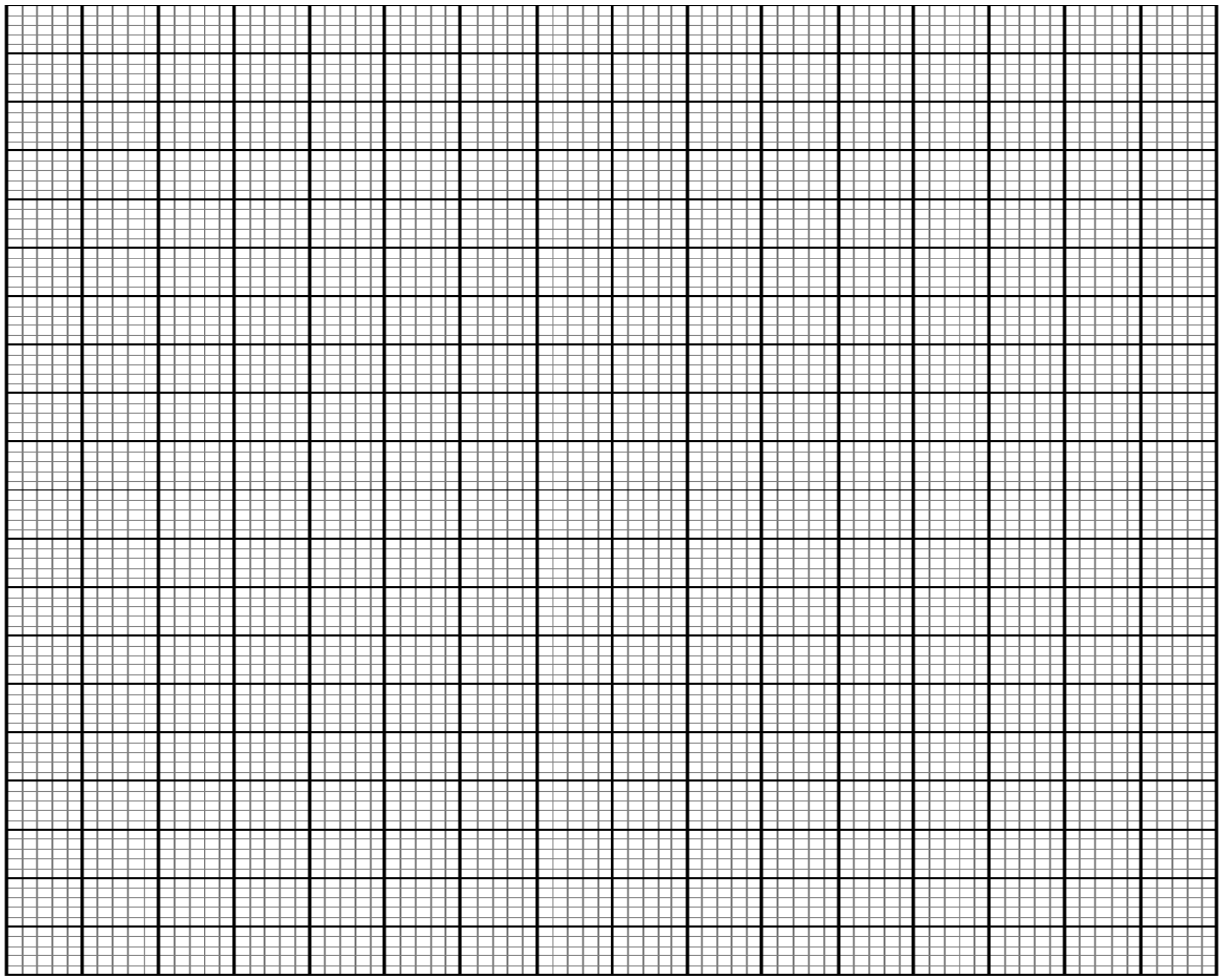


SECTION B: ANSWER 5 QUESTIONS ONLY IN THIS SECTION.

17. a) Complete the table below for the function $y=2x^2+3x-5$

x	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**
$2x^2$					0		
3x	-12	18					
-5	-5			-3			6
y							

b) On the grid provided draw the graph of $y=2x^2+3x-5$ for $-4\leq x\leq 2$. (4mks)



c) Use your graph to state the roots of

i. $2x^2+3x-5=0$ (1mk)

ii. $2x^2+6x-2=0$ (3mks)

18. A trader bought 8 cows and 12 goats for a total of ksh.294, 000. If he had bought 1 more cow and 3 more goats he would have spend ksh.337, 500.
    a. Form two equations to represent the above information. (2mks)

    b. Use matrix method to determine the cost of a cow and that of a goat. (3mks)

    c. The trader sold the animals he had bought making a profit of 40% per cow and 45% per goat.
        i. Calculate the total amount of money he received. (3mks)

ii. Determine his profit in Kenyan shillings. (2mks)

20. The bearing of towns P and Q on a horizontal ground from a tower are 050 and 142 respectively. The angle of elevation of the top of the lower from town P is 34 . Given that P is 200m from the top of the tower and Q is 120m from the base of the tower

Determine a) The height of the tower (3mks)

b) The angle of elevation of the top of the lower from Q (3mks)

c) The distance between the two towns P and Q (4mks)

21.A group of young men decided to raise ksh.480, 000 to start a business. Before actual payment was made four members pulled out and each of the remaining had to pay an additional ksh.20,000 write an expression in terms of p for;

a. i. Original contribution of each member. (1mk)

ii. Contribution after withdrawal of four members. (1mk)

b. Form an equation in p and hence determine the number of initial members. (5mks)

c. Three men Kamau, James and Hassan shared shs.480, 000 such that Kamau: James is 3:2 and James:Hassan is 4:2. Find how much each got. (3mks)

19. 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)

17. a) The current price of a vehicle is shs 500,000. If the vehicle depreciates at a rate of 15% p.a . Find the number of years it will take for its value to fall to shs 180,000. (4mks)
b) The cash price of a cooker is shs 9,000. A customer bought the cooker by paying 15 monthly installments of shs 950 each. Calculate:
a) the carrying charge (3mks)
b) the rate of interest (3mks)

20. The table below shows the income tax rates in a certain year.

Total income in k£ per annum	**Rate in shs per pound**
1 – 3,900	2
3,901 – 7,800	3
7,801 – 11,700	4
11,701 – 15,600	5
15,601 – 19,500	7
Over 19,500	7.5

Mrs Musau earned a basic salary of ksh 18,600 per month and allowances amounting to ksh.7, 800 per month. She claimed a personal relief of ksh 1,080 per month. Calculate;
a. Total taxable income in k£ p.a. (2mks)

b. i. The tax payable in ksh per month without relief. (4mks)

ii. The tax payable in ksh per month after relief. (2mks)

c. Mrs Musau's net monthly income. (2mks)