4.1.3 Mathematics Alt. B Paper 1 (122/1)

SECTION I (50 marks)

*Answer **all** the questions in this section in the spaces provided.*

1 Simplify the expression

$$\frac{a^2 - b^2}{a^2 + ab - a - b}$$

(3 marks)

2 Three partners Auma, Barua and Chiku contributed Ksh 200 000, Ksh 300 000 and Ksh 500 000 respectively for a business enterprise. They realised a profit which they shared in the ratio of their contributions. If Auma and Chiku together received Ksh 105 000, calculate the total profit realised from the business. (3 marks)

3 Given that $3^{2y} = 6561$, determine the value of y. (3 marks)

4 Given $\tan \theta = \frac{5}{7}$, find the value of $\sin \theta$. (2 marks)

5 A solid whose volume is 64 cm□ has a mass of 30 g. Calculate its density in kg/m□ (3 marks)

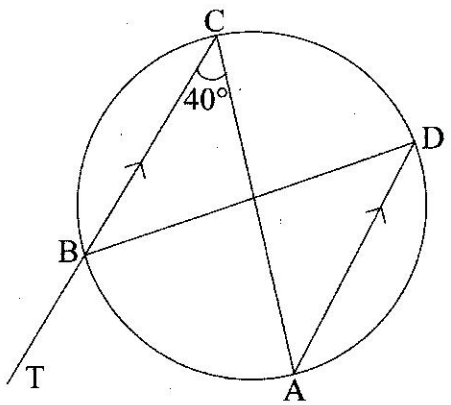
6 A carpenter had three pieces of timber of lengths 40 cm, 56 cm, and 64 cm. He cut the timber into smaller pieces of equal length. Calculate:

(a) the greatest possible length of each piece that the carpenter cut; (2 marks)

(b) the total number of pieces of timber obtained. (2 marks)

7 The circumference of a circle is 31.24 cm. A minor arc of the circle subtends an angle of 81° at the centre. Find the length of the major arc of the circle. (3 marks)

8 In the figure below, ABCD is a cyclic quadrilateral. Line TBC is parallel to line AD and angle ACB = 40°.



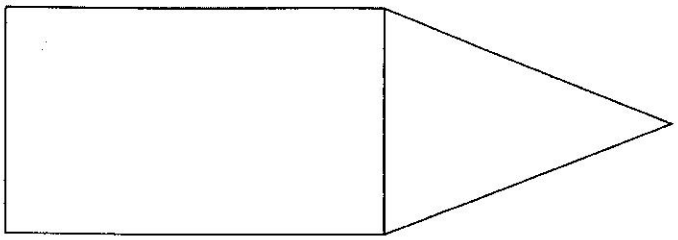
Find the size of:

(a) angle CAD; (1 mark)

(b) angle TBD. (2 marks)

9 The figure below is part of a net of a triangular prism. Complete the net.

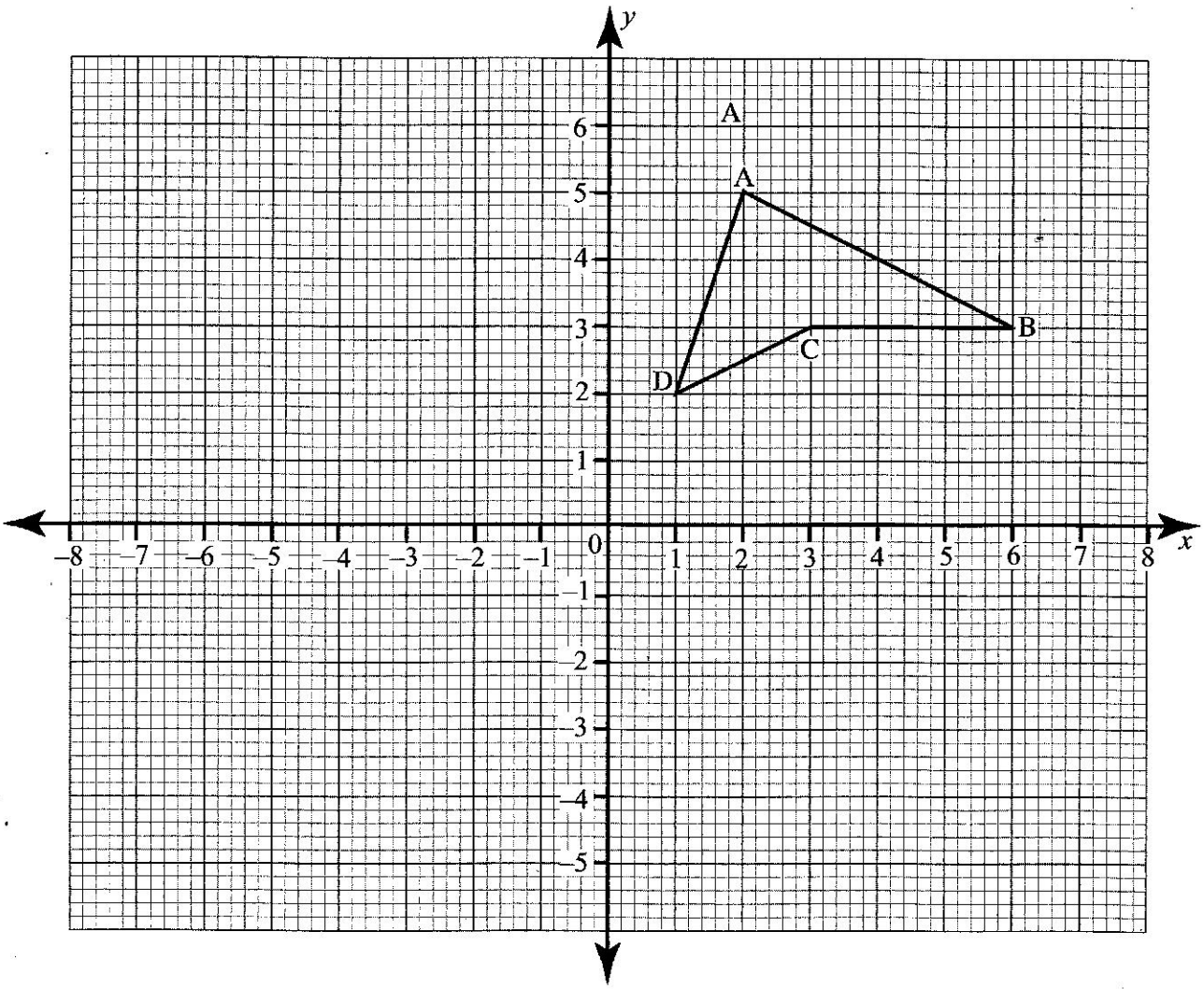
(3 marks)



10 Express 0.1333... as a fraction in its simplest form. (3 marks)

11 Quadrilateral ABCD shown below, whose vertices are A(2, 5), B(6, 3), C(3, 3) and D(1, 2) is mapped onto A′ B′ C′ D′ by a reflection in the line x = -1.

(a) On the grid provided draw the line x = -1 and A′ B′ C′ D′ (2 marks)



(b) State the type of congruence between quadrilateral ABCD and A′ B′ C′ D′ (1 mark)

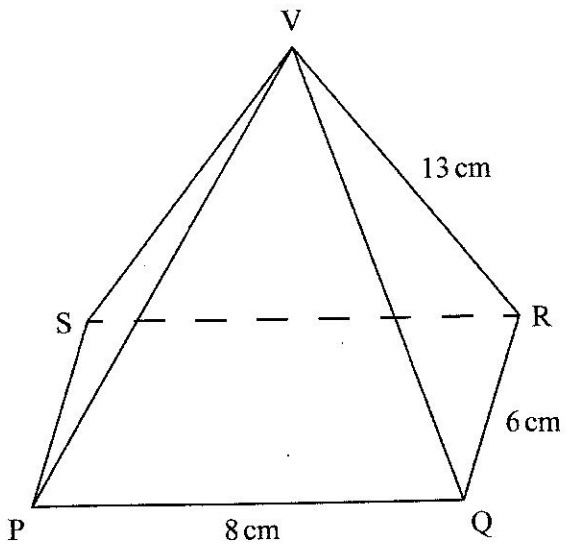
12 The radius of a solid cone is 3.5 cm and its slant height is 9 cm. Calculate the total surface area of the cone. (3 marks)

13 A tower B is 60 km from a tower A on a bearing of 045°. Tower C is 100 km from tower B on a bearing of 150°. Using scale drawing:

(a) show the positions of the towers; (2 marks)

(b) determine the distance, in kilometres, from tower A to tower C. (2 marks)

14 The figure below represents a rectangular based pyramid VPQRS. PQ = 8 cm, QR = 6 cm and VP = VQ = VR = VS = 13 cm.



Calculate:

(a) the vertical height of the pyramid; (2 marks)

(b) the volume of the pyramid. (2 marks)

15 Solve the inequality given below and represent the solution on a number line. (2 marks)
$-5x - 3 > 2x + 4$

16 Makau started his journey from village A at 8.00 am. After walking for 12 km at a speed of 4 km/h he arrived at village B. He stayed at village B for 30 minutes. He then took a minibus which travelled at a speed of 72 km/h and arrived at village C at 11.45 am. Calculate the distance between A and C via B. (4 marks)

SECTION II (50 marks)

*Answer only **five** questions in this section in the spaces provided.*

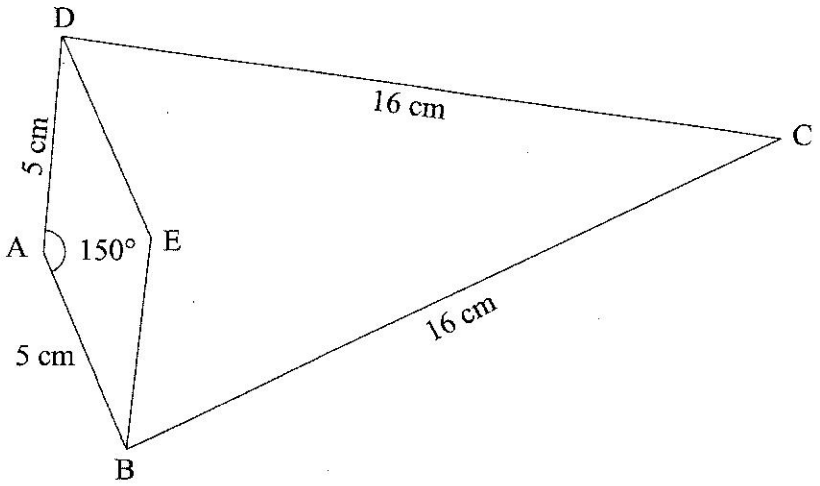
17 The inside of a rectangular hall measures 15 m long, 9 m wide and 3 m high. There are three doors each measuring 2 m by 2.2 m and six windows each measuring 1.5 m by 1.5 m. The walls of the hall are to be painted.

(a) Calculate the total area of the walls to be painted. (4 marks)

(b) To paint an area of 2.5 m^2 requires one litre of paint. If the paint is sold in 4 litre tins, determine the number of tins of paint that should be bought. (3 marks)

(c) The cost of a 4 litre tin of paint is Ksh 1700. The painter is paid a fixed charge of Ksh 2 000 and Ksh 30 per square metre of the wall painted. Calculate the total cost of painting the walls. (3 marks)

18 The figure below shows a kite ABCD and a rhombus ABED. AB = AD = 5 cm, BC = DC = 16 cm and angle DAB = 150°.



Calculate:

(a) the area of the rhombus ABED; (2 marks)

(b) (i) the length of diagonal BD, correct to one decimal place; (2 marks)
(ii) the area of triangle BCD. (3 marks)

(c) the area of the kite ABCD. (3 marks)

19 (a) The sum of four consecutive odd numbers is 120. If x represents the smallest of the odd numbers, determine the four odd numbers. (4 marks)

(b) (i) In a certain shop, the cost of 3 spades and 2 hammers is Ksh 1180 and the cost of 2 spades and one hammer Ksh 680. Find the total cost of one spade and one hammer. (4 marks)
(ii) In another shop, the cost of a spade is 10% higher while the cost of a hammer is 5% lower. Find the total cost of one spade and one hammer in the shop. (2 marks)

20 (a) A wall of a building is 8 m high. In a photograph of the building, the height of the wall is 10 cm.

(i) Find the height of a door in the photograph if its actual height is 2.4 m. (3 marks)

(ii) The area of a window on the photograph is 1.4 cm□ Calculate the actual area of the window. (3 marks)

(b) The surface areas of two similar cuboids are 16 cm□and 49 cm□

(i) Find the volume scale factor of the cuboids. (2 marks)

(ii) If the volume of the smaller cuboid is 128 cm^3, determine the volume of the bigger cuboid. (2 marks)

21 Line AB shown below is one side of a triangle ABC in which AC = 7 cm and angle BAC =120°. Using a pair of compasses and ruler only:

(a) Complete triangle ABC. (2 marks)

(b) On the same diagram as in (a) above,

(i) construct a circle that touches the sides of triangle ABC. Measure the radius of the circle. (3 marks)

(ii) Construct a perpendicular from C to meet BA produced at N. Measure the length of CN. (2 marks)

(c) Find the area of the region in the triangle ABC that lies outside the circle. (3 marks)

22 On a certain day, an exchange bureau bought and sold foreign currencies as shown in the table below.

Currency	Buying (Ksh)	Selling (Ksh)
1 US Dollar	80.89	81.06
1 Sterling Pound	128.23	128.55
1 South African Rand	11.60	11.73
1 UAE Dirham	22.02	22.07
1 Euro	107.65	107.93

(a) A Kenyan businessman intending to travel abroad required 3600 UAE Dirham and 4500 Euros. Calculate the amount of money in Kenya Shillings, that he needed for the exchange. (3 marks)

(b) Another businessman arrived in Kenya in possession of 2000 US dollars and 5000 South African Rands.

(i) Calculate the amount of money, in Kenya Shillings, that he obtained after exchanging the foreign currencies. (3 marks)

(ii) The businessman used 65% of the money to buy goods in Kenya. He changed the balance of the money into sterling pounds. Calculate the amount of money, to the nearest pound, he obtained. (4 marks)

23 (a) The equation of a line L_1 is $y = 2x + 3$. Find:

(i) the value of x when $y = 0$; (1 mark)

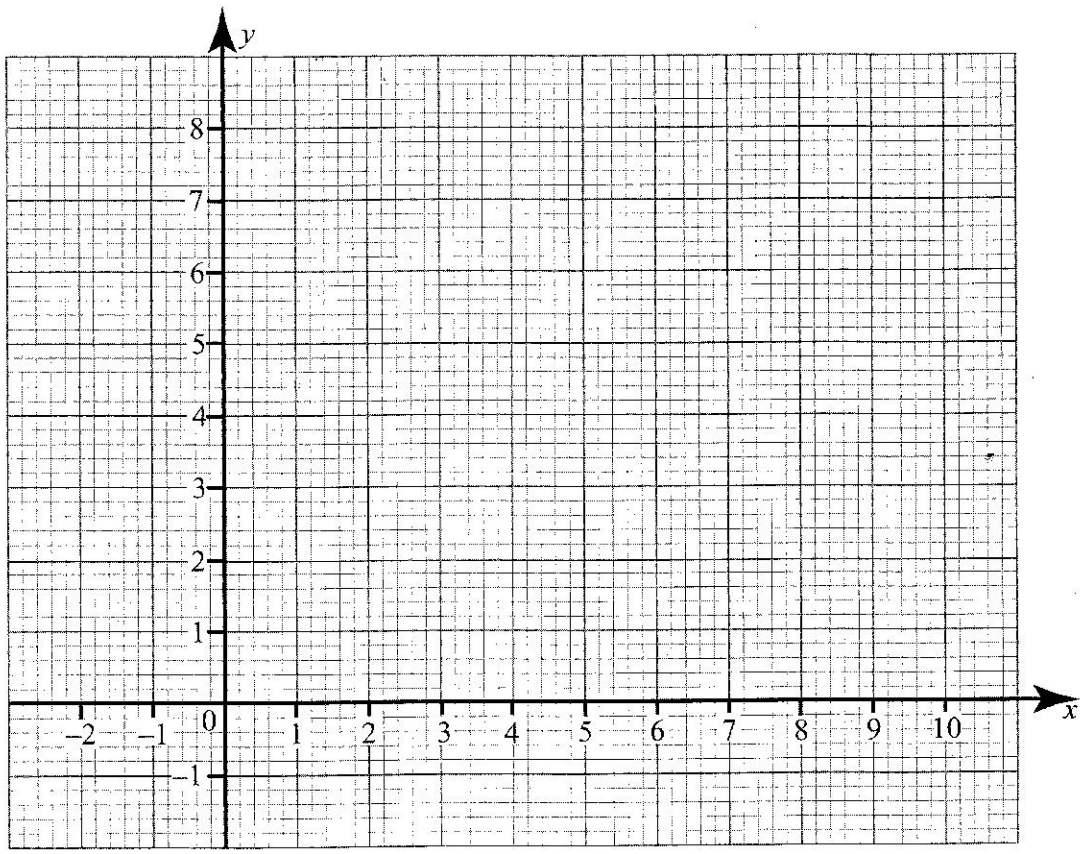
(ii) the value of y when $x = 0$. (1 mark)

(b) The equation of another line L_2 is $y = -\frac{1}{2}x + 5$. Find:

(i) the value of x when $y = 4$. (1 mark)

(ii) the value of y when $x = -2$. (1 mark)

(c) (i) On the grid provided, draw L_1 and L_2. (2 marks)



(ii) From the graph determine the values of x and y where L_1 and L_2 intersects. (1 mark)

(iii) Determine the area, in cm□of the region enclosed by the x-axis, L_1 and L_2. (3 marks)

24 A room measuring $4x$ metres by $(2x + 2)$ metres is to be carpeted leaving a uniform margin all around the walls. The dimensions of the carpet are $(3x + 1)$ metres by $2x$ metres.

(a) Write an expression for the area of the carpet. (1 mark)

(b) If the area of the margin is 36 square metres, find:

(i) the value of x; (3 marks)

(ii) the area of the carpet. (2 marks)

(c) The carpet costs Ksh 1600 per square metre. The cost of transport and labour is 2.5% of the cost of the carpet. Calculate the total cost of carpeting the room. (4 marks)