MATHS 2
570

— CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

General Certificate of Education Examination

ORDINARY LEVEL

JUNE 2009

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)   An Urban Council, in one particular year, got its revenue solely by collecting from each vehicle in the area a tax of $\frac{1}{8}$ of its value.

    (a)   Find the amount of tax that was paid for a car valued at 3.6 million francs.

    Of the total amount of 8.5 million francs collected by the council, 25 % was paid into government treasury, 15 % was spent on Medical Care, 30 % on Education, 10% on other needs, and the rest on Salaries.

    (b)   Calculate how much was spent on Education.

    The amount spend on Education was shared between Basic and Secondary Education in the ratio 10:7.

    (c)   Find the amount spent on Basic Education.
    (d)   Determine how much was spent on Salaries.
    (e)   State the ratio (in lowest terns) of the amounts distributed to the five headings of expenditure.

    (ii)   At the current rate 360 dollars are exchanged for 240 pounds.
    (a)   Determine the equivalent of one pound in dollars
    (b)   Find how many dollars would be exchanged for 15 000 pounds.

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2. (i)   The functions f and g are defined on $\mathbb{U}$, the set of real numbers, as follows:
$$f: x \to 2x - 3 ,$$
$$g: x \to x^2 + 1.$$

    (a)   Evaluate $f(-1)$
    (b)   Determine $f^{-1}(x)$
    (c)   Find the value of $gf^{-1}(9)$

    (ii)   Sixty students in a hostel can either play the games Monopoly (M), Scrabble (S) and Cards (c). Figure 1 below shows the number of students in each region of the Venn diagram.
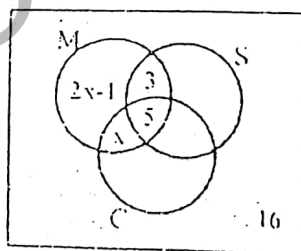

Figure 1

Given that $n(M) = 28$, four students play only cards, and that two students play only scrabble.
    (a)   determine the value of x,
    (b)   determine how many play only cards and scrabble,
    (c)   find the number who play scrabble.
    (d)   describe, in simple everyday English, the set $C' \cap M \cap S'$,
    (e)   In a sketch Venn diagram, shade the region represented by $C' \cap M' \cap S'$.

3. (i)   Workers in a certain company recorded the number of children they had as follows:

1	0	1	2	3
0	3	1	2	7
1	2	4	3	2
2	1	6	3	0
1	2	5	2	6

   (a)   Draw a frequency table to represent this distribution
   (b)   Find the median.
   (c)   Determine the mean.

(ii)

Number of pens	12	26	18	y
Colour	Red	Blue	Black	Green
Angle of sector	72°	x	108°	z

The above table was used to draw a pie chart representing colours of pens in a certain packet.

   (a)   Calculate the values of x, y and z.
   (b)   Determine the total number of pens
   (c)   Find the probability that a pen taken out at random is either red or black.

4.   (i)   The position vectors of the points A and B are respectively $4i - 8j$ and $-4i + 7j$, where i and j are unit vectors in the x – and y – directions respectively.
   Determine

   (a) $|OA|$ (leave answer in surd form)
   (b)   the value of q given that OA and OB are perpendicular
   (c)   the components of the vector BA
   (d)   the coordinates of the point D such that OADB is a rectangle.

(ii)
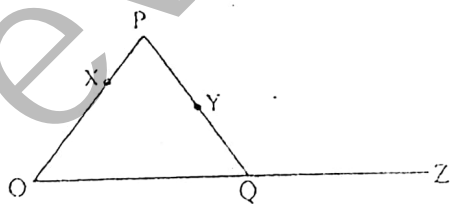

Figure 2

Figure 2 above. X is a point on OP such that OX : OP = 2:3, Y is the midpoint of PQ, and Z is a point on OQ produced such that OQ = QZ. Given that OP = p and OQ = q, find, in terms of p and q, the vectors

   (a)   OY
   (b)   XY
   (c)   YZ

5.   (i)
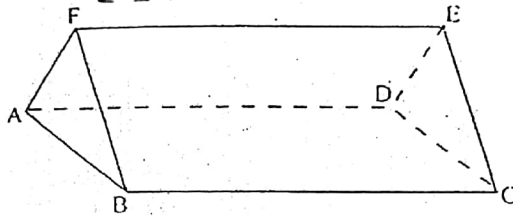

Figure 3

(a)   Determine the ratio
           faces: edges: vertices
(b)   Calculate, to two decimal places, the volume of the prison.
(c)   Find, to two significant figures, the total surface area of the prison.
(d)   The prison is melted down and cast into a solid cube. Calculate the length of the side of the cube, to one decimal place.

(ii)   The sum of the first four terms of an arithmetic progression is 16. The sum of the seventh and eighth terms is -12.
        Find the first term and the common difference of the progression.

6.   (i)   Use ruler, pencil and compasses only in this question.

(a)   In the middle of a fresh page, draw the line OX of length 10 cm.
(b)   Construct line OY such that angle XOY = 60°.
(c)   Mark points P and Q on OX such that OP = 3 cm and OQ = 7 cm.
       Construct the perpendicular bisector of PQ.
(d)   Bisect angle YOP.
(e)   Construct a circle on the chord PQ with centre T where the two bisectors in (c) and (d) intersect.
(f)   State, to one decimal place, the radius of the circle.
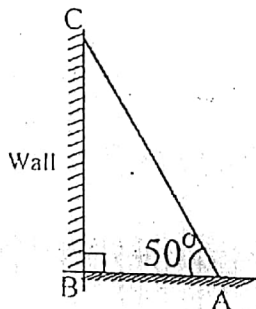
(ii)

Figure 4

A ladder, AC, leaning against a vertical wall (figure 4), makes an angle of 50" with the floor. Given that the distance BA is 2.6 m,
Calculate, to one decimal place,
(a)   the height BC
(b)   the length of the ladder AC.

5

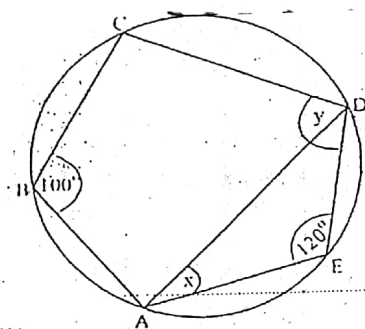7.   (i)

Figure 5

In Figure 5, all the points lie on the circumference of the circle, with AE = ED, angle AED = 120° and angle ABC = 100°. Angle EAD = x° and angle EDC = y°.

(a)   Give the name of the figures CDEAB, EAD and BADC.
(b)   Find the value of x.
(c)   Calculate the values of y
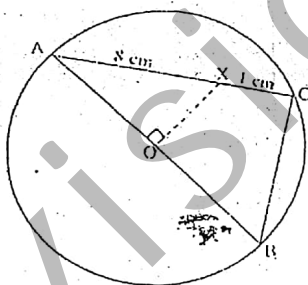(d)   State the sum of angles BA and BCD.

(ii)

Figure 6

Figure 6 shows a circle centre O and C a point on the circumference. X is a point on AC such that AX = 8 cm XC = 1 cm and angle AOX = 90°.

(a)   Show that triangles AOX and ACB are similar.
(b)   Find the radius of the circle.
(c)   Determine the ratio $\dfrac{\text{area of } \triangle ABC}{\text{area of } \triangle AXO}$

6

8. The function f(x) is defined as follows:

$$f(x) = \tfrac{1}{2}(x^2 + 2x - 5)$$

(a) Copy ad complete the table below.

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

(b) Taking 2 cm to represent 1 unit on both axes, draw the graph of y = f(x).
(c) Write down the coordinates of the turning point.
(d) Use your graph to estimate the values of x when f(x) = 1.8
(e) On the same axes draw the line y = 3x - 4

(f) Write down the equation whose solutions are the points of intersection of the curve and the line.

9. On graph paper, taking 1 cm 1 unit, draw the x- and y-axes from −6 to +12 for each axis

(a) Draw the triangle T with vertices P (2, 1), Q(2, 3) and R (5, 1)

Constructing on the graph, and writing down the coordinates of the vertices,

(b) translate by vector $\begin{pmatrix} -6 \\ 5 \end{pmatrix}$ the triangle T and label it T_1.

(c) reflect T in the y-axis and label it T_2.

(d) rotate T through 90° clockwise and label it T_3.
(e) enlarge about the origin by scale factor 2 and label it T_4.