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:

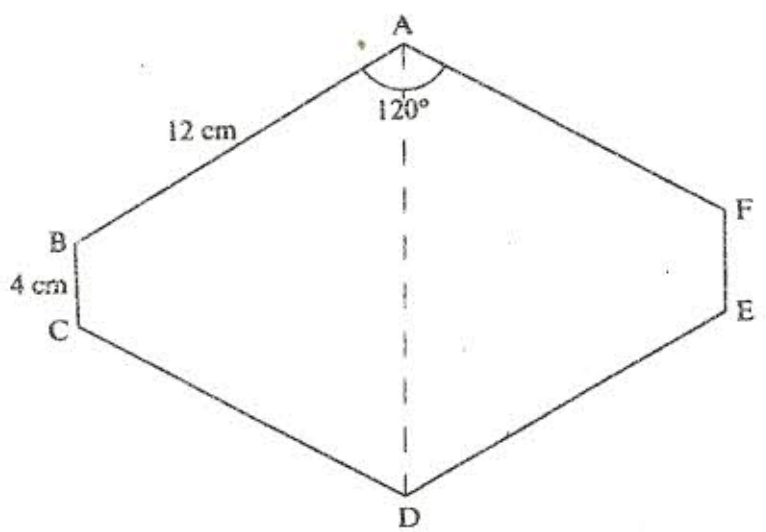
$(x + 2y)^2 - (x - 2y)^2$ (3 marks)

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 cm, BC = EF = 4cm and $\angle BAF = \angle CDE = 120^0$. 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

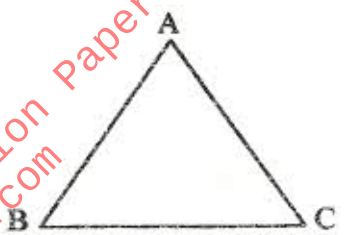
Use the exchange rates below
1 Swiss Franc = 1.28 Deutsche Marks
1 Swiss Franc = 45.21 Kenya Shillings

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 in 2 millimeters (3 marks)

9. Use logarithms to evaluate

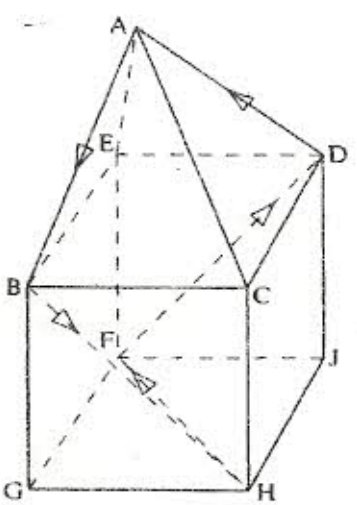
$$\frac{(0.0056)^{\frac{1}{2}}}{1.38\times 27.27.42}$$

(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 28m². 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

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

14. Simplify the expression

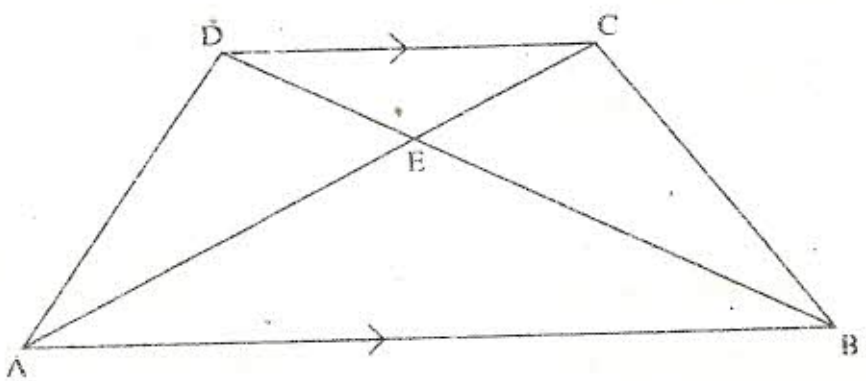
$$\frac{4x^2 - y^2}{2x^2 - 7xy + 3y^2}$$ (3 marks)

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° at the centre.

a) i) Convert 1350 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 π 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.

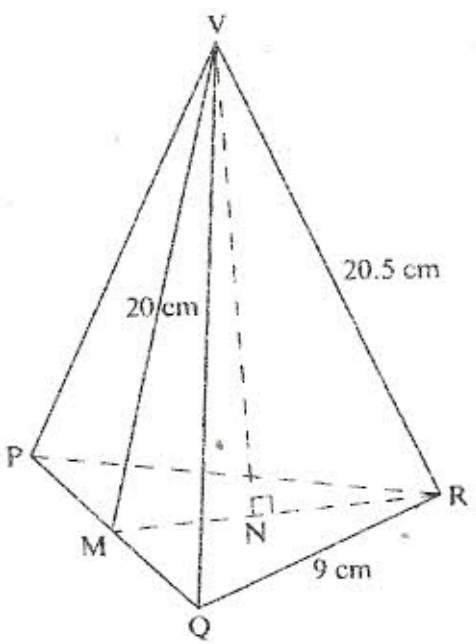
a) Determine the distance between the two towns. (3 marks)

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:

i) Total fuel consumption for the round trip (2 marks)

ii) 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 2,700kg/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 60^0 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)