SECTION I (50 marks)

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

1. Round off each of the numbers in the expression below correct to 3 significant figures.

$$\frac{2436 \times 0.2562}{0.05117}$$

Hence, without using mathematical tables or a calculator, evaluate the expression. (3 marks)

2. Makau saved some money in a bank. Every month he deposited twice as much money as the previous month. In the 6th month he deposited Ksh 1 600. Calculate the amount of money he deposited in the 10th month. (3 marks)

3. A *matatu* owner charged 14 passengers Ksh 2 800 for a distance of 80 km. If the charges per kilometre were constant, calculate the amount of money charged to 9 passengers for a distance of 150 km. (3 marks)

4. (a) Given that $y = 4x - x^2$, complete the table below for $0 \le x \le 4$. (2 marks)

| x	0	0.5	1	1.5	2	2.5	3	3.5	4
y	0		3			3.75		1.75	

(b) Use trapezium rule to estimate the area enclosed by the curve $y = 4x - x^2$, the lines $x = 0.5$, $x = 3.5$ and the x-axis. (2 marks)

5. Charo had x bags of maize. The mass of 1 bag of maize was $(x - 10)$ kg. He had a total of 2000 kg of maize. Calculate the mass of 35 such bags. (4 marks)

6. Make x the subject in:

$$\sqrt{\left(\frac{x+y}{x-y}\right)} = 3$$

(2 marks)

7. (a) Use a ruler and a pair of compasses only to construct a triangle ABC such that, BC = 3.6 cm, AC = 4.8 cm, AB = 6 cm and $\angle$ BCA = 90°. (1 mark)

(b) Construct an inscribed circle for triangle ABC and measure its radius. (3 marks)

8. Given that the local time at point X(20°N, 15°E) is 3.30 a.m. Find the local time at point Y(20°N, 30°W). (3 marks)

23. The figure below represents a wooden model. The model consist of a frustrum part and a cylindrical part. The diameter of the cylindrical part is 18 cm and the height is 30 cm. The height of the frustrum part is 80 cm.
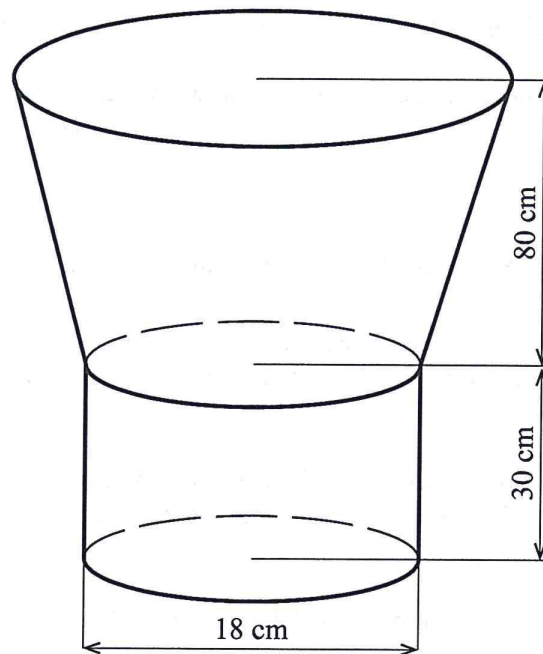
If the vertical height of the cone from which the frustum was cut was 120 cm, calculate:

(i)   the larger radius of the frustrum;   (2 marks)

(ii)   the slant height of the frustrum;   (4 marks)

(iii)   the surface area of the model.   (4 marks)

24. A cylindrical container of radius 14 cm has a capacity of 12.32 litres. (Take $\pi = \frac{22}{7}$)

(a)   Calculate the height of the container.   (3 marks)

(b)   The container was used to store juice. If the container was full of juice and some of it was used up to a level of 5 cm, calculate the amount, in litres, of juice used.
                                                                                   (3 marks)

(c)   The remaining juice was packed into cylindrical bottles of radius 2 cm and height 8.4 cm. Calculate the number of bottles of juice obtained.   (4 marks)

Giving reasons in each case, find the size of:

(a)   ∠AOD (2 marks)

(b)   ∠BDC (2 marks)

(c)   ∠ACB (2 marks)

(d)   ∠FDC (2 marks)

(e)   ∠ATD (2 marks)

21.   The vertices of a triangle ABC are A(–3,2), B(–1,2) and C(–1,4).

(a)   On the grid provided, draw triangle ABC. (1 mark)

(b)   Triangle ABC is reflected on line $y = x + 1$.

   (i)   Draw line $y = x + 1$. (2 marks)

   (ii) Draw triangle A′B′C′, the image of triangle ABC under reflection in the line $y = x + 1$. (2 marks)

(c)   Draw triangle A″B″C″, the image of triangle A′B′C′ under a rotation of –90° about (0,0). (2 marks)

(d)   Under a translation $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$, triangle A′B′C′ is mapped onto A‴B‴C‴.

   (i)   Find the coordinates of A‴B‴C‴. (2 marks)

(b)   Draw triangle A‴B‴C‴. (1 mark)

22.   A car started from rest and moved at a constant acceleration of 0.5 m/s² for 20 seconds. It maintained a constant velocity for the next 10 seconds before accelerating at 0.8 m/s² for 25 seconds. It then decelerated uniformly and came to rest after 15 seconds.

(a)   On the grid provided, draw the velocity – time graph for the car. (4 marks)

(b)   Use the graph to determine:

   (i)   the deceleration of the car; (2 marks)

   (ii) the total distance covered by the car; (2 marks)

   (iii) the average speed of the car, correct to 2 decimal places. (2 marks)