

# K.C.S.E. MATHEMATICS PAPER 121/1 2002

## SECTION I (52 marks)

*Answer all the questions in this section*

1. Evaluate:

$$\frac{-12 \div (-3) \times 4 - (-20)}{-6 \times 6 \div 3 + (-6)}$$

(3 marks)

2. Simplify:

$$(x + 2y)^2 - (x - 2y)^2$$

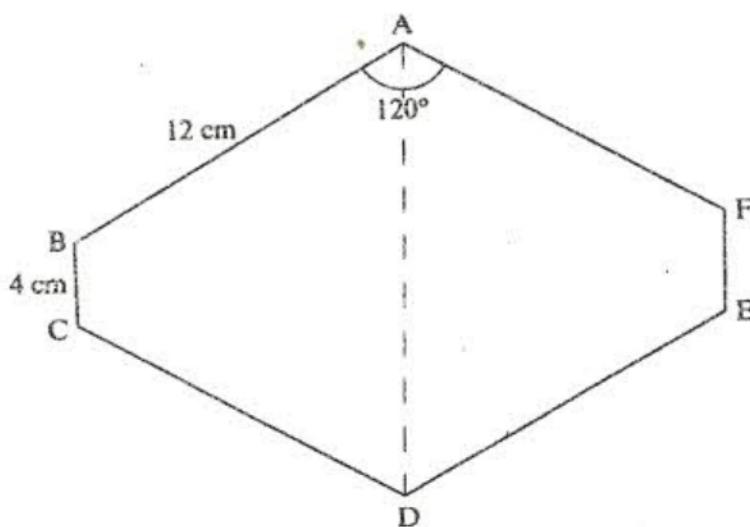
(3 marks)

3. Use reciprocal and square tables to evaluate, to 4 significant figures, the expression:

$$\frac{1}{24.56} + 4.346^2$$

(3 marks)

4. The figure below is a polygon in which  $AB = CD = DE = FA = 12 \text{ cm}$ ,  $BC = EF = 4 \text{ cm}$  and  $\angle BAF = \angle CDE = 120^\circ$ . AD is a line of symmetry.



Find the area of the polygon

(4 marks)

5. A Kenyan tourist left Germany for Kenya through Switzerland. While in Switzerland he bought a watch worth 52 Deutsche Marks.

Find the value of the watch in

- a) Swiss Francs
- b) Kenya Shillings

Use the exchange rates below

1 Swiss Franc = 1.28 Deutsche Marks

1 Swiss Franc = 45.21 Kenya Shillings

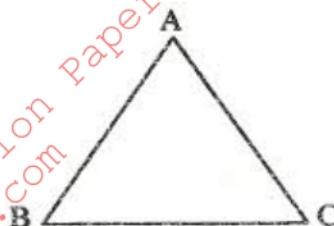
6. Solve the following inequalities and represent the solutions on a single number line:

$$3 - 2x < 5$$

$$4 - 3x \geq -8$$

(3 marks)

7. The figure below shows a triangle ABC.



- a) Using a ruler and a pair of compasses, determine a point D on the line BC such that  $BD : DC = 1 : 2$  (2 marks)

- b) Find the area of triangle ABD, given that  $AB = AC$  (2 marks)

8. The internal and external diameters of a circular ring are 6cm and 8cm respectively. Find the volume of the ring if its thickness is 2 millimeters (3 marks)

9. Use logarithms to evaluate

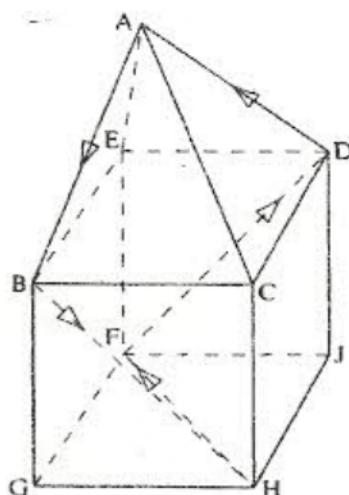
$$\frac{(0.0056)^{\frac{1}{2}}}{1.38 \times 27.27.42}$$

(3 marks)

10. Kipketer can cultivate a piece of land in 7 hours while Wanjiku can do the same work in 5 hours. Find the time they would take to cultivate the piece of land when working together. (3 marks)

11. A triangular flower garden has an area of  $28\text{m}^2$ . Two of its edges are 14 metres and 8 metres. Find the angle between the two edges. (2 marks)

12. The figure below represents a square based solid with a path marked on it.



Sketch and label the net of the solid.

(2 marks)

13. Solve for  $x$  in the equation

$$\frac{81^{2x} \times 27^x}{9^x} = 729. \quad (3 \text{ marks})$$

14. Simplify the expression

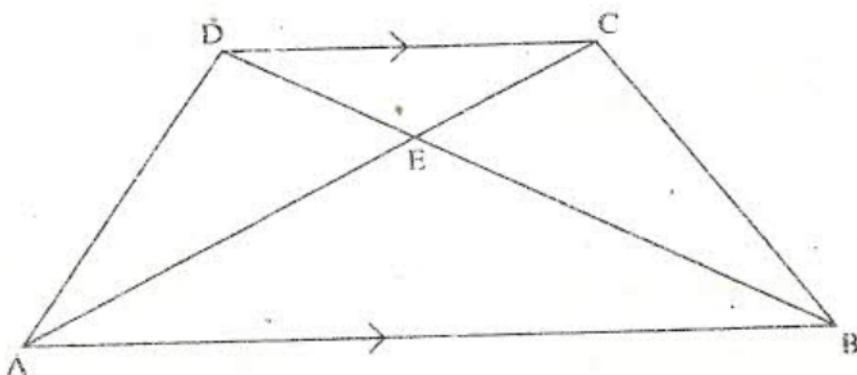
$$\frac{4x^2 - y^2}{2x^2 - 7xy + 3y^2} \quad (3 \text{ marks})$$

15. Atieno and Kamau started a business by contributing Sh. 25,000 and Sh. 20,000 respectively.

At the end of the year, they realised a profit of Sh 81,000. The profit was allocated to development, dividends and reserves in the ratio 4:5:6 respectively.

The dividends were then shared in the ratio of their contributions. Calculate the dividend paid to Atieno. (3 marks)

16. In the diagram below, ABCD is a trapezium with AB parallel to DC. The diagonals AC and BD intersect at E.



a) Giving reasons, show that triangle ABE is similar CDE. (2 marks)

b) Given that  $AB=3DC$ , find the ratio DB to EB. (2 marks)

## SECTION II

*Answer any six questions in this section*

17. A minor sector of a circle of radius 28cm includes an angle of  $135^\circ$  at the centre.

a) i) Convert  $135^\circ$  into radians. Hence or otherwise find the area of the sector (3 marks)

ii) Find the length of the minor arc (1 mark)

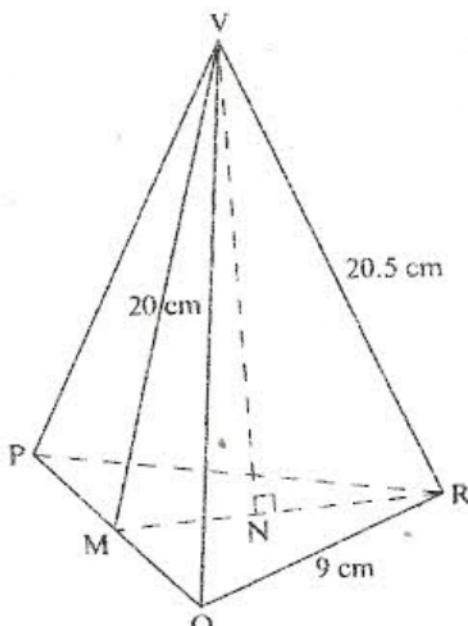
b) The sector is folded to form a right circular cone. Calculate the  
i) radius of the cone (2 marks)

ii) height of the cone (Take the value of  $\pi$  to be  $\frac{22}{7}$ ) (2 marks)

18. A bus travels from Nairobi to Kakamega and back. The average speed from Nairobi to Kakamega to Nairobi is 50km/h. It takes the bus 3 more hours to travel Kakamega to Nairobi.

- a) Determine the distance between the two towns. (3 marks)
- b) At 50km/h, the fuel consumption is 0.35litres per kilometre and at 80km/h, the consumption is 0.3 litres per kilometre.  
Find the:
- Total fuel consumption for the round trip (2 marks)
  - Average fuel consumption per hour for the round trip. (3 marks)

19. The figure VPQR below represents a model of a top of a tower. The horizontal base PQR is an equilateral triangle of side 9cm. The lengths of the edges are VP=VQ=VR=20.5cm. Point M is the mid-point of PQ and VM=20cm. Point N is on the base and vertically below V.



Calculate the:

- a) i) length of RM (2 marks)  
ii) height of the model (2 marks)  
iii) volume of the model (2 marks)
- b) The model is made of material whose density is  $2,700\text{kg/m}^3$ . Find the mass of the model. (2 marks)

20. Four points B,C,Q and D lie on the same plane. Point B is 42km due south-west of point Q. Point C is 50km on a bearing of S  $60^\circ$  E from Q. Point D is equidistant from B, Q and C.

- a) Using the scale: 1cm represents 10km, construct a diagram showing the positions of B,C, Q and D. (5 marks)
- b) Determine the:  
i) distance between B and C (1 marks)  
ii) bearing of D from B. (2 marks)