K.C.S.E. MATHEMATICS PAPER 121/1 2001

SECTION I

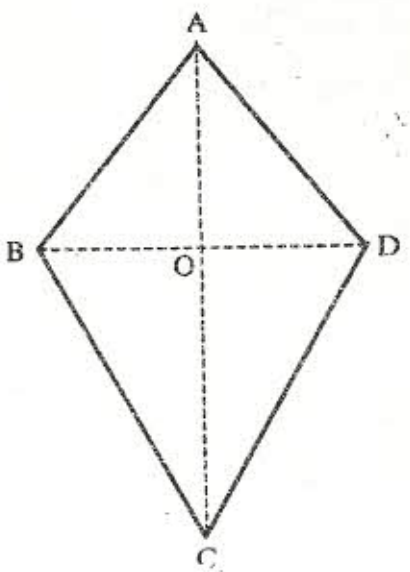
Answer all the questions in this section

1. Find the reciprocal of 0.342. Hence evaluate:

$$\frac{\sqrt{0.0625}}{0.342}$$

(3 marks)

2. The figure below represents a kite ABCD, AB=AD=15cm. The diagonals BD and AC intersect at O, AC = 30 cm and AO = 12cm.



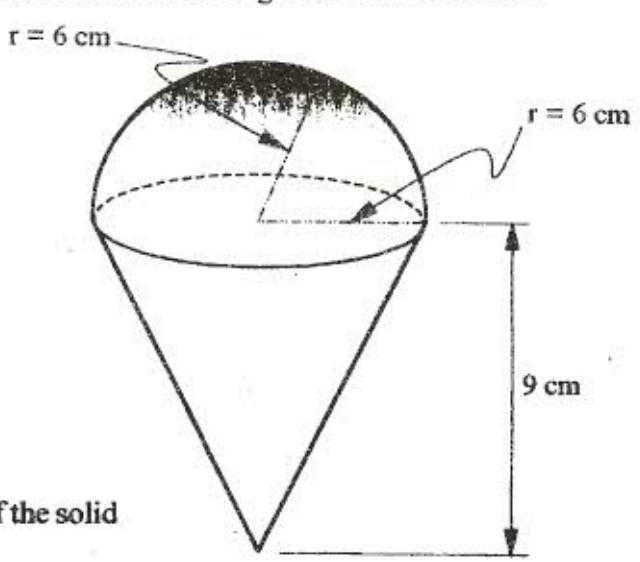
Find the area of the kite (3 marks)

3. Use logarithms to evaluate

$$(3.256 \times 0.0536)^{\frac{1}{3}}$$

(4 marks)

4. The diagram below represents a solid made up of a hemisphere mounted on a cone. The radius of the hemisphere are each 6cm and the height of the cone is 9cm



Calculate the volume of the solid
(Take $\pi = \frac{22}{7}$) (3 marks)

5. A line L_1 passes through point (1, 2) and has a gradient of 5. Another line L_2, is perpendicular to L_1 and meets it at a point where $x = 4$. Find the equation for L_2 in the form $y = mx + c$

(4 marks)

6. Simplify the expression:

$$\frac{3x^2 - 4xy + y^2}{9x^2 - y^2}$$

(3 marks)

7. The length of a room is 4 metres longer than its width. Find the length of the room if its area is $32m^2$

(3 marks)

8. Use a ruler and compasses in this question. Raw a parallelogram ABCD in which AB=8cm, BC=6cm and BAD=75°. By construction, determine the perpendicular distance between AB and CD

(4 marks)

9. The interior angles of the hexagon are $2x^0$; $\frac{1}{2}x^0$, $x^0 + 40^0$, 110^0, 130^0 and 160^0. Find the value of the smallest angle

(3 marks)

10. A town N is 340km due west of town G and town K is due west of town N. A helicopter Zebra left G for K at 9.00am. Another helicopter Buffalo left N for K at 11.00am. Helicopter Buffalo travelled at an average speed of 20km/h faster than Zebra. If both helicopters reached K at 12.30p.m.. Find the speed of helicopter Buffalo

(3 marks)

11. Evaluate:

$$\frac{1}{3} of \left(2\frac{3}{4} - 5\frac{1}{2}\right) \times 3\frac{6}{7} \div \frac{9}{4}$$

(2 marks)

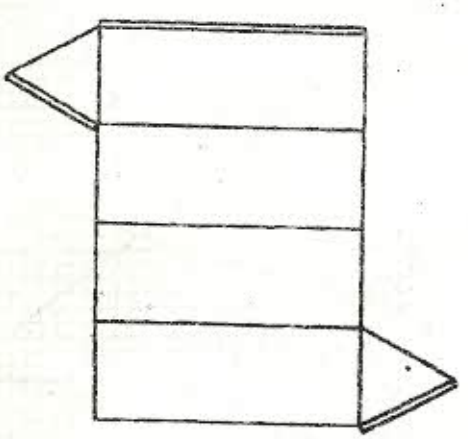
12. Solve for x in the equation: $32^{(x-3)} \times 8^{(x+4)} = 64 \div 2^x$

(3 marks)

13. Three people Odawa, Mliwa and Amina contributed money to purchase a flour mill. Odawa contributed of the total amount, Mliwa contributed of the remaining amount and Amina contributed the rest of the money. The difference in contribution between mliwa and Amina was sh 40,000. Calculate the price of the flour mill.

(3 marks)

14. The figure below shows a net of a prism whose cross-section is an equilateral triangle.



a) Sketch the prism.

(2 marks)

b) State the number of planes of symmetry of the prism.

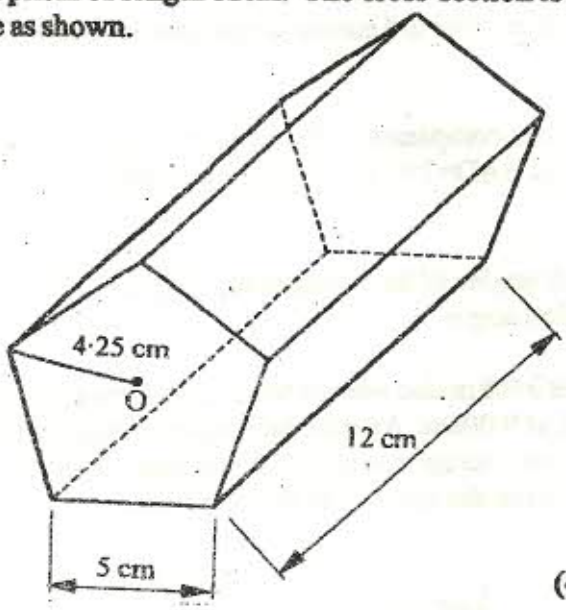
(1 mark)

15. A translation maps a point P(3,2) onto P'(5,4).

a) Determine the translation vector. (1 mark)

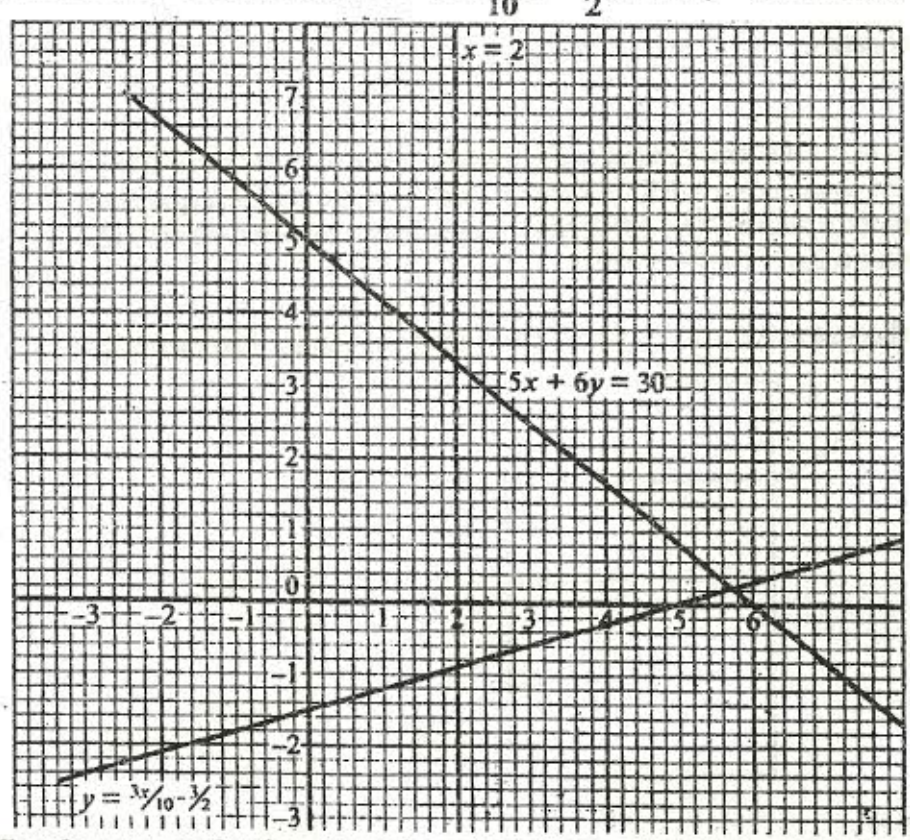
b) A point Q' is the image of the point Q(2,5) under the same translation. Find the length of P'Q, leaving the answer is surd form. (2 marks)

16. The figure below represents a pentagonal prism of length 12cm. The cross-section is a regular pentagon, centre O, whose dimensions are as shown.



Find the total surface area of the prism. (4 marks)

17. The diagram below shows the graph of: $y \geq \frac{3}{10}x - \frac{3}{2}$, $5x + 6y = 30$ and $x \geq 2$



By shading the unwanted region, determine and label the region R that satisfies the three inequalities:

$$y \geq \frac{3}{10}x - \frac{3}{2},\ 5x + 6y \geq 30 \text{ and } x \geq 2$$

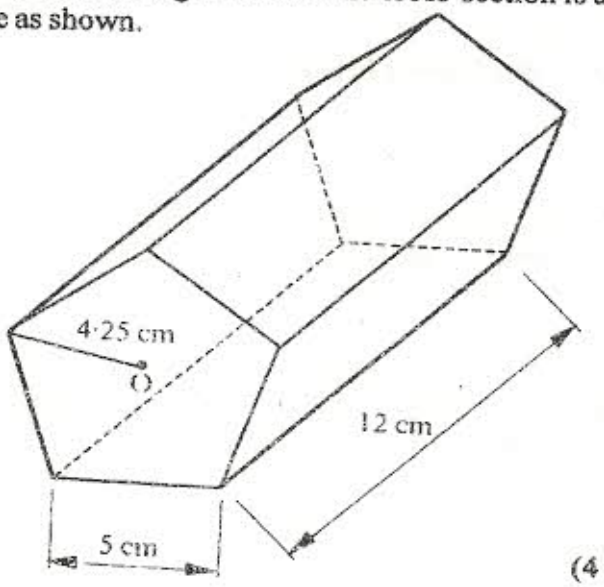
(4 marks)

15. A translation maps a point P(3,2) onto P'(5,4).

a) Determine the translation vector. (1 mark)

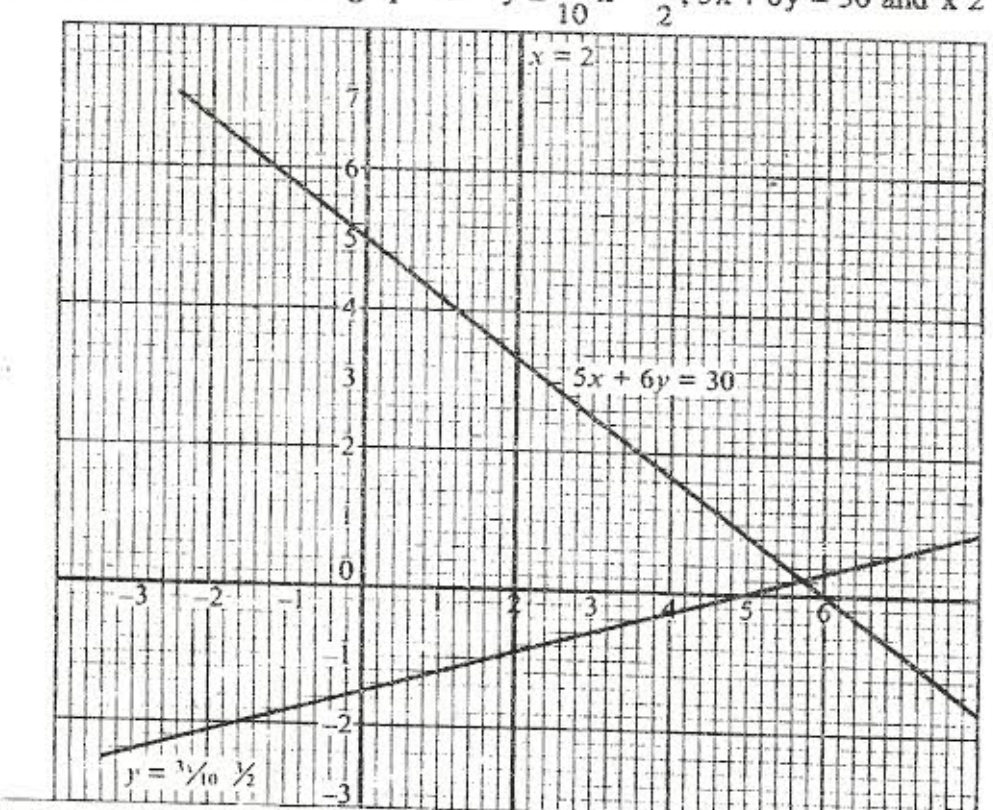
b) A point Q' is the image of the point Q(2,5) under the same translation. Find the length of P'Q, leaving the answer is surd form. (2 marks)

16. The figure below represents a pentagonal prism of length 12cm. The cross-section is a regular pentagon, centre O, whose dimensions are as shown.



Find the total surface area of the prism. (4 marks)

17. The diagram below shows the graph of: $y \geq \frac{3}{10}x - \frac{3}{2}$, $5x + 6y = 30$ and $x \geq 2$



By shading the unwanted region, determine and label the region R that satisfies the three inequalities:

$y \geq \frac{3}{10}x - \frac{3}{2}$, $5x + 6y \geq 30$ and $x \geq 2$ (4 marks)

SECTION II

Answer any **six** *questions in this section*

18. A helicopter is stationed at an airport H on a bearing 060° and 800km from another airport P. A third airport J is on a bearing of 140° and 1,200km from H.

a) Determine:
   i) the distance between P and J. (3 marks)

   ii) the bearing of P from J. (3 marks)

b) A jet flying at a speed of 1,035 km/h left J towards P. The helicopter at H also took off towards P at the same time. Find the speed at which the helicopter will fly so as to arrive at P, 12 minutes later than the jet. (2 marks)

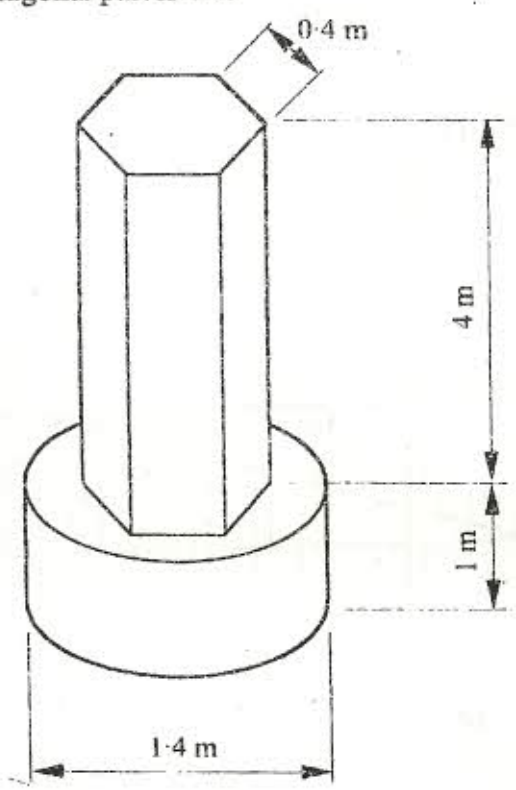
19. An electric pylon is 30m high. A point S on top of the pylon is vertically above another point R on the ground. Points A and B are on the same horizontal ground as R. Point A due south of the pylon and the angle of elevation of S from A is 26°. Point B is due west of the pylon and the angle of elevation of S from B is 32°.

Calculate the:
a) distance from A and B (6 marks)

b) bearing of B from A. (2 marks)

20. The diagram below represents a pillar made of cylindrical and regular hexagonal parts. The diameter and height of the cylindrical part are 1.4m and 1 m respectively. The side of the regular hexagonal face is 0.4m and height of hexagonal part is 4m.

$\left(\text{Take } \pi = \frac{22}{7}\right)$



a) Calculate the volume of the:

i) cylindrical part (2 marks)

ii) hexagonal part. (3 marks)

b) An identical pillar is to be built but with a hollow centre cross-sectional area of $0.25m^2$. The density of the material to be used to make the pillar is $2.4g/cm^3$. Calculate the mass of the new pillar. (3 marks)