

MATHS 2
570

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

General Certificate of Education Examination

JUNE 2007

ORDINARY LEVEL

Subject Title	Mathematics
Paper No.	Paper 2
Subject Code No.	570

Two and a half hours

Answer SEVEN questions.

All questions carry equal marks.

All necessary working must be shown.

You are reminded of the necessity for good English and orderly presentation in your answers.

In calculations, you are advised to show all the steps in your working, giving your answer at each stage.

Electronic calculators and four-figure tables may be used.

1. In one year, Mr. Iwu drove a total distance of 28 000 km in both Cameroon and Nigeria. He drove a quarter of this distance in Cameroon using a luxury car with an average fuel consumption of 14 litres for every 100km. In Nigeria he used a more economical car with an average fuel consumption of 8 litres per 100 km. Calculate
- the distance travelled in Nigeria.
 - the total quantity, in litres, of fuel used.
 - the average fuel consumption for the whole year, giving the answer in litres per 100 km.

Given that Mr Iwu spent a total of 868,000FCFA on fuel and that fuel costs 400FCFA per litre in Cameroon,

- Calculate, to the nearest franc, the cost per litre of fuel in Nigeria.
- Calculate in Nairas, the cost per litre of fuel in Nigeria, to two decimal places, given that 1 ₦ = 8.4 F CFA.

2. (i) Using ruler, pencil and a pair of compasses only,
- draw a triangle ABC such that AB = 7 cm, AC = 10 cm and BC = 6 cm
 - construct the bisector of angle ACB
 - construct the mediator of AC
 - complete the parallelogram ABCD
 - measure DB.
- (ii) A solid cuboid of length p cm has a square cross-section of side (p - 3)cm. Find, in terms of p, expressions for
- the area of cross-section.
 - the total surface area of the cuboid.
 - the volume of the cuboid.

3. (i) A survey of the English, French and Mathematics textbooks owned by the 120 students in a certain class revealed the following:
- Only one textbook was prescribed per subject.
 - Of those who had only one textbook, 22 had only the French textbook.
 - Of those who had two or three textbooks,
 - 6 had English and Mathematics textbooks,
 - 14 had English and French textbooks,
 - and 5 had French and Mathematics textbooks only.

There were only 20 Mathematics and 60 English textbooks in the whole class.

Taking x for the number of students who had all three textbooks,

- draw a Venn diagram showing the above information.
- find the value of x.
- determine the number of students without any of the three textbooks.

- (ii) The binary operation \otimes is defined on Q^* , the set of non-zero rational numbers, as

$$p \otimes q = \frac{pq}{p+q}$$

- Evaluate $2 \otimes 3$ and $\frac{2}{3} \otimes \frac{3}{2}$.
- Solve, for y, the equation $y \otimes y = 5$.

4

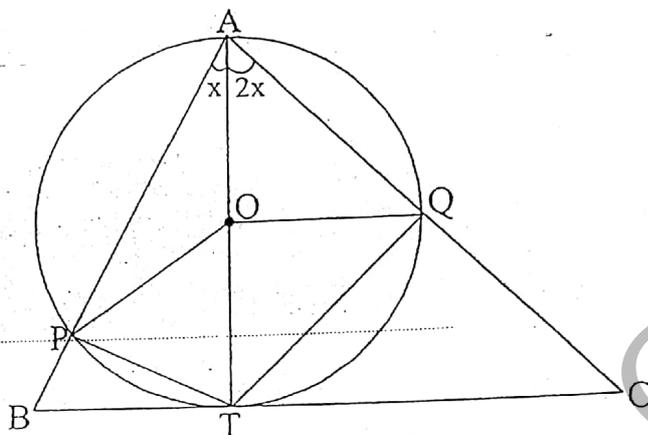


Figure 1

Figure 1 shows a circle centre O with tangent BTC, angle $BAT = x^\circ$ and angle $TAP = 2x^\circ$:

- Name, giving reasons, three other angles each equal to $2x^\circ$.
- Given that $x = 22$, find, giving reasons, the value of angles POA, PTA and TCA.
- Given that the radius of the circle is 5cm, find the area of triangle ABC.

5. The functions f , g and h are defined on \mathbb{R} , the set of real numbers, thus:

$$f: x \rightarrow 3x + 1,$$

$$g: x \rightarrow x^2 - 1,$$

$$h: x \rightarrow \frac{1}{x + 2}, \quad x \neq -2.$$

- Evaluate $f(4)$ and $h(-5)$.
Find expressions for the functions below in a similar manner as above, stating their domains,
- f^{-1} , and h^{-1} .
- $g \circ f$ and $g \circ h$.

Solve the equation

$$(d) \quad g \circ f(x) = 0.$$

$$(e) \quad g \circ h(x) = 0.$$

6. (i)

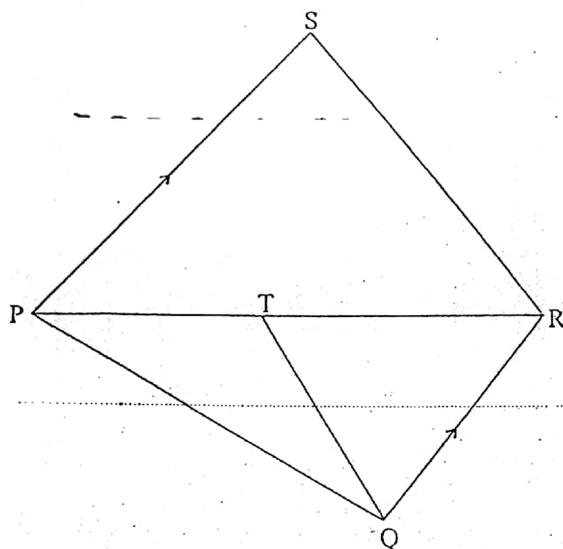


Figure 2 shows a quadrilateral PQRS with PS parallel to QR. T is a point on PR such that $PT = kPR$, and, $PS = mQR$, where k and m are constants.

Figure 2

Given that $QR = a$ and $QP = b$, express in terms of a, b, k and m,

- (a) PR.
- (b) QT.
- (c) RS.

Given also that $AT = \frac{1}{2}RS$,

- (d) find the values of m and k.

(ii) Given the matrix $M = \begin{pmatrix} 5 & 8 \\ -3 & -5 \end{pmatrix}$,

(a) Evaluate M^2

(b) Express the equations

$$5x + 8y = 2$$

$$1 + 3x + 5y = 0$$

in the form $MX = N$ where X and N are 2×1 matrices. Hence, using M^{-2} or any other matrix method, solve for x and y.

7. The score (out of 20 marks) of 70 candidates who sat a recruitment test where as follows:

12	9	5	8	13	10	3	15	7	9
10	8	11	9	6	14	9	3	10	9
11	8	13	10	12	5	6	13	4	8
7	14	11	9	8	11	5	12	8	12
12	10	3	7	10	13	9	7	9	8
7	11	9	13	12	4	7	2	9	5
10	9	9	6	10	5	12	10	6	11

- Draw a simple frequency table for this distribution.
- State the modal mark.
- Find the mean of the distribution, giving your answer to 1 decimal place.
- Draw a suitable cumulative frequency table.

Using graph paper, taking 1 cm for 5 candidates (on the y-axis) and 1 cm for 1 mark (on the x-axis), draw the cumulative frequency graph.

Use your graph to determine

- the median mark.
- the cut-off mark, given that 18 candidates were recruited.

8. (i) The line L with equation $2y + x = 10$ cuts the x-axis at the point P and the y-axis at the point Q. Find
- the coordinates of P and Q.
 - the gradient of the line PQ.
 - the equation of the line M which passes through the origin and is perpendicular to the line L.
 - the coordinates of the point of intersection of the lines L and M.

(ii) On a graph paper, using 2 cm for 1 unit on both axes for $1 \leq x \leq 6$, draw the graphs

$$y_1 = x - \frac{2}{x}$$

$$y_2 = \frac{2}{3}(5 - x)$$

From your graphs, find

- one root of the equation $y_1 = 0$.
- one solution of the equation $y_1 = y_2$.

9. USE A FULL GRAPH PAPER; PLACE THE AXES IN THE MIDDLE.

- (a) Taking 1cm for 1 unit on both axes, draw the triangle whose vertices are A (3,1), B(6,1) and C(6,4) and the triangle with vertices mirror line
- A' (1,3); B'(1,6) and C' (4,6).
- (b) Given that triangle A'B'C' is a reflection of triangle ABC, draw the mirror line. Find the equation of this mirror line.
- (c) The triangle A'B'C' is translated to the position PQR, the translation vector being $T = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$.
Draw triangle PQR.
- (d) Triangle PQR is rotated anticlockwise about the origin through 90° . Draw the image P'Q'R' of triangle PQR under this transformation.