EDUCATOR EXAM SERIES

MATHEMATICS 121/1

Sample paper 1

Mathematics   **Paper 1**

TIME: 2 ½ Hours

Instructions to Candidates

   (a) Write your name and Index Number in the spaces provided.
   (b) Sign and write the date of examination in the spaces provided above.
   (c) Answer **ALL** the questions in the spaces provided in the question paper.
   (d) All working **MUST** be clearly shown where necessary.
   (e) Mathematical tables and electronic calculators may be used.
   (f) This paper consists of seven (7) Printed pages.
   (g) Candidates should check the question paper to ascertain that all the pages are
       printed as indicated and that no question(s) are missing.

For Examiners use only

| Question	Maximum Score	Score
TOTAL		

QUESTIONS PAPER
SECTION 1 (50MARKS)

1. Without using calculator, evaluate the following (3mks)

$$\frac{\frac{19}{2} - \frac{10}{3} \div \frac{5}{9}}{\frac{3}{5} \ of \ 6\frac{1}{4} + \frac{3}{2}}$$

2. A farmer has a piece of land measuring 840m by 396m. He divides into square plots of equal sizes. Find the maximum area of one plot. (3mks)

3. Calculate the area of the shaded region below, given that AC is an arc a circle centre B and given that AB=BC=14cm, CD=8CM and angle ABD=75^0 (4mks)
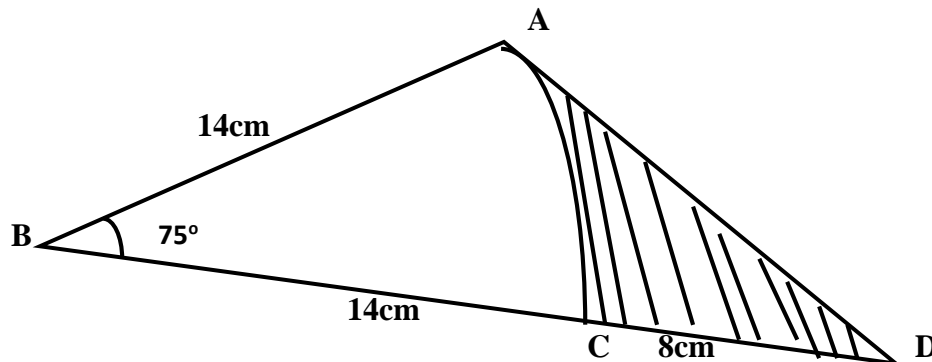
Takeπ=22/7 **figure**

4. Find the value of X in the following equations (3mks)

$$\left(\frac{9}{36}\right)^{-2x} = \left(\frac{1}{32}\right)^{3x-4}$$

5. Use table of reciprocal to find the value of X given that (3mks)

$$\frac{1}{x} = \frac{1}{0.27} - \frac{1}{4.6}$$

6. The line passing through the point B(1,-2) is parallel to the line whose equation is $-2x + 3y = 5$ Find the equation of the line and hence determine the coordinates of point P where this line cuts the equation y = 0 (4mks)

7. Mutoa bought 4 mangoes and 2 Banana at sh. 39 while Mueni bought 2 mangoes less and 2 Banana more than Mutoa at Sh 69. Determine the cost of each fruit. (3mks)

8. The ratio of the area of two similar spheres is 16:25 if the volume of the smaller one is 195cm³. Find the volume of the large one to 1d.p.   (3mks)

9. Simplify completely   (3mks)

$$\frac{(6a + b)(a + b) - 7b(a + b)}{2a^2 - 2b^2}$$

10. Below is an entry from a field book. AB is a base line and all length are in metres. Find the area of surveyed.   (4mks)

B	
200	
150	17 TO E
100	23 TO D
50	10 TO C
A	

11. Given the points P($-6, -3$) Q($-2, -1$)and R($6,3$) Express PQ and QR as column Vectors. Hence show that the points P,Q and R are collinear.   (3mks)

12. In the figure below, AD is parallel to GJ and GI is parallel to FD. Angle BAH=30^0 and angle BGF=63^0. Find angle AFD   (3mks)
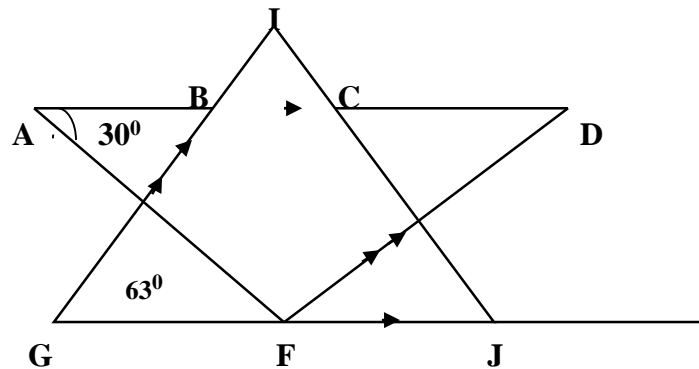
13. Write   down three in inequalities which fully describe the unshaded region R in the figure below   (3mks)
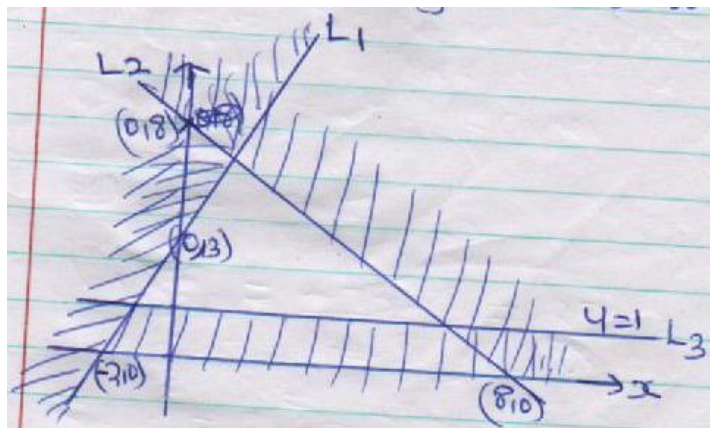
14. A test tube is made up of hemispherical bottom and a cylindrical stem. Both of internal radius 0.7cm. Calculate the capacity of the test tube given that its height is 12cm (3mks)

15. In fourteen years time, a Mother will be twice as old as her son. Four years ago, the sum of their ages was 30years. Find how old the mother was, when the son was born. (3mks)

16. Solve for value of x if $\sin(3x + 20) = \cos 4x$ (2mks)

SECTION II (50MARKS)

17. A Construction Company requires to transport 288 tonnes of stones to sites A and B. The Company pays 48,000 to transport 48 tonnes of stones for every 28Km. Peter transported 96 tonnes site to A, 49Km away.

    (a) Find how much he was paid. (3mks)

    (b) Peter spends Kshs. 6,000 to transport every 8 tonnes of stone to site A. **Calculate his total profit.** (3mks)

(c) John transported the remaining stones to site B, 84km away. If he made a profit of 44%. Find his transport cost (4mks)

18. A rectangle OABC has vertices $0(0,0)$, $A(2,0)$ $B(2,3)$ and $C(0,3)$ O' A'B'C' is the image of OABC under a translation $T=\begin{pmatrix}0\\4\end{pmatrix}$ O" A" B" C" is the image of $O^1 A^1 B^1 C^1$ under a transformation given by the matrix $M = \begin{pmatrix}0 & -1\\1 & 0\end{pmatrix}$

a) Draw the rectangles O AB C , $O^1 A^1 B^1 C^1$ and $O^{11} A^{11} B^{11} C^{11}$ on the grid provided (6marks)

b) Use your diagram to find the centre of rotation which Maps OABC onto $O^{11} A^{11} B^{11} C^{11}$ (2mks)

c) Find the co-ordinates of $O^{111} A^{111} B^{111} C^{111}$ the image of $O^1 A^1 B^1 C^1$ under a reflection on the line $y = -x$ (2mks)

19. A ship sails from A to D through B and C. B is 500km on a bearings of $N50^0E$ from A. C is on a bearing of 340^0 from B and at a distance of 620Km. The bearing of D from A and C are $N20^0W$ and 560^0w respectively.

   a) Using a scale of 1cm to Rep 100Km, show the relative position of A, B, C and D

(4mks)

   b) Find the distance of D from   (2mks)
     i)   A

     ii)   C

   c) Find the bearing of D from B   (1mks)

   d) If the ship was sailing at an average speed of 500Km/h. Find how long the journey took. Give the answer to the nearest hour.   (3mks)

20. A bus and a Matatu left Voi for Mombasa 240 Km away at 8:00a.m. They travelled at 90Km/h and 120km/h, respectively after 20minutes the matatu had a puncture which took 30 minutes to mend. It then continued with the journey.

   a) How far from Voi did the Matatu catch up with the bus.   (6mks)

b) At what time did the Matatu catch up with the bus? (2mks)

c) At what time did the bus reach Mombasa? (2mks

21. A right conical frustrum of base radius 7cm, top radius 4cm and height 5cm is stuck onto a cylinder of base radius 7cm and height 6cm and further attached to the hemisphere to from a closed solid as shown below$\left(Take\ \pi\ \frac{22}{7} \right)$

a) Find the volume of the solid to 1 decimal place (8mks)

b) Given that the Mass of the solid is 2430g. Find it's density to 4 decimal places (2mks)

22. a) Complete the table below for the function

$y = 3x^2 - 2x - 1 \qquad for -3 \le x \le 4$

(2mks)

x	-3	-2	-1	0	1	2	3	4
$y = 3x^2 - 2x - 1$		15				7		

b) Draw the graph of $y = 3x^2 - 2x - 1$ (3mks)

c) Draw the line $y = 3x + 1$ on the same axis. Hence find the value of x for which $y = 3x2 + 1$ and $y = 3x^2 - 2x - 1$ are equal (3mks)

d) Write down the simplified quadratic equation whose roots are the solution of the simultaneous equations in (c) above
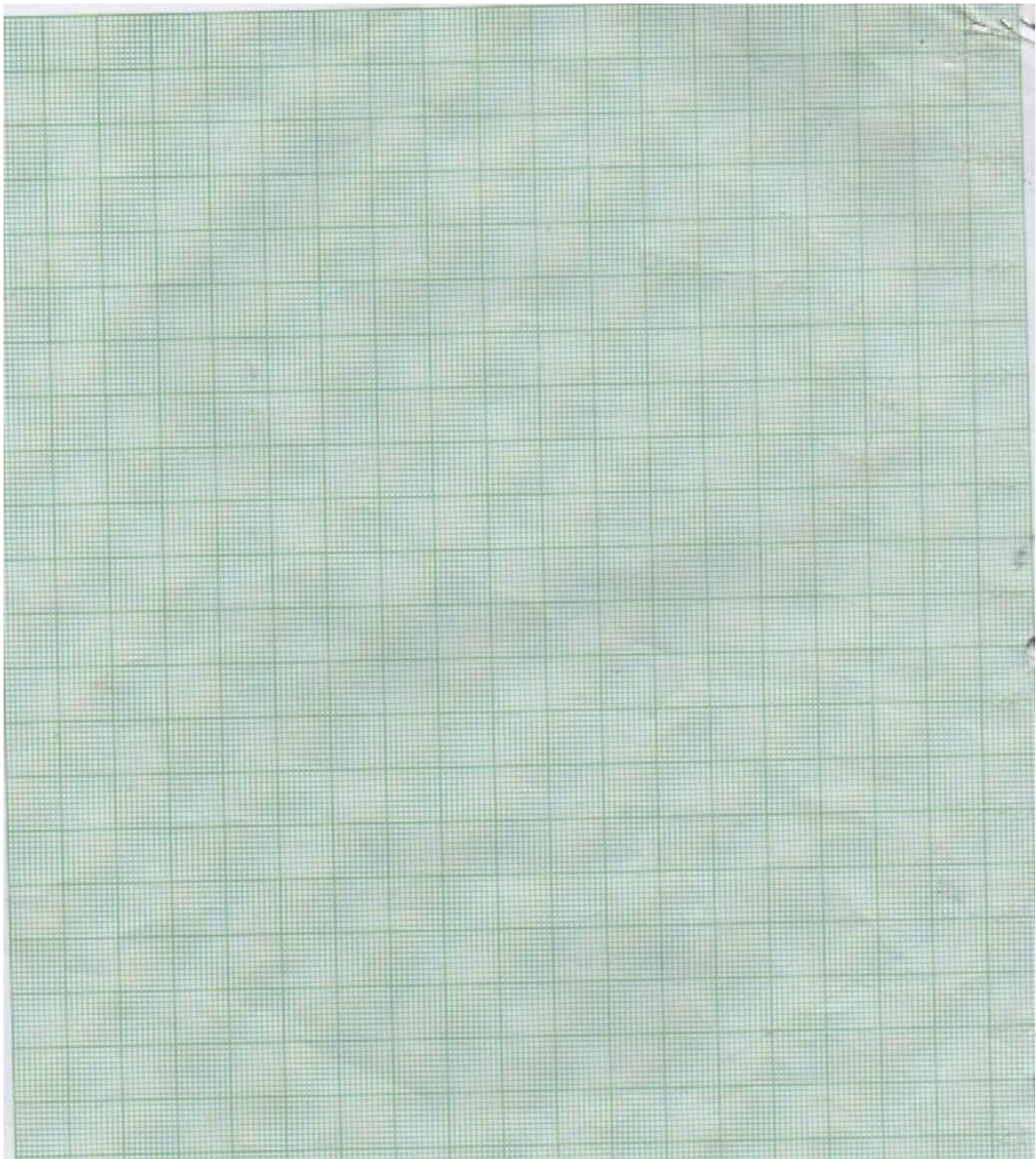
(2mks)

23. The table below show height of seedling of tomatoes record in a nursery

Height	$0 \leq x < 7$	$7 \leq x < 17$	$17 \leq x < 27$	$27 \leq x < 47$	$47 \leq x < 67$
No. of seedling	8	43	65	70	10

a) Estimate the mean height   (5mrks)

b) Draw a histogram and frequency polygon to illustrate the above distribution   (5mks)

24. The displacement S metres of a particle from a fixed point in motion at any given time (t) seconds is given by $S = 3t + \frac{3}{2}t^2 - 2t^3$

a) Find the initial acceleration (3mrks)

b) Calculate

   i. The time when the particle was momentarily at rest (2mrks)

   ii. It's displacement by the time it came to rest (2mrks)

   iii) Calculate the maximum speed attained (3mrks)