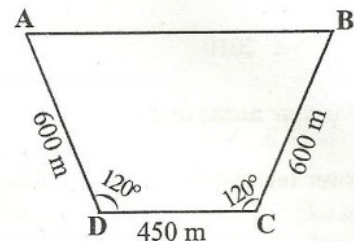


1. (a) Simplify $37\frac{1}{2} \div \frac{5}{9}$ of $(\frac{4}{7} + \frac{1}{5}) - 80\frac{1}{3}$.
- (b) The n th term of a sequence is $5 + \frac{2}{3^{n-2}}$ for $n \geq 1$. What is the sum of the fourth and fifth terms? Leave your answers in the form $\frac{x}{y}$ where x and y are integers.
2. (a) Factorize $x^2 + 4x + 3 + mx + 3m$.
- (b) A T-shirt costs 5 times as much as a singlet. for GH¢800, a trader can buy 32 more singlets than T-shirts. How much does a T-shirt cost?

3. The diagram shows a field $ABCD$ in the form of a trapezium. If $|AD| = |BC| = 600$ m, $\angle ADC = \angle BCD = 120^\circ$ and $|DC| = 450$ m,

- (a) find the perimeter of the field;
- (b) calculate, correct to **three** significant figures, the area of the field.

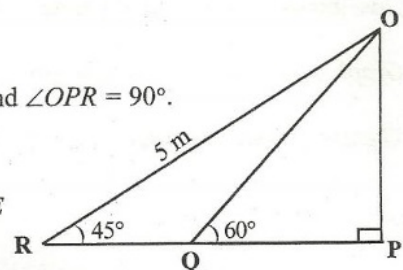


NOT DRAWN TO SCALE

4. (a)

In the diagram, $|OR| = 5$ m, $\angle ORP = 45^\circ$, $\angle OQP = 60^\circ$ and $\angle OPR = 90^\circ$. Find the distance QP , leaving your answer in surd form.

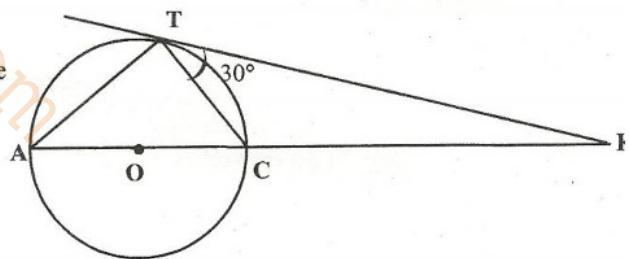
NOT DRAWN TO SCALE



- (b) X and Y are two cylindrical tanks with base radii $2r$ cm and r cm respectively. If the water level in Y is 10 cm, what level will the same quantity of water be in X ? (Use $\pi = \frac{22}{7}$)
5. (a) In a class, the probability that a student passes a test is $\frac{2}{5}$. What is the probability that if 2 students are chosen at random from the class, one would pass and the other would fail?

- (b)

In the diagram, O is the centre of the circle. AK is a straight line and TK is a tangent. If $\angle CTK = 30^\circ$, calculate $\angle TKC$.



PART II

[60 marks]

Answer **five** questions **only** from this part. All questions carry equal marks.

6. (a) In a class of 31 students, 16 play football, 12 play table-tennis and 5 play both games. Find the number of students who play
 - (i) **at least** one of the games;
 - (ii) **none** of the games.
- (b) Two commodities A and B cost D70 and D80 per kg respectively. If 34.5 kg of A is mixed with 26 kg of B and the mixture is sold at D85 per kg, calculate the percentage profit.

7. (a) Copy and complete the following table of values for the relation $y = (x - 4)(x + 2)$ for $-3 \leq x \leq 5$.

x	-3	-2	-1	0	1	2	3	4	5
y				-8					

- (b) Using scales of 2 cm to 1 unit on the x -axis and 2 cm to 2 units on the y -axis, draw the graph of $y = (x - 4)(x + 2)$ for $-3 \leq x \leq 5$.
- (c) Using the graph, find the:
- values of x for which y is decreasing;
 - gradient of the curve at $x = 0$.

8. (a) Using a ruler and a pair of compasses only, construct:
- triangle PQR such that $|PQ| = 8.5$ cm, $\angle QPR = 60^\circ$ and $|PR| = 7.5$ cm;
 - the locus l_1 of points equidistant from P and R ;
 - the locus l_2 of points equidistant from Q and R ;
 - locate the point of intersection I , of the loci l_1 and l_2 .

- (b)
 - Construct a circle passing through the three vertices of the triangle PQR .
 - Find the radius of the circle.
 - Measure $|QR|$.

9. (a) Simplify $\sqrt{\left(\frac{x^3 y^5}{xy^7}\right)}$, where $x > 0$ and $y > 0$.

- (b) A man 1.7 m tall observes the angle of elevation of the tip of a tower to be 35° . He moves 50 m away from the tower and now observes the angle of elevation to be 28° . How far above the ground is the tip of the tower to **three** significant figures?

10. The table shows the distribution of marks scored by 50 students in a test.

Marks (%)	1 - 10	11 - 20	21 - 30	31 - 40	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90
Frequency	1	3	5	8	12	10	5	4	2

- (a) Construct a cumulative frequency table for the distribution.
- (b) Draw a cumulative frequency curve for the distribution.
- (c) Use the curve to estimate the :
- interquartile range;
 - percentage of students who scored more than 66%.

11. The base of a right pyramid with vertex O is a square $ABCD$ of side 13 cm. Each slant edge is 12 cm long. Calculate, correct to **two** significant figures, the:

- (a) vertical height $|OE|$ of the pyramid;
- (b) volume of the pyramid.

12. (a) The operation (\bullet) is defined on the set $\{2, 4, 6\}$ by $m \bullet n =$ the unit digit in the product mn .

- (i) Copy and complete the table.

\bullet	2	4	6
2	4	8	2
4		6	
6			

(ii) Use the table to solve the following equations:

(α) $x \bullet 4 = 8$;

(β) $e \bullet e = e$;

(γ) $(4 \bullet f) \bullet 4 = f$.

(b) The functions f and g are defined as

$$f: x \rightarrow 2 - x^2 \text{ and}$$

$$g: x \rightarrow \frac{1}{x-1}.$$

Evaluate

(i) $g(-1/4)$:

(ii) $\frac{f(2)}{g(3)}$.

13. (a) A triangle has vertices $A(1, 1)$, $B(2, 4)$ and $C(5, 8)$.

(i) If the triangle is translated by the vector $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$ to $A'B'C'$, where $A \rightarrow A'$, $B \rightarrow B'$ and $C \rightarrow C'$, calculate the coordinates of A' , B' and C' .

(ii) The triangle ABC undergoes a transformation involving rotation in an anticlockwise direction through 90° about the origin followed by a translation. If the final position is $A''(2, -1)$, $B''(-1, 0)$ and $C''(-5, 3)$, determine the translation vector.

(b) In triangle PQR , $\vec{PQ} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\vec{RQ} = \begin{pmatrix} -6 \\ -4 \end{pmatrix}$, find \vec{PR} .

(c) Find the equation of the line which is perpendicular to the line $y = 2x - 1$ and passes through the point $(2, 5)$.

QUESTIONS 14 AND 15 ARE FOR CANDIDATES IN NIGERIA, SIERRA LEONE AND THE GAMBIA ONLY.

14. P (lat 40° N, long 18° W) and Q (lat 40° N, long 78° W) are two cities on the surface of the earth. Calculate the:

(a) radius of the parallel of latitude on which P and Q lie, correct to the **nearest** 10 km;

(b) length of the minor arc PQ , correct to the **nearest** 100 km;

(c) vertical distance between the centre of the earth and the centre of the small circle on which P and Q lie, correct to the **nearest** km.

[Take $\pi = \frac{22}{7}$ and radius of the earth = 6400 km]

15. (a) The second, fourth and sixth terms of an Arithmetic Progression (AP) are $x - 1$, $x + 1$ and 7 respectively. Find the

(i) common difference;

(ii) first term;

(iii) value of x .

(b) A spherical bowl of radius r cm is one-quarter full when 6 litres of water is poured into it.

Calculate, correct to **three** significant figures, its diameter. [Take $\pi = \frac{22}{7}$].

END OF PAPER