K.C.S.E. MATHEMATICS PAPER 1

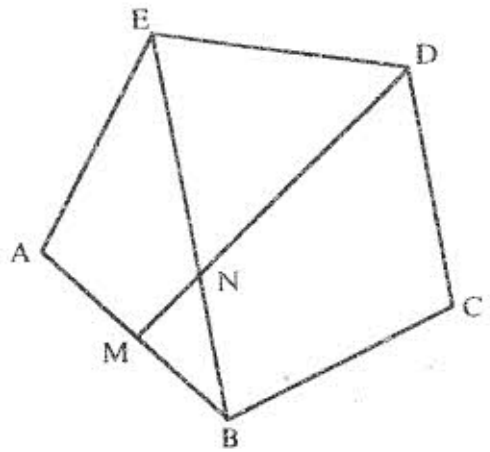
SECTION I (52 marks)

Answer all the questions in this section

1. Evaluate $\frac{28-(-18)}{-2} - \frac{15-(-2)(-6)}{3}$ (3 marks)

2. Simplify the expression $\frac{3a^2+4ab+b^2}{4a^2+3ab-b^2}$ (3 marks)

3. In the figure below, ABCDE is a regular pentagon and M is the midpoint of AB. DM intersects EB at N.



Find the size of:

a) $\angle BAE$ (1 mark)

b) $\angle BED$ (1 mark)

c) $\angle BNM$ (1 mark)

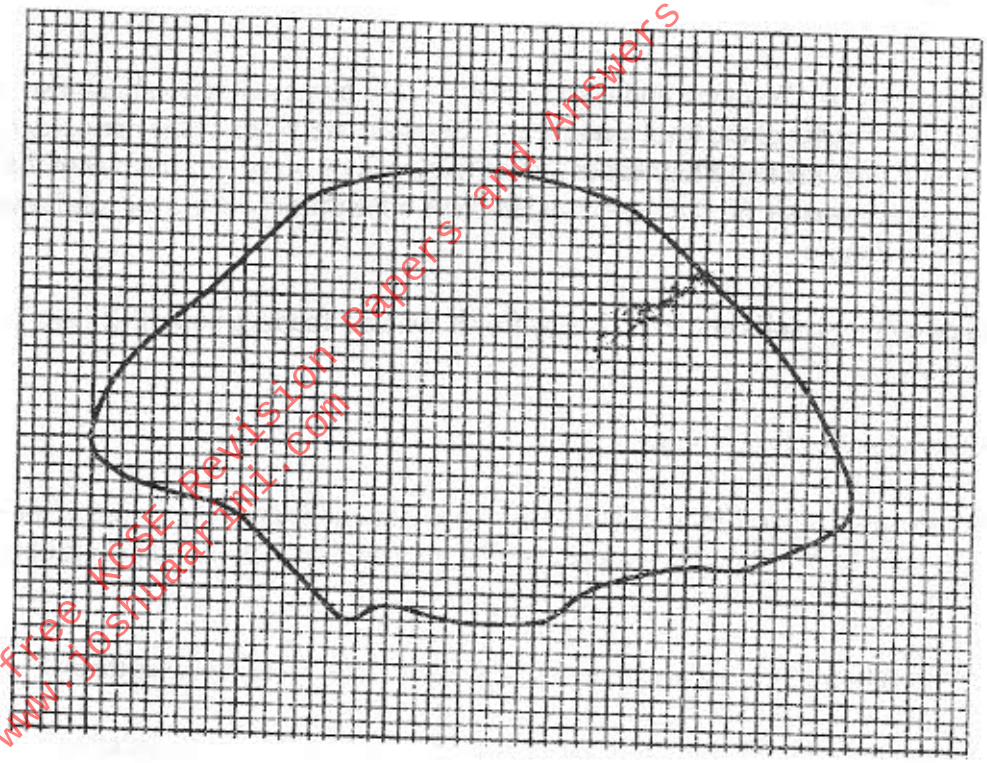
4. The table below shows heights of 50 students

Height (cm)	Frequency
140 - 144	3
145 - 149	15
150 - 154	19
155 - 159	11
160 - 164	2

a) State the modal class (1 mark)

b) Calculate the median height (2 marks)

The enclosed region shown in the figure below represents a ranch drawn to scale. The actual area of the ranch is 1075 hectares

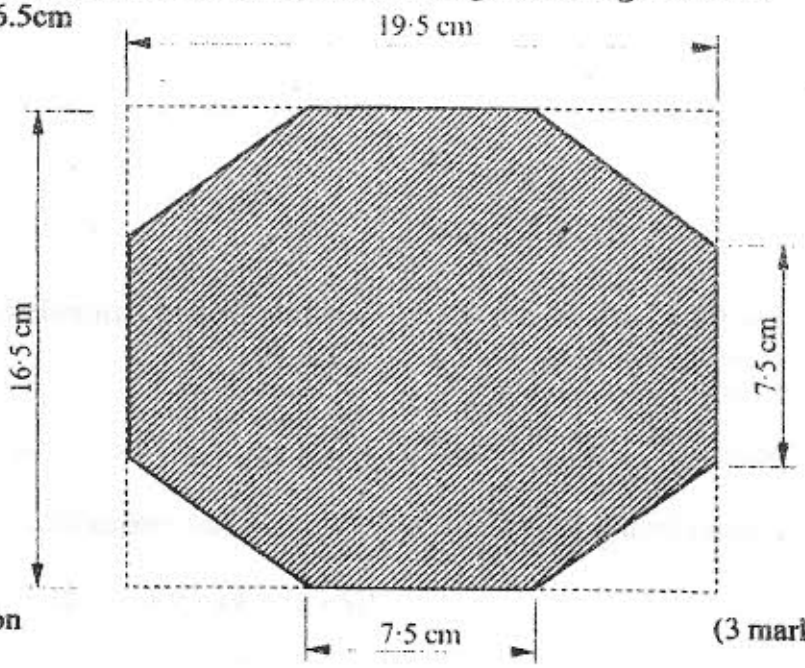


a) Estimate the area of the enclosed region in square centimetres (1 mark)

b) Calculate the linear scale used (2 marks)

Shopping centres X, Y, and Z are such that Y is 12km south of X and Z is 15km from X. Z is on a bearing of 330^0 from Y.
Calculate the bearing of Z from X.

The figure below shows an octagon obtained by cutting off four congruent triangles from a rectangle measuring 19.5 by 16.5cm



Calculate the area of the octagon (3 marks)

8. A pyramid VABCD has a rectangular horizontal base ABCD with AB=12cm and BC = 9cm. the vertex V is vertically above A and VA = 6cm. Calculate the volume of the pyramid (2 marks)

9. Three people Korir, Wangare and Hassan contributed money to start a business. Korir contributed a quarter of the total amount and Wangare two fifths of the remainder. Hassan's contribution was one and a half times that of Korir. They borrowed the rest of the money from the bank which was sh. 60,000 less than Hassan's contribution. Find the total amount required to start the business (4 marks)

10. Karani bought 4 pencils and 6 biro-pens fro sh. 66 and Tachora bought 2 pencils and 5 biro-pens for sh. 51.

a) Find the price of each item

b) Musoma spent sh. 228 to buy the same type of pencils and biro-pens. If the number of biro-pens he bought were 4 more than the number of pencils, find the number of pencils bought. (2 marks)

11. Find the equation of the perpendicular to the line $x + 2y = 4$ and passes through point (2, 1). (2 marks)

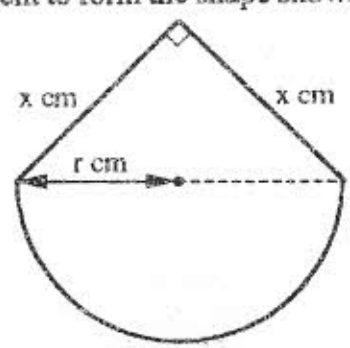
12. A passenger noticed that she had forgotten her bag in a buss 12 minutes after the bus had left. To catch up with the bus, the immediately took a taxi which travelled at 95km/h. The bus maintained an average speed of 75km/h. Determine

a) the distance covered by the bus in 12 minutes. (1 mark)

b) the distance covered by the taxi to catch the up with the bus (2 marks)

13. Two sides of a triangle are 5cm each and the angle between them is 120^0. Calculate the area of the triangle. (3 marks)

14. A piece of wire, P cm long, is bent to form the shape shown in the figure below.



The figure consists of a semicircular arc of radius r cm and two perpendicular sides of length x cm each.

Express x in terms of P and r, (1 mark)

hence show that the area A cm², of the figure is given by $A = \frac{1}{2}\pi r^2 + \frac{1}{8}(P - \pi r)^2$ (2 marks)

15. Find all the integral values of x which satisfy the inequalities

$$2(2 - x) < 4x - 9 < x + 11$$ (3 marks)

16. Akinyi, Bundi, Cura and Diba invested some money in a business in the ratio of 7 : 9 : 10 : 14 respectively. The business realised a profit of sh. 46,800. They shared 12% of the profit equally and the remainder in the ratio of their contributions.
Calculate the total amount of money received by Diba. (3 marks)

17. A triangle is formed by the coordinates A (2, 1), B(4, 1) and C(1, 6). It is rotated clockwise through 90° about the origin. Find the coordinates of this image. (3 marks)

18. Use the logarithms to evaluate

$$\sqrt[3]{\frac{1.23 \times 0.0089}{76.54}}$$

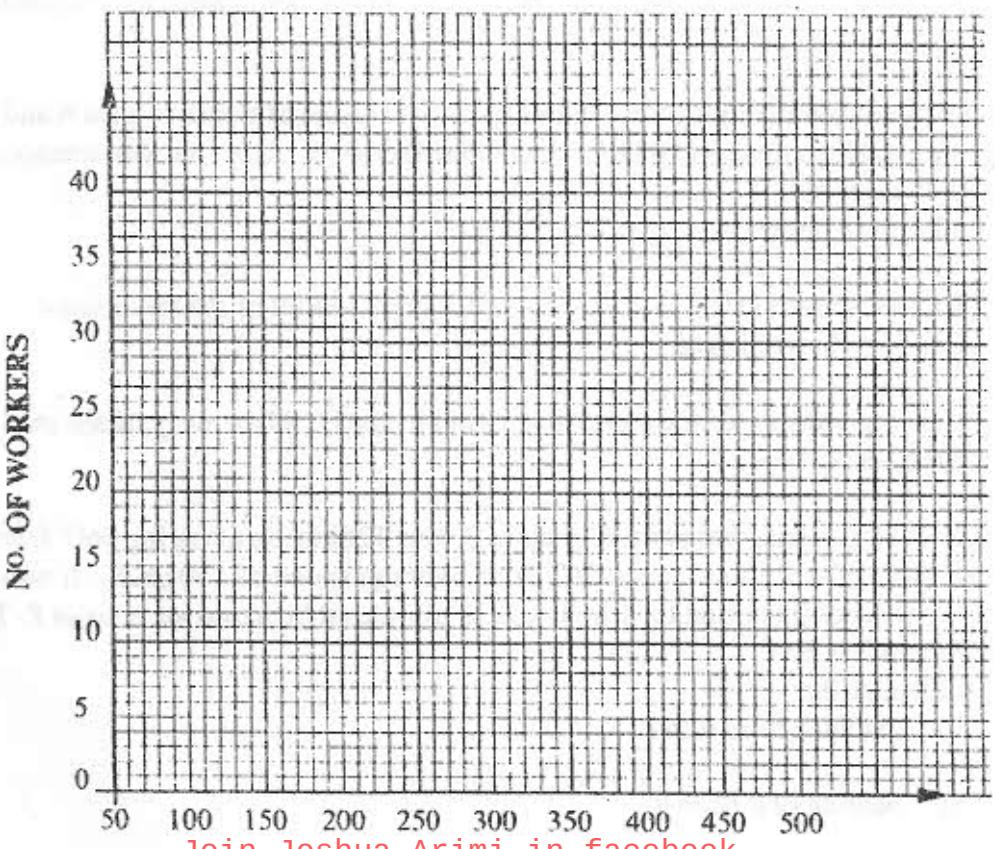
(4 marks)

19. Find the value of x which satisfy the equation $5^{2x} - 6 \times 5^{x} + 5 = 0$ (4 marks)

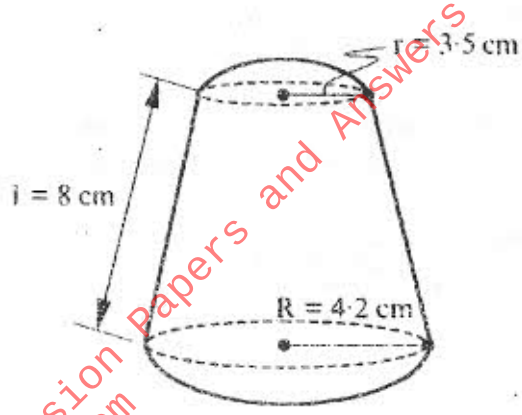
20. The frequency distribution table below shows the weekly salary (K£) paid to workers in a factory.

Salary (K£)	$50 \le x < 100$	$100 \le x < 150$	$150 \le x < 250$	$250 \le x < 350$	$350 \le x < 500$
Number of workers	13	16	38	24	9

On the grid provided below, draw a histogram to respect the information shown above.(3 marks)



21. A solid is made up of a conical frustum and a hemispherical top as shown in the figure below. The dimensions are as indicated in the figure.



a) Find the area of:

i) the circular base (1 mark)

ii) the curved surface of the frustum (3 marks)

iii) the hemispherical surface (2 marks)

b) A similar solid has a total surface area of 81.51cm^2. Determine the radius of its base (2 marks)

22. A construction company requires to transport 144 tonnes of stones to sites A and B. The company pays sh. 24,000 to transport 48 tonnes of stone for every 28km. Kimani transported 96 tonnes to site A, 49km away.

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

b) Kimani spends ksh. 3,000 to transport every 8 tonnes of stones to site A. Calculate his total profit. (2 marks)

c) Achieng transported the remaining stones to site B, 84km away. If she made 44% profit, find her transport cost. (3 marks)

23. A rally car travelled from point R to point S. S is 128km on a bearing 060^0 from R. The car then set off from S at 9.30 am towards T at an average speed of 150km/h. It was expected at T at 11.30 am. After travelling for 1 hour and 20 minutes it broke down at point P. The bearing of T and P from S is 300^0.

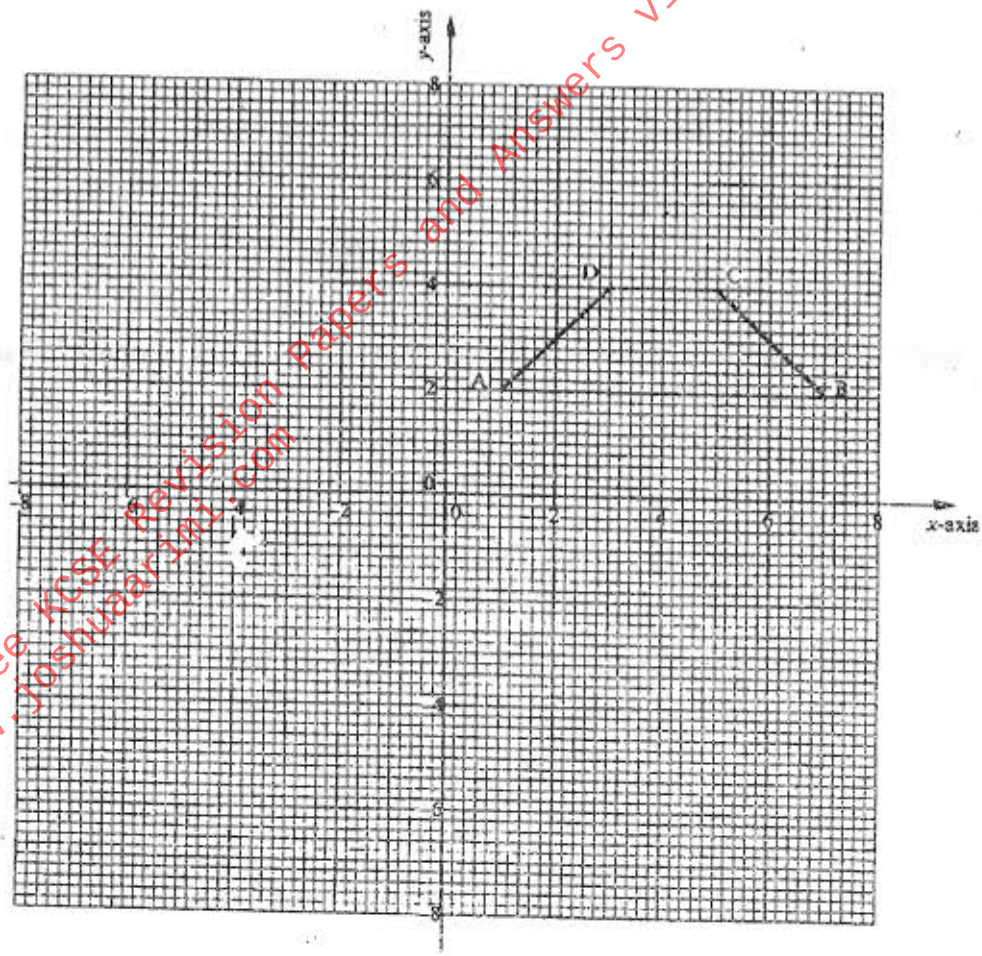
a) Calculate the:

i) distance from R to P (4 marks)

ii) bearing of P from R. (3 marks)

b) The repair took 10 minutes and the car set off to complete its journey to T. Find the speed at which car must now move to reach T on time. (1 mark)

24. The diagram on the grid provided below shows a trapezium ABCD.



On the same grid:

a) i) Draw the image A'B'C'D' of ABCD under a rotation of 90° clockwise about the origin. (1 mark)

ii) Draw the image A"B"C"D" of A'B'C'D' under a reflection in line y=x. State the coordinates of A"B"C"D. (3 marks)

b) A"B"C"D" is the image of A"B"C"D" under the reflection in the line x = 0. Draw the image A"B"C"D" and state its coordinates. (2 marks)

c) Describe a single transformation that maps A"B"C"D onto ABCD. (2 marks)