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 School.....  
 ADM No. ....

Index No...../.....  
 Date .....  
 Candidate's Sign.....

121/1  
 MATHEMATICS  
 PAPER 1  
 DECEMBER, 2021  
 Time: 2 ½ Hours

# SUKELLEMO MOCKS 2021

Kenya Certificate of Secondary Education (K.C.S.E)

## INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided at the top of this page.
2. Sign and write the and number and the date of the examination
3. This paper consists of two sections: Section I and Section II.
4. Answer **ALL** questions in section 1 and **ONLY FIVE** questions from section II
5. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
6. Marks may be given for correct working even if the answers are wrong.
7. Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except were stated otherwise.

## FOR EXAMINERS 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	22	23	24	TOTAL

**GRAND  
TOTAL**

*This paper consists of 15 printed pages.  
 Candidates should check the question paper to ensure that all pages are printed as indicated  
 and no questions are missing*

**SECTION 1 (50 MARKS)**

**Answer all the questions in this section:**

1. Evaluate 
$$\frac{\frac{3}{5} \text{ of } 30 + 5\frac{5}{6} \div \frac{7}{12} - 2\frac{2}{3} \times 1\frac{1}{2}}{5\frac{5}{8} \times 1\frac{7}{9} - \frac{5}{9} \text{ of } 4\frac{4}{5} + \frac{14}{5} \div \frac{7}{10}}$$

Leaving your answer in fraction form.

(3 marks)

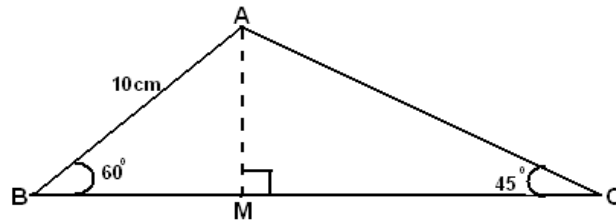
2. Use squares, square roots and reciprocal tables only to **evaluate** the following giving your answer correct to 2 decimal places. (3 marks)

$$\frac{2}{\sqrt{34.46}} + \frac{5}{(8.67)^2}$$

3. **Factorize** completely the expression  $75x^2 - 27y^2$  (2 marks)

4. In the figure below,  $\angle ABC = 60^\circ$ ,  $\angle ACB = 45^\circ$ . **Calculate** the length BC and hence **calculate** the area of triangle ABC.

(4 marks)



5. Solve for  $x$  and  $y$  in the following equations.

(4 marks)

$$2^x + 3^y = 59$$

$$2^{x+3} - 3^{y+2} = 13$$

6. Find the quartile deviation for the data below 235, 418, 626, 405, 335, 717, 504, 609, 414, 431, 918.

(3 marks)

7. A solid tetrahedron of height  $\sqrt{200}$  cm is melted down and recast into a solid cylinder. The height of the cylinder is equal to the height of the tetrahedron. If the height of the tetrahedron is  $10\sqrt{3}$  cm, find the radius of the cylinder to two decimal places. (4 marks)

8. Find an estimate of the area enclosed by the curve  $y = x^3 - 5$ , the  $x$  - axis and the lines  $x = 4$  and  $x = 6$  using the mid-ordinate rule with 4 rectangles. (3 marks)

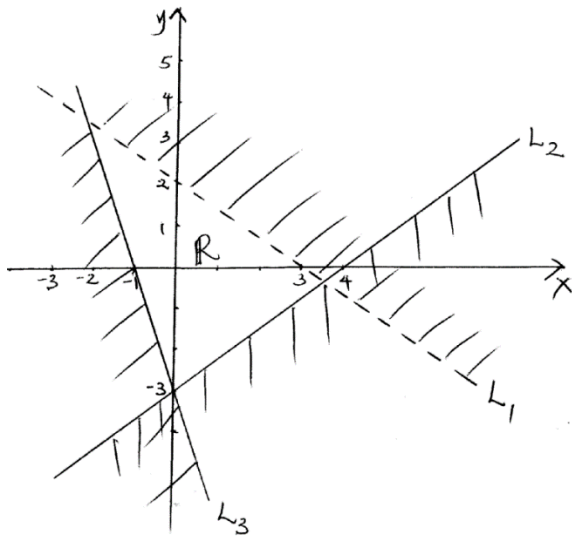
9. Find the value of  $d$  so that the expression  $25x^2 - 10x + \frac{1}{3} + d$  is perfect square where  $d$  is a real number. (3 marks)

10. A wholesaler sold a dress to a retailer at a profit of 50%. The retailer sold the dress at a profit of 25% of her cost price to a consumer for sh. 120. How much did the wholesaler pay for the dress?

(3 marks)

11. Write down all the inequalities represented by the regions R.

(3 marks)



12. The figure below shows part of a diagram of rotation symmetry order 3 about a point O. Complete the diagram. (3 marks)

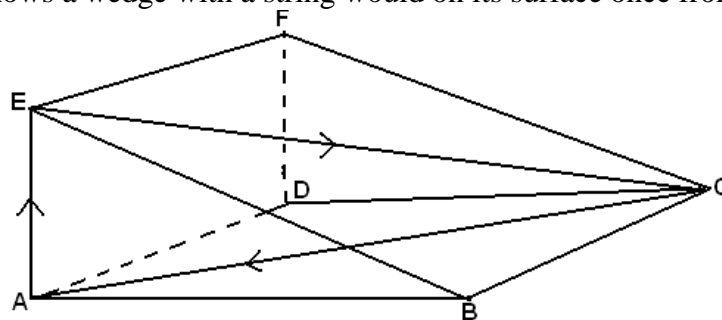


13. Draw a line segment  $PQ = 6\text{cm}$  and locate a point X which divides PQ in the ratio 7:-2 (3 marks)

14. A line  $y = mx + 8$  makes an angle of  $75.97^\circ$  with the x-axis, find the co-ordinates of the point where the line cuts the x-axis. (3 marks)

15. Sixteen men working at the rate of 9hrs a day can complete a piece of work in 14 days.  
 How many more men working at the rate of 7 hours a day would complete the same job  
 in 12 days (3 marks)

16. The figure below shows a wedge with a string would on its surface once from A to E to C to A.



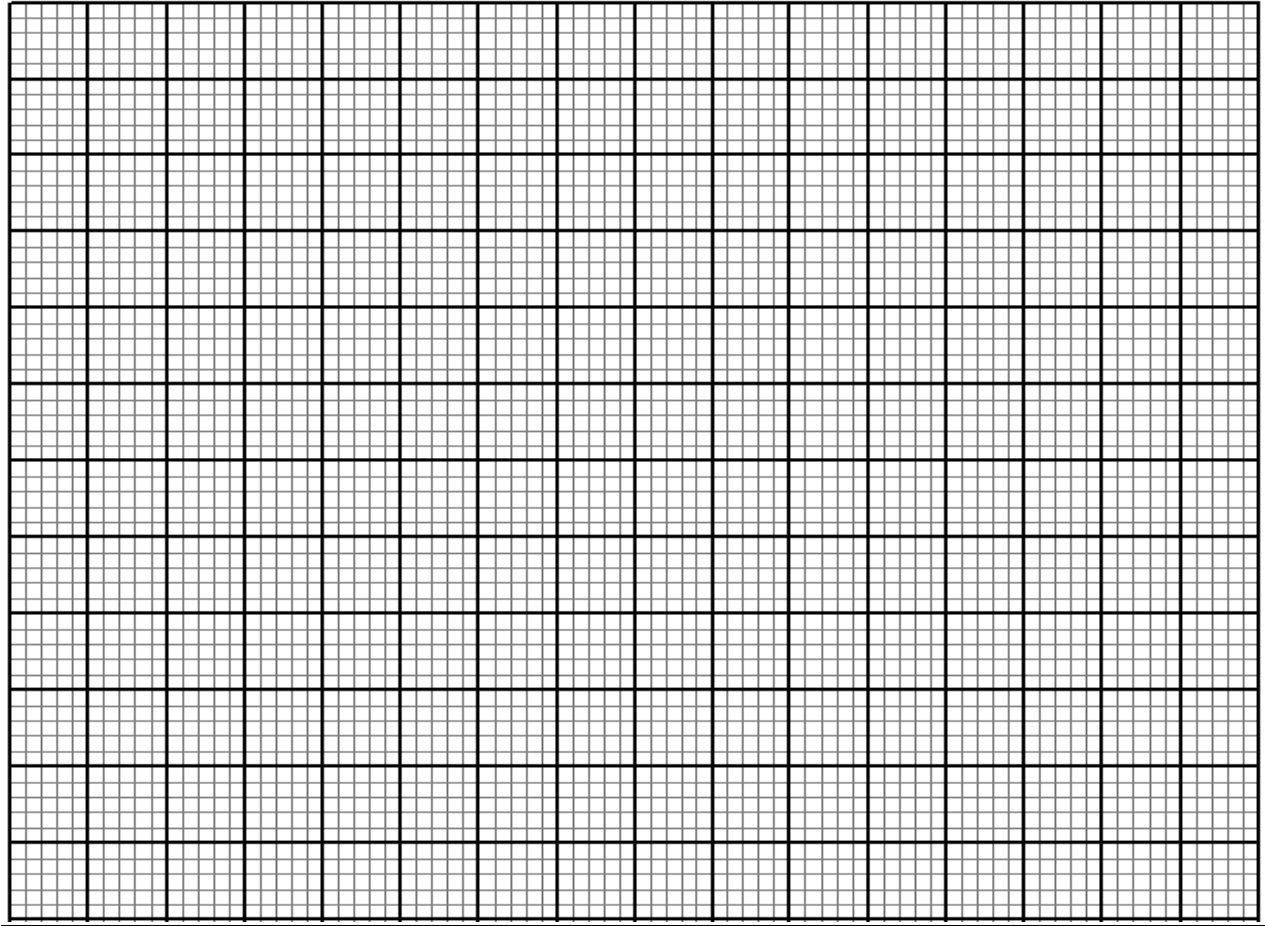
**Sketch** the net of the solid and show the path of the string (3 marks)

**SECTION II (Answer ONLY 5 questions in this section)**

17. (a). Complete the table below for the function  $y = x^3 + 2x^2 - 5x - 6$  (2 marks)

x	-4	-3	-2	-1	0	1	2	3
y					-6			

(b). Using the values obtained in the table above draw the graph of  $y = x^3 + 2x^2 - 5x - 6$  (3 marks)



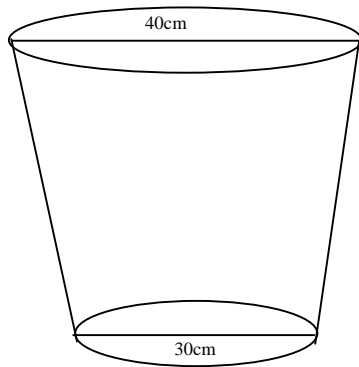
(c) Using your graph in (b) above, solve the following equations.

i.  $x^3 + 2x^2 - 5x - 6 = 0$  (2 marks)

ii.  $x(x^2 + 2x - 4) = 8$  (3 marks)



18. The figure below shows a bucket of depth 30cm used to fill a cylindrical tank of radius 1.2m and height 1.35m which is initially three-fifth full of water.



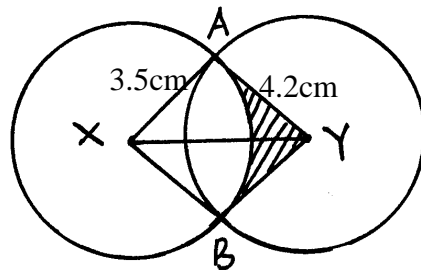
a) Calculate, leaving your answer in  $\Pi$ ;

(i) The capacity of the bucket in litres (5 marks)

(ii) The volume of water required to fill the tank in litres (2 marks)

(iii) Calculate the number of buckets that must be drawn to fill the tank (3marks)

19. Two circles of radii 3.5cm and 4.2cm with centres X and Y respectively intersect at point A and B as shown below.



Given that the centres of the circles are 6cm apart, find

a) angle AXB

(4 marks)

b) angle AYB

(2 marks)

c) the area of the quadrilateral XAYB correct to 2d.p.

(2 marks)

d) the shaded area correct to 2 significant figures. (Take  $\pi = 22/7$ )

(2 marks)

20. The cost of making a table consist of transport, labour and raw material in the ratio 4:2:6 respectively. During an inflation year the transport cost increased by 6%, the labour by 9% and raw materials by 20%.

a) Find the percentage increase in producing a table. (6 marks)

b) What was the old price of a table if the new price is Kshs. 680.00. (2 marks)

c) How much would Raisa have saved if she buys a dozen of tables at the old price? (2 marks)

21. A bus left Nairobi at 7.00am and travelled towards Eldoret at an average speed of 80km/hr. At 7.45am a car left Eldoret towards Nairobi at an average speed of 120km/hr. The distance between Nairobi and Eldoret is 300km

Calculate

a) the time the bus arrived at Eldoret (2 marks)

b) the time of the day the two met. (4 marks)

c) the distance from Nairobi where the two met. (2 marks)

d) the distance of the bus from Eldoret when the car arrived at Nairobi. (2 marks)

22. A straight line  $L_1$  has a gradient  $-\frac{1}{2}$  and passes through point P (-1, 3). Another line  $L_2$  passes through the points Q (1, -3) and R (4, 5). Find.

(a) The equation of  $L_1$ . (2marks)

(b) The gradient of  $L_2$ . (1mark)

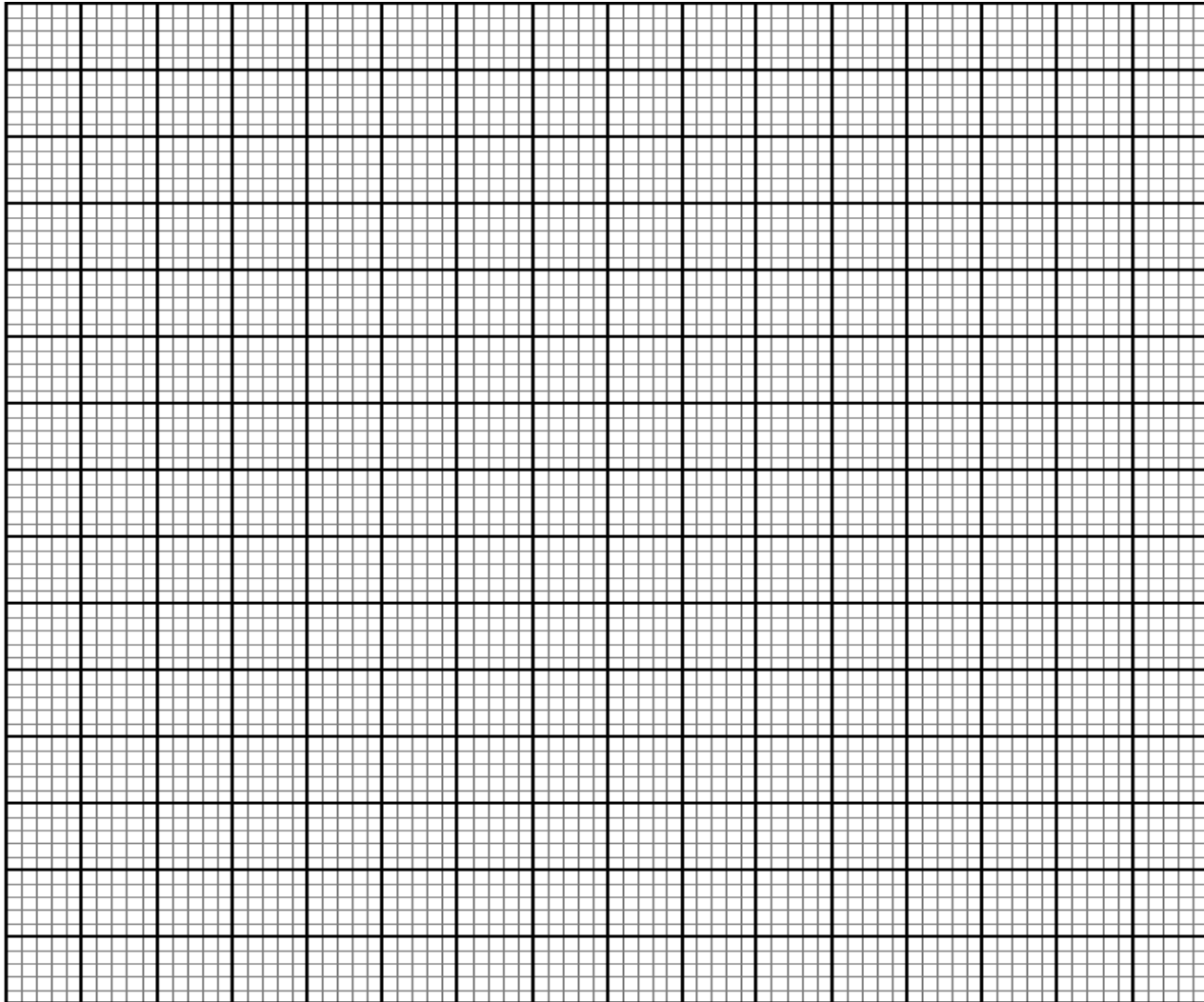
(c) The equation of  $L_2$ . (2marks)

(d) The equation of a line passing through a point S (0, 5) and is perpendicular to  $L_2$ . (3marks)

(e) The equation of a line through R parallel to  $L_1$ . (2marks)

23. A triangle with A (-4, 2), B (-6, 6) and C (-6, 2) is enlarged by a scale factor -1 and centre (-2, 6) to produce triangle  $A^1B^1C^1$ .

a) Draw triangle ABC and  $A^1B^1C^1$ .and state its coordinates (4 marks)



b) Triangle  $A^1B^1C^1$  is then reflected in the line  $y = x + 2$  to give triangle  $A^{11}B^{11}C^{11}$  draw  $A^{11}B^{11}C^{11}$  and state its coordinates (3 marks)

c) If triangle  $A^{11}B^{11}C^{11}$  is mapped onto  $A^{111}B^{111}C^{111}$  whose co-ordinates are  $A^{111}(-2, 0)$ ,  $B^{111}(2, -2)$  and  $C^{111}(-2, -2)$  by a rotation. Find the centre and angle of rotation. (3 marks)

24. A particle moves in a straight line so that its velocity  $V$  m/s after time  $t$  is given by  $V = \frac{1}{2}t^2 - 3t + 7$   
Where  $t$  is time in seconds. Find  
(i) The velocity after 8 seconds. (2 marks)

(ii) the acceleration when  $t=0$ . (2 marks)

(iii) the minimum velocity attained. (2 marks)

(iv) the distance traveled in first 2 seconds. (4 marks)

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