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

SECTION I (50 marks)

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

1 Without using a calculator, evaluate:

$270 \div (90 \times 2) + 7 \times 4 - 40 \div 5$. (2 marks)

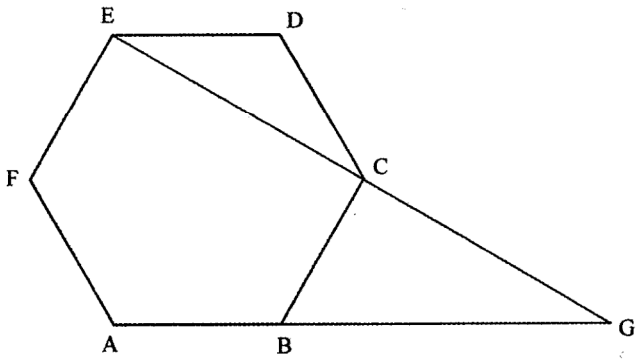
2 Use the prime factors of 7056 to find $\sqrt{7056}$ (2 marks)

3 Given that $x = -2$, $y = 3$ and $z = 5$, evaluate $\frac{2x + 3(y + z)}{4yz}$. (2 marks)

4 The length of a rectangular floor of a hall is 35.2m. If the diagonal of the floor is 37.7m, Calculate the area of the floor. (3 marks)

5 Use logarithms to evaluate $\frac{43.2 \times 0.015}{\sqrt[3]{0.00679}}$. (4 marks)

6 In the figure below, ABCDEF is a regular polygon. Line AB and EC are each extended to meet at G.



Calculate the size of angle BGC. (3 marks)

7 Without using a calculator, evaluate: (3 marks)

$$\frac{3\frac{1}{3} + \frac{6}{7} \text{ of } 5\frac{4}{9}}{4\frac{2}{5} - 3\frac{1}{2}}$$

8 The base of a rectangular water tank is 4 m long and 3.5m wide. The tank contains 21 000 litres of water. Calculate the height of the water in the tank. (3 marks)

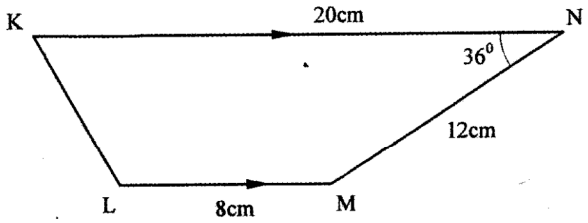
9 Using a pair of compasses and a ruler only, construct:

(a) a triangle ABC such that AB = 6 cm, BC = 3.5cm and CA = 4 cm; (1 mark)

(b) a circle to pass through the vertices of the triangle ABC. (2 marks)

10 Solve the inequality $3x - 2 < 10 + x \leq 2 + 5x$. (3 marks)

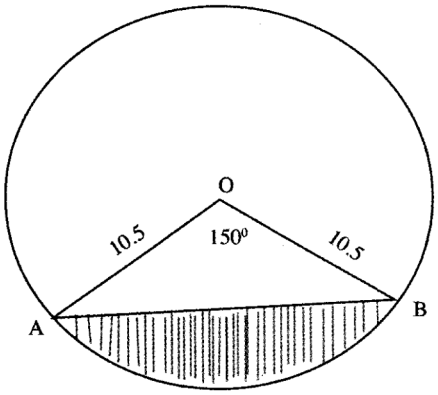
11 The figure below shows a trapezium KLMN in which KN is parallel to LM, KN = 20 cm, MN = 12 cm, LM = 8 cm and $\angle KNM = 36^0$.



Calculate the length of the perpendicular from M to KN and hence find the area of the trapezium. (4 marks)

12 The price of a shirt and that of a pair of trousers are increased in the same ratio. The price of the shirt is increased from Ksh 800 to Ksh1 200. If the new price of the pair of trousers is Ksh 2 700, calculate its original price. (3 marks)

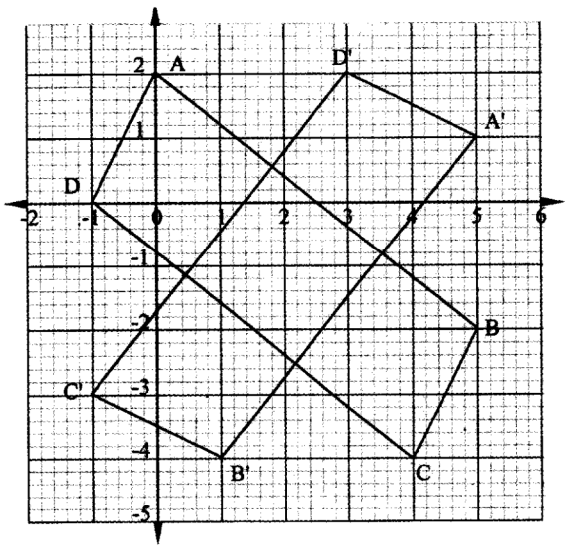
13 The figure below is a circle centre 0 of radius 10.5 cm. Angle AOB = 150°.



Calculate the area of the shaded part of the circle, correct to 4 significant figures. (4 marks)

14 Three alarms are programmed to sound at intervals of 25 minutes, 30 minutes and 35 minutes. Given that the three alarms sound together at a particular time, determine the time, in hours, it will take for them to sound together again. (4 marks)

15 The figure below shows a quadrilateral ABCD and its image A′B′C′D′ under a rotation.



Determine:

(a) the centre of rotation; (2 marks)

(b) the angle of rotation. (1 mark)

16 A saleswoman was paid a basic salary of Ksh12 000 per month. She also received commission in two parts as follows:

2% for sales of up to Ksh 30 000,
3 ½% for sales above Ksh 30 000.

In one month she sold goods worth Ksh 84 000. Determine the saleswoman's total earnings that month. (4 marks)

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

17 A tourist from Britain had 2400 sterling pounds (£). On arrival in Kenya, he changed the money into Kenya shillings at the rate of £1 = Ksh120. He spent Ksh135 000 in Kenya, before proceeding to Tanzania, where he changed the remaining money into Tanzanian shillings at the rate of Ksh1 = Tsh 16.5. While in Tanzania, the tourist spent 40% of the money. He changed the remaining amount into sterling pounds at the rate of £1 = Tsh1980.

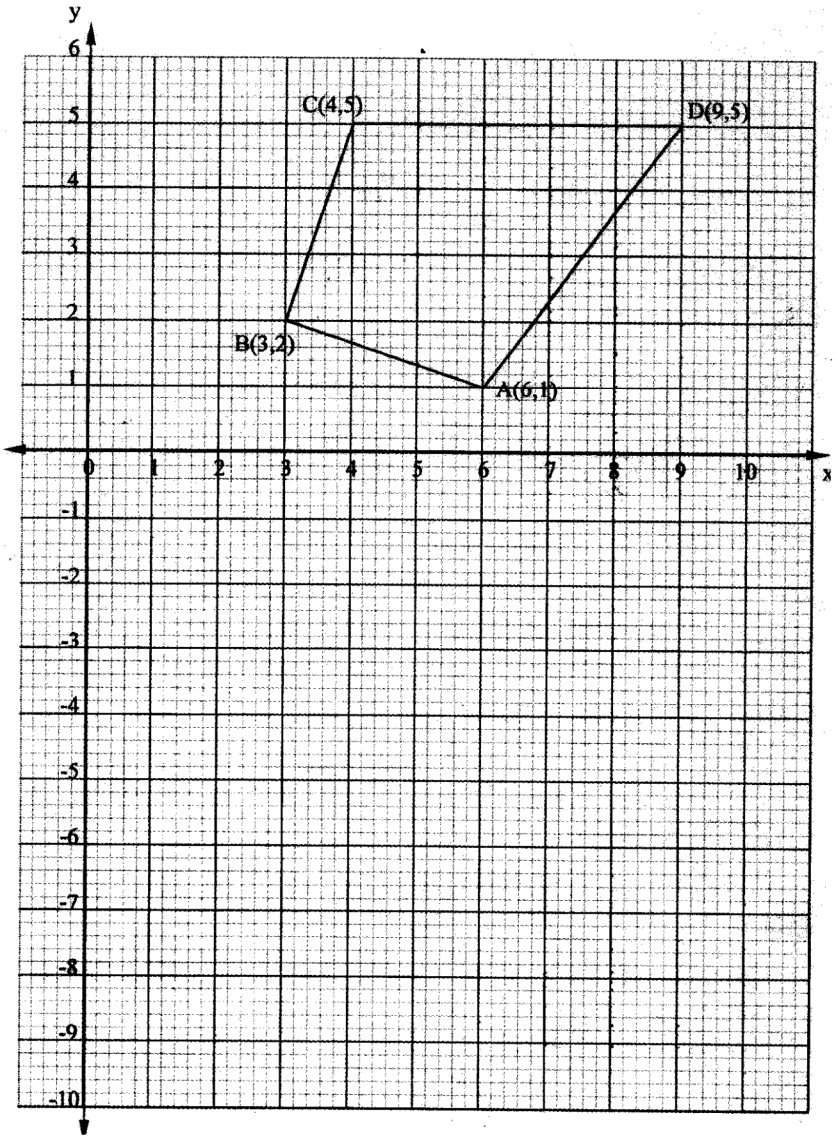
Calculate:

(a) the amount of money, in Kenya shillings, the tourist received after exchanging £2400; (2 marks)

(b) the amount of money, in Tanzanian shillings, the tourist spent while in Tanzania; (5 marks)

(c) the amount of money, in sterling pounds, the tourist received after exchanging from Tanzanian shillings. (3 marks)

18 The points A(6,1), B(3,2), C(4,5) and D (9,5) are vertices of an object ABCD as shown in the figure below.



(a) Draw the image A′B′C′D′ of ABCD under reflection in the mirror line y = 0. (2 marks)

(b) The images of A′, B′, C′ and D′ under reflection are A″ (1, – 6), B″(2, -3), C″(5, – 4) and D″(5, – 9).
On the same diagram above, draw;

(i) A″B″C″D″; (1 mark)

(ii) the mirror line of the reflection. (2 marks)

(c) Determine:

(i) the equation of the mirror line of the reflection that maps A′B′C′D′ on to A″B″C″D″; (2 marks).

(ii) the matrix of reflection that maps A′B′C′D′ onto A″B″C″D″. (3 marks)

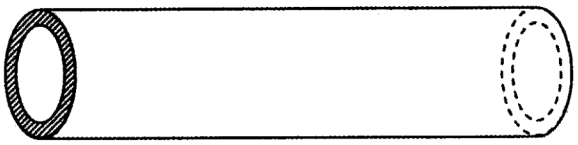
19 The length and width of a rectangular plot of land are given as $(7x + 5)$ m and $(x + 10)$ m respectively.

(a) Express the area of the plot in the form $ax^2 + bx + c$. (2 marks)

(b) If the area of the plot is 600 m^2, find the perimeter of the plot. (6 marks)

(c) Trees are to be planted along the sides of the plot at intervals of 5m, with a tree at each corner.
Calculate the number of trees to be planted. (2 marks)

20 The diagram below represents a pipe whose cross-section is shaded. The pipe has internal radius of 0.26m and an external radius of 0.3m.



(a) Calculate, to 2 decimal places, the cross-section area of the pipe. (3 marks)

(b) The length of the pipe described above is 6.5m. Calculate to 2 decimal places:

(i) the external surface area of the pipe; (3 marks)

(ii) the internal surface area of the pipe; (2 marks)

(iii) the total surface area of the pipe. (2 marks)

21 Towns A, B and C are located such that B is 400 km to the north of A and town C is 750 km on a bearing of 225° from town B.

(a) Using a scale of 1 cm to represent 100 km, show by scale drawing the locations of towns A, B and C. (3 marks)

(b) Determine the bearing and the distance of town A from town C. (4 marks)

(c) Find the shortest distance from A to BC. (3 marks)

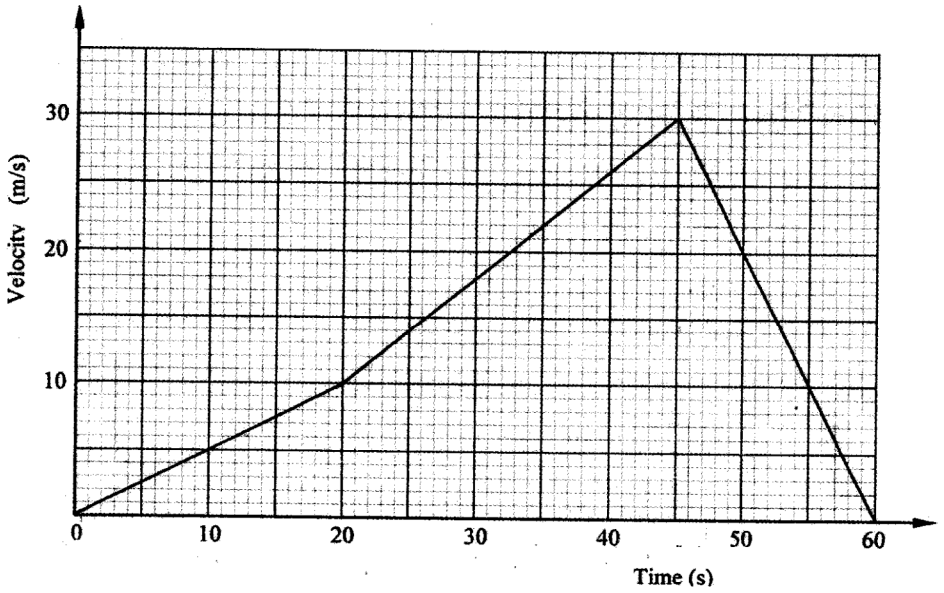
22 The volume of a cuboid is 64m^3. The volume of a smaller similar cuboid is 512 cm^3.

(a) Express the volume of the larger cuboid in cm^3. (2 marks)

(b) Calculate the ratio of the surface area of the larger cuboid to that of the smaller cuboid. (5 marks)

(c) To paint the smaller cuboid requires 0.004 litres of paint. If the cost of 1 litre of paint is Ksh120, calculate the cost of painting the larger cuboid. (3 marks)

23 The figure below is a velocity - time graph for a car that travelled from t = 0 to t = 60, where t is time in seconds.



Use the graph to calculate:

(a) the distance travelled by the car between t = 0s and t = 20s; (2 marks)

(b) the average velocity of the car between t = 0s and t = 45s. (5 marks)

(c) the acceleration of the car during the last 15 seconds. (3 marks)

24 The angle of elevation of the top of a vertical mast, viewed by an observer 50m away, was found to be 16.7°.

(a) Calculate to the nearest centimetre:

(i) the height of the mast; (3 marks)

(ii) the length of a cable fixed at the point of the observer to the top of the mast. (3 marks)

(b) Another observer, directly behind the first one, finds the angle of elevation of the top of the mast to be 8.35°. Find the distance between the two observers. (4 marks)