# SECTION I (50 marks)

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

1     Evaluate $\dfrac{^-3 \times {}^+6 + {}^-2}{{}^-4 + {}^+5 - {}^-3}$                                            (3 marks)

2     Find the common prime factors of 1890 and 1008.                  (2 marks)

3     On a certain day a journalist started travelling at 0850 hours to attend a meeting. He travelled for 6½ hours and then rested for 1 hour 45 minutes. He attended the meeting for 3¼ hours and travelled for 35 minutes to a hotel.
Determine the time, in 12-hour clock system, the journalist arrived at the hotel.     (3 marks)

4     Use cube tables to calculate, to 4 significant figures, the volume of a cube whose side is 0.4321 m.
                                                                  (3 marks)

5     A cylindrical container of height 45 cm has a capacity of 25 litres. Find the radius of the container to the nearest millimetre.                              (3 marks)

6     Find the integral values of $x$ which satisfy the inequality $3x \le 2x + 3 < 4x + 5$     (3 marks)

7     Three metal rods of lengths 234 cm, 270 cm and 324 cm were cut into shorter pieces, all of the same length, to make window grills.
Calculate the length of the longest piece that can be cut from each of the rods and hence the total number of pieces that can be obtained from the rods.            (4 marks)

8     Simplify $\dfrac{1\frac{1}{5} - \frac{3}{8} \div \frac{2}{3}}{\frac{6}{7} \text{ of } 1\frac{1}{2} - \frac{3}{8}}$                                           (3 marks)

9     A support cable of length 6.5 m is fixed on a vertical pole at a distance of 0.9 m from the top. The cable is anchored on the ground at a distance of 2.5 m from the foot of the pole.
Determine the height of the pole.                                    (3 marks)

10     Use logarithm tables to evaluate                                        (3 marks)

$$\sqrt{\dfrac{2.5 \times 0.064}{8.1}}$$

11     Using a ruler and a pair of compasses only, construct triangle ABC such that AB = 4.5 cm, BC = 8.1 cm and angle CBA = 60°.
Measure angle CAB.                                          (3 marks)

12     The areas of the lids of two similar cylinders are 16 cm² and 25 cm². If the volume of the bigger cylinder is 800 cm³, find the volume of the smaller cylinder.            (4 marks)

13     Use factorisation to solve the equation:                                           (3 marks)
      $\frac{1}{8}x^2 + x = 48$

**14** The sum of interior angles of a regular polygon is $1620°$. Calculate the number of sides of the polygon. (2 marks)
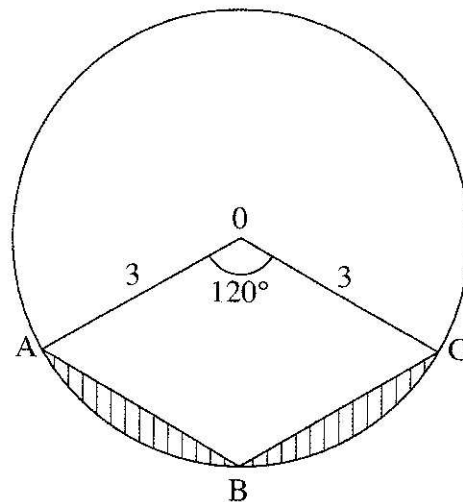
**15** Solve the simultaneous equations:
$p - q = 3$
$p^2 - q^2 = 21$
(4 marks)

**16** In the figure below, OABC is a rhombus drawn in a circle, centre O, of radius 3 cm. Angle $AOC = 120°$



Determine the total area of the shaded regions to 2 decimal places. (4 marks)

**SECTION II** (50 marks)

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

**17** A salesman was paid a basic salary of Ksh 48 000 per month plus a commission of 3% for sales of goods worth above Ksh 500 000.

    (a) In January he sold goods worth Ksh 800 000, calculate his total earnings that month.
    (3 marks)

    (b) In February his total earnings were Ksh 78 000. Find the value of goods sold that month. (4 marks)

    (c) In the month of March, his original rate of commission was reduced by 60%. If he sold goods worth Ksh 2 500 000, calculate his total earnings that month. (3 marks)

**18**    Three straight lines $L_1$, $L_2$ and $L_3$ are such that:

$L_1$ cuts the y-axis at $y = 5$ and has a gradient of 2;
$L_2$ is perpendicular to $L_1$ at the point where $L_1$ cuts the x-axis;
$L_3$ is parallel to $L_2$ and passes throught point $(1, 2)$.

(a)    Find the equations, in the form $y = mx + c$, of:

      (i)    $L_1$;                                                                    (2 marks)

      (ii)    $L_2$;                                                                   (3 marks)

      (iii)    $L_3$.                                                                  (2 marks)

(b)    Determine the coordinates of the point at which $L_3$ is perpendicular to $L_1$.    (3 marks)


**19**    Three partners, Amani, Furaha and Nehema, contributed a total capital of Ksh 750 000 to start a business. Amani contributed $\frac{1}{3}$ of the money, Furaha contributed $\frac{2}{5}$ of the money and Nehema contributed the rest.
After some time the business realised a profit of 36% of the capital. The profit was taxed at the rate of 5%.
After taxation, each of the partners received Ksh 20 000 of the profit. The remainder of the profit was shared among the three partners in the ratio of their contributions.

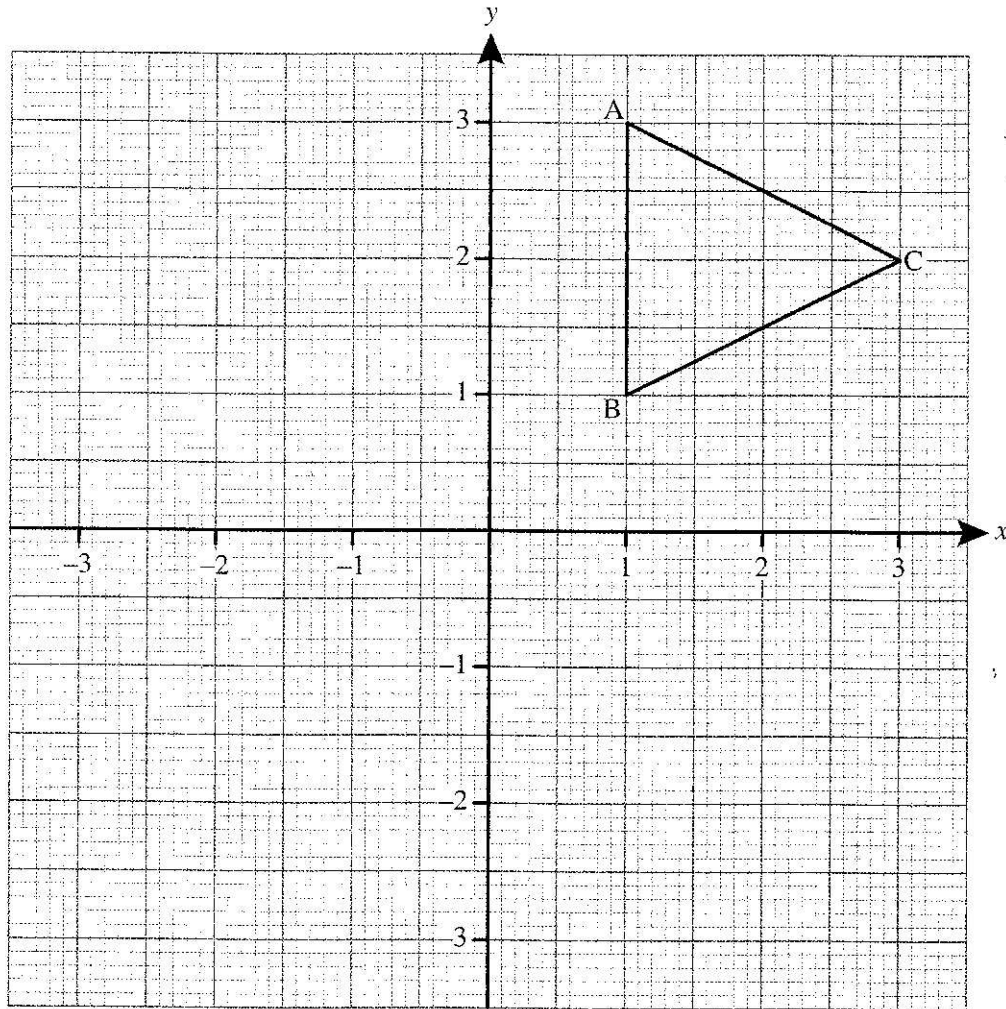Calculate:

(a)    the amount of money contributed by Nehema;                        (3 marks)

(b)    the profit realised after taxation;                                      (3 marks)

(c)    the amount of money Furaha got more than Nehema.              (4 marks)

**20**   The figure below shows triangle ABC with co-ordinates A (1, 3), B (1, 1) and C (3, 2).



(a)   Draw triangle A'B'C', the image of △ ABC under reflection in the y-axis.   (2 marks)

(b)   (i)   Draw line $y = x$.   (1 mark)

  (ii)   Draw triangle A"B"C", the image of △ A'B'C' under reflection in the line $y = x$.
  (2 marks)

(c)   Determine the matrix of transformation that maps △ ABC onto △ A"B"C".   (3 marks)

(d)   Describe fully a single transformation that maps △ ABC onto △ A"B"C".   (2 marks)

**21** In the figure below, points L, M, N and P are on the circumference of a circle centre O. Line LON is a diameter of the circle. PL = PN and angle NLM = 20°.
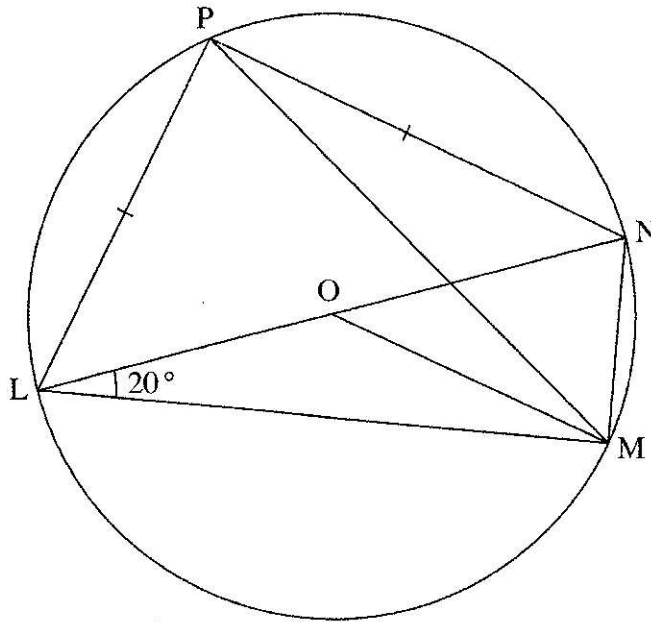


Find, giving a season in each case, the size of each of the following angles.

(a)  ∠ MPN;                                                        (2 marks)

(b)  ∠ PLN;                                                        (2 marks)

(c)  ∠ LPM;                                                        (2 marks)

(d)  ∠ MNP;                                                        (2 marks)

(e)  ∠ PMO.                                                        (2 marks)

22    In the figure below, BC = 12 cm, ∠ ACB = 40°, ∠ BAD = 60°, BCD is a straight line and CE is parallel to BA.
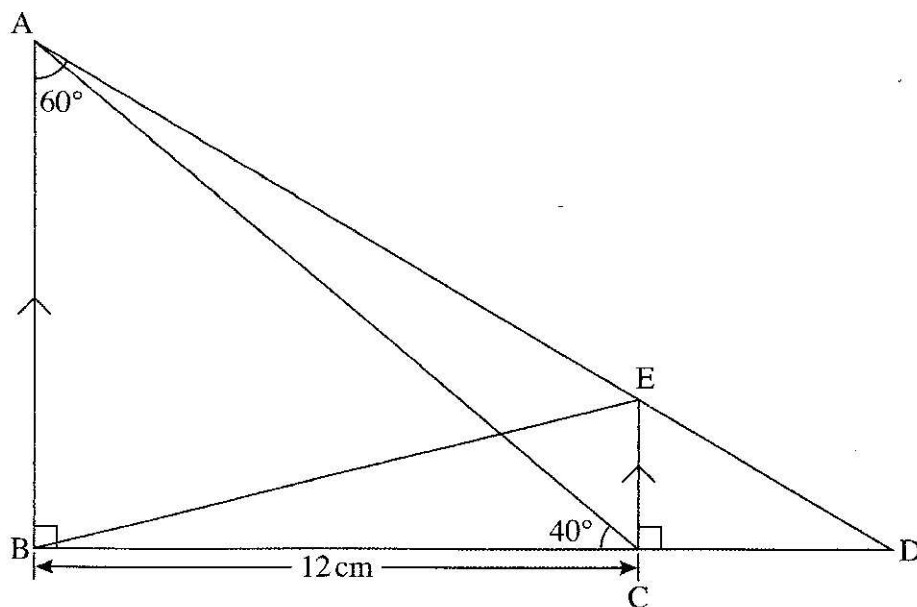


Calculate:

(a)    the length of:

      (i)    AB;                                                          (2 marks)

      (ii)   CD.                                                          (4 marks)

(b)    the size of angle CBE.                                            (4 marks)

23    A piece of land is in the shape of a quadrilateral ABCD. Point B is 450 m east of A. Point D is 500 m from A on a bearing of 310°. Point C is 700 m from D on a bearing of 080°.

(a)    Using 1 cm to represent 100 m, make a scale drawing of the piece of land.    (4 marks)

(b)    Find:

      (i)    the perimeter of the piece of land;                         (3 marks)

      (ii)   the length of AC;                                           (1 mark)

      (iii)  the bearing of A from C.                                    (2 marks)

**24**     The figure below represents a frustum of a cone with dimensions as shown.
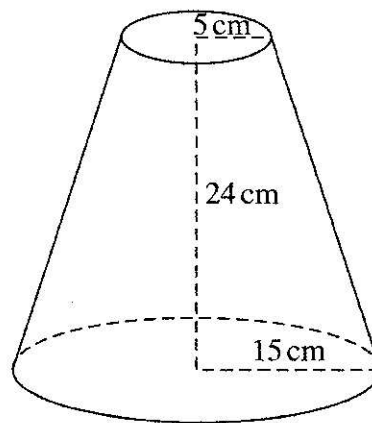


Taking $\pi = 3.142$, calculate:

(a)     the area of the circular surfaces, correct to 4 significant figures;                    (3 marks)

(b)     the height of the small cone that was cut off to make the frustum;                (2 marks)

(c)     the area of the curved surface of the frustum, correct to 4 significant figures.    (5 marks)