CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

General Certificate of Education Examination

JUNE 2008 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 may be used.

1. (i) A woman buys a house costing 2 000 000 FCFA. She pays 30% of the cost from her resources and takes a loan to pay the balance, at $2\frac{1}{2}$ % simple interest per annum.

(a) Find the amount she paid from her resources.
(b) Determine the simple interest paid, given that she takes 8 years to repay the loan.
(c) Calculate the percentage increase in the cost of the house to the woman as a result of the loan.

In the 10th year, the woman renovates the house at a cost of 220 000 FCFA, and sells it for 3 300 000 FCFA.
(d) Calculate her profit

(ii)

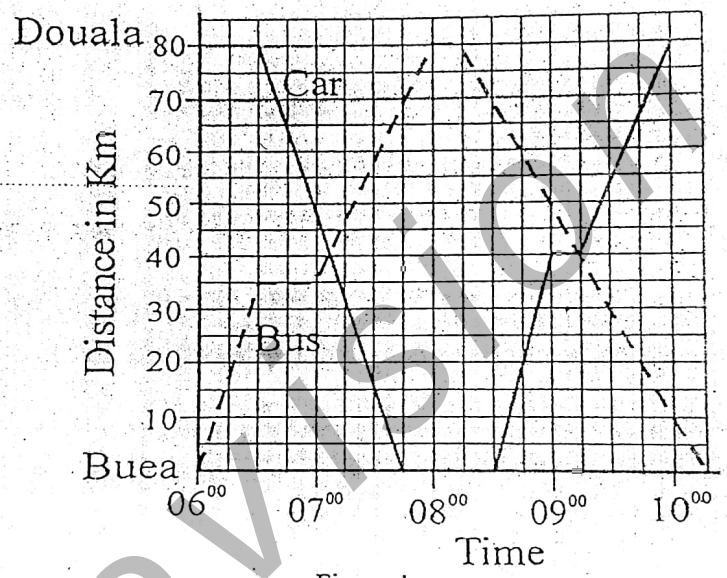

Figure 1

The distance-time graph in Figure 1 shows the journeys of a bus and a car along the Buea – Douala road. Using this graph,

(a) state the distance between Buea and Douala;
(b) state the time when the vehicles met for the first time and how long it took for them to meet again;
(c) calculate the average speed, in km/h, of the car when travelling from Douala to Buea..

2.

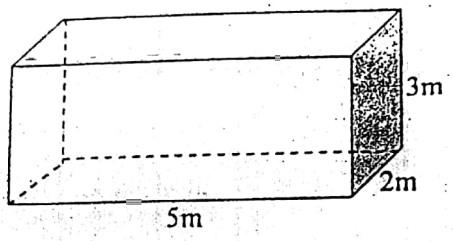

Figure 2

Figure 2 shows a closed water tank in the form of a cuboid, made from sheet metal of negligible thickness. The internal and external surfaces are to be given two coats of paint, using two different paints A and B.

(a) Show that the total internal and external surface area to be painted is $124m^2$.

For his labour, the painter charges 500 FCFA for every $2m^2$ painted, for either type of paint.

(b) Find the labour charge for painting the tank.

(c) Given that each coat of paint is 5mm thick, calculate in m^3, the volume of each type of paint used.

(d) Given also that the cost of paint is 200 000 FCFA/m^3 for paint A and 250 000 FCFA/m^3 for paint B, calculate the cost of paint used.

(e) Calculate the total amount of money spent in painting the tank.

3. (i) Each of the 60 students in a certain class take part in at least one of the sports football (F), Handball (H) and Volleyball (V). No student is allowed to take part in more than two sports. In the class, all 25 handball players do play football. Altogether, 35 students take part in two sports and 40 students play football.

(a) Draw a Venn diagram to illustrate this information.

(b) Using your Venn diagram, find the total number of students who take part in only one sport.

(c) Express in ordinary English, the statement:

$$(H \cap F \cap V) \neq \varnothing$$

(ii) The binary operation $\star$ is defined as:

$$a \star b = \frac{a^2 + b^2}{2ab}, \quad a, b \in R.$$

(a) Evaluate $-2 \star 5$.

(b) Solve, for x, the equation: $x \star 6 = \frac{11}{12}$.

(c) Without using numerical values for a and b, show that whenever $a \star b = 1$, $a = b$.

4. Given that $f(x) \equiv k + 2x - \frac{1}{2}x^2$;

(a) use the table below to calculate the value of k.

x	-1	0	1	2	3	4	5
f(x)				3			

(b) Hence, copy and complete the table.

(c) Using a scale of 2cm for 1 unit on both axes, draw the graph of $y = f(x)$.

From your graph,

(d) find the maximum value of $f(x)$ and the corresponding value of x.

(e) solve, for x, the equation $2 + 4x - x^2 = 0$.

(f) estimate, correct to 1 decimal place, then gradient of the curve at the point (4, 1)

5. (i)

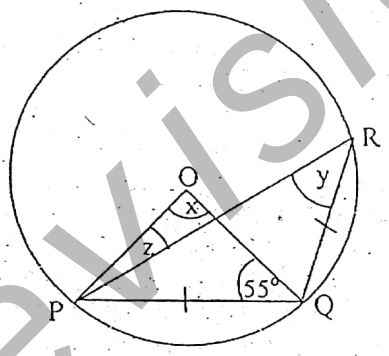

Figure 3

Figure 3 shows a circle centre O. Find the values of the angles marked x, y and z, where ∠ POQ = x, ∠ PRQ = y and ∠ OPR = z, giving reasons for your answers.

(ii) *Use ruler and compasses only in this question, showing clearly all construction lines.*

(a) Draw the line AB of length 8cm.

(b) Construct angle CAB = 30°.

(c) Construct angle DBA = 90°.

(d) Bisect angle DBA. Mark the point P where this bisector meets the line AC.

(e) Construct the perpendicular from P to meet the line AB at the point E.

(i) Measure the length of PE, correct to one decimal place.

(ii) Hence, calculate the area of triangle APB, correct to 1 decimal place.

6. (i) In Figure below, AB = 15m. The line AB is perpendicular to the line AD and C is a point on AD. Angle ABC = 42° and angle ADB = 24°.

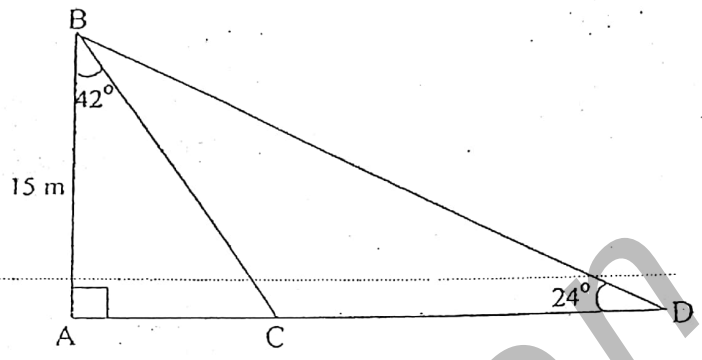

Figure 4

(a) Calculate the length CD.
(b) Hence, calculate, to one decimal place, the area of Δ CBD.

(ii) From points A and B which are 1 km apart on the same horizontal level, a bird C is observed at angles of elevation of 40° and 30° respectively. Given that C is h metres vertically above a point D that lies between A and B,
(a) draw a diagram showing all given points and angles;
(b) write out two equations relating h and the angles 40° and 30°;
(c) hence, determine h, correct to 2 decimal places.

7. (i) Given the matrix A of order m x n and the matrix B of order p x q, state the necessary condition for the multiplication AB to be possible.

(ii) Given the matrix $T = \begin{pmatrix} 5 & 2 \\ 7 & -3 \end{pmatrix}$, find T^{-1}, the inverse of T.

(iii) Determine which of the matrices

$X = \begin{pmatrix} a-1 & a \\ a & a+1 \end{pmatrix}$ and $Y = \begin{pmatrix} a+1 & 1 \\ a^2-1 & a-1 \end{pmatrix}$ is singular for all values of a.

(iv) A triangle with vertices A(-1, 3), B(2, 1) and C(-2, 2) is transformed by the matrix $M = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ onto the triangle A′ (-2, 3), B′(4, 1) and C′(-4, 2).
(a) Find the exact values of a, b, c and d.
(b) Describe completely, the transformation represented by the matrix M.

8. (i) The sales of bottled dinks in a store, for one day, were recorded as follows:

	Quantity (in bottles)
Brasseries drinks	60
UCB drinks	40
French wine	30
Guinness drinks	x
Total =	180

(a) Find the value of x.
(b) Illustrate this information in a pie chart.

(ii) The heights of 94 boys in a football school were recorded as follows:

Height(h) in cm	Frequency
$155 \leq h < 160$	3
$160 \leq h < 165$	13
$165 \leq h < 170$	37
$170 \leq h < 175$	29
$175 \leq h < 180$	10
$180 \leq h < 185$	2

Six others who came late, had heights: 176, 161, 168, 163, 183, 178 cm.
(a) Rewrite the table to include the heights of the six latecomers.
(b) Calculate the mean height of all the boys, correct to 2 decimal places.
(c) Find the probability that a boy chosen at random has a height ≥ 170 cm.

9. (i) Given the functions f and g defined on R as:
$f: x \mapsto 3x + k$, and $g: x \mapsto 5x - 1$, where k is a constant,
find:
(a) $g^{-1}(9)$,
(b) the value of k such that $f \circ g$ and $g \circ f$ represent the same function.

(ii) Given that $(x - 2)$ is a factor of $f(x)$, where $f(x) \equiv 2x^3 + x^2 - 7x - 3b$,
(a) find the value of the constant b.
Hence,
(b) factorise $f(x)$ completely;
(c) solve, for x in Z, the equation $f(x) = 0$.