

**FORM 3 MATHEMATICS
CAT 1 TERM 3 2017
TIME: 2½ HOURS**

<i>Date done</i>	
<i>Invigilator</i>	
<i>Date returned</i>	
<i>Date revised</i>	

INSTRUCTIONS

- Write your name, stream and class number in the spaces provided at the top of this page.
- The paper contains two sections i.e. **I** and **II**.
- Answer **ALL** the questions in Section I and II.
- All answers and working must be written on the question paper in the spaces provided.
- Marks may be awarded for correct workings even if the answer is wrong.
- Mathematical tables and calculators may be used where stated or otherwise.

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	TOTAL

GRAND TOTAL

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1. Use logarithms to evaluate:

(4mks)

$$\sqrt{\frac{675 \times 0.9106^2}{8075}}$$

2. State the 5th term in each of the following patterns:

(i) 3, 8, 13,

(1 mk)

(ii) 200, -100, 50,.....

(1 mk)

(iii) a, ad, ad²,.....

(1 mk)

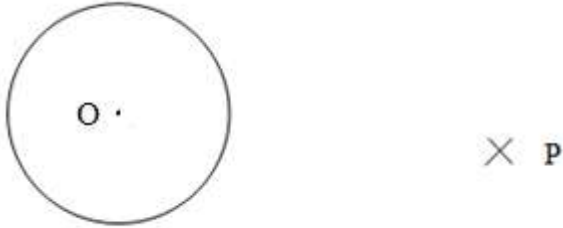
3. Three Sisters; Alice, Beatrice and charity are to share ksh. 10000 in the ratio 2:x:3 respectively.

If Alice received ksh. 2000, how much does Beatrice receive?

(3 marks)

Name..... ADM No..... CLASS..... No..... Sign

4. Construct two tangents from point P to the circle centre O given below. (2 marks)



5. The marks by 300 students in a mathematics examination are recorded in the table below.

Marks	30-39	40-49	50-59	60-69	70-79	80-89
No. of students	20	50	60	75	55	40

Estimate the median mark. (3mks)

6. Solve the compound inequality $4 \leq 2 - x < 7$ and list the integral values which satisfy the inequality. (3mks)

Name..... ADM No..... CLASS..... No..... Sign

7. Given that $A = \begin{pmatrix} 2 & 4 \\ 3 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 11 & 4 \\ 4 & 1 \end{pmatrix}$ Find;

i. $A + B$ (1mk)

ii. Matrix C such that $B - C = A$ (2mks)

8. The library is 74 km north east of the school gate. The staffroom is 42km east of the school gate. Calculate the distance between the library and the staffroom. (3 marks)

9. Calculate the magnitude of vector **AB** given the coordinates A (-2,5) and B (6,11). (3marks)

10. Given that $\frac{\sqrt{3}}{3\sqrt{2} - 2\sqrt{3}} - \frac{\sqrt{2}}{3\sqrt{2} + 2\sqrt{3}} = a\sqrt{b}$, Find the values of a and b . (3mks)

11. A TV set was marked at ksh 400000 cash price and its hire purchase price was ksh 580000. a customer made a deposit of ksh 100000 plus 10 equal monthly instalments. The amount remaining after the deposit was compounded at a rate of $r\%$ p.m. Find;

i) The carrying charge (1mk)

ii) r leaving your answer to 2 Significant figures. (3mks)

12. The length and width of a rectangular field were measured and recorded as 70.5 m and 50.2 m respectively. Calculate the percentage error in the perimeter of the field correct to 4.s.f. (3 mks)

Name..... ADM No..... CLASS..... No..... Sign

13. Simplify; $\frac{16m^2 - 9n^2}{4m^2 - mn - 3n^2}$ (3mks)

14. Make r the subject of the formula: $P = (ar^2 - s)^{\frac{1}{2}}$ (3mks)

15. The variable P varies directly as the square of the variable Q. Given that P=80 when Q=4, find an equation connecting P and Q. (3 marks)

Name..... ADM No..... CLASS..... No..... Sign

16. A group of girls planned to contribute equally towards a party which needed ksh 3000. However five girls of the group withdrew from the party. As a result each of the remaining girls was to contribute ksh 20 more. Find the original number of the girls in the group. (4 marks)

SECTION II (50 marks)

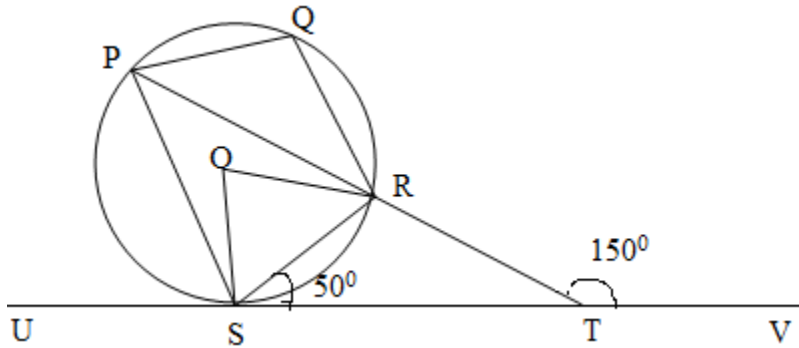
Answer all question.

17. (a). Express the equation $2x+y=8$ in the form $\frac{x}{a} + \frac{y}{b} = 1$, hence state the coordinates of the x and y intercepts of the line. (3mks)

- (b). A varies directly as B and inversely as the square root of C. Find the percentage change in A if B is increased by 12% and B decreased by 36%. (3mks)

- (c). Given that G varies partly as F and partly as the square of F and that $G=20$, when $F =2$ and $G=21$ when $F=3$, determine the value of G when $F=4$. (4mks)

18. In the figure below P, Q, R and S are point on the circle centre O. PRT and USTV are straight lines. UV is the tangent to the centre at S, angle RST = 50° and angle RTV = 150°



- a) Calculate the size of;
- (i). Angle ORS (2mks)

 - (ii). Angle USP (1mk)

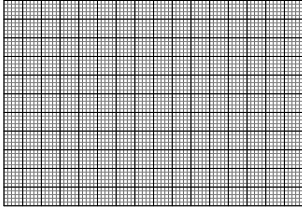
 - (iii). Angle PQR (2mks)
- b) Given that $RT = 7\text{cm}$ and $ST = 9\text{cm}$, calculate to 3 significant figures:
- (i) The length of line PR (2mks)

 - (ii) The radius of the circle (3mks)

19. (a) Complete the table below for the quadratic equation $y = x^2 - 2x - 3$ for the range $-2 \leq x \leq 4$ (2mks)

X	-2	-1	0	1	2	3	4
X^2		1	0	1	4		
$-2x$		2			-4	-6	-8
-3	-3	-3	-3	-3	-3	-3	-3
Y		0	-1		-3		5

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



Use the graph in part (b) above to solve the following quadratic equation:-

(i). $x^2 - 2x - 3 = 0$ (2mks)

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

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

Income (k£ P.a)	Rate %
1 -5808	10
5809 - 11280	15
11281 - 16752	20
16753 - 22224	25
22225 - 27696	30
27697 and above	35

In that year Mr. Waweru's monthly earning were as follows:-

Basic salary ksh. 42 000

House allowance ksh. 12 000

Medical allowance ksh. 2 680

Hardship allowance equivalent to 30% of his basic salary.

He is entitled to a personal relief of ksh. 1056 per month. Calculate;

a) His taxable income in k£ P.a (3mks)

b) Net tax per month in ksh. (5mks)

c) Net pay per month in ksh. (2mks)

21. (a). Find the inverse of the matrix $\begin{pmatrix} 5 & 7 \\ 3 & 4 \end{pmatrix}$ (2mks)

(b). Juma bought 40 cows and 56 goats at a cost of ksh.176000. If he had bought 24 similar cows and 32 similar goats he would have spent ksh.72000 less. Using matrix method, determine the cost of each cow and each goat. (4mks)

(c). If the cost of each cow increased by 30% while each goat increased by 20%. Determine his percentage profit if he sold the animals at the new cost. (4mks)