MATHS 2
570

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

General Certificate of Education Examination

JUNE 2014   **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.

Calculators are allowed.

1. In a certain school, the Parents Teachers Association (PTA) decided to reward excellence with an amount of money.

$\frac{2}{5}$ of this amount was shared equally to the top ten students, $\frac{1}{2}$ of the remainder to the staff and the balance of 150.000FCFA to the administration.

Find the fraction of the amount given to
(a)   both the students and the staff
(b)   the administration

(c)   calculate the amount given to
   (i)   each student
   (ii)   the staff
(d)   Write out the ratio of the sharing in the form, students: staff: administration.
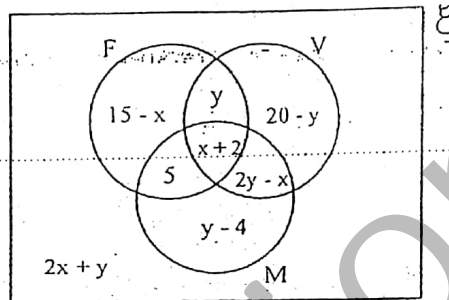(e)   Find the percentage of the amount given to the staff.

2.

Figure 1

In figure 1, the Venn diagram represents the number of times a patient ate the food items, comprising of, Fish (F), Vegetables (V) and Meat (M) in the month of May.

Given that n (F ∩ M) = 11 and n (F ∪ V ∪ M)' = 15
(a)   Find the values of x and y.
(b)   Using these values of x and y, copy and complete the Venn diagram in Figure 1.

From the Venn diagram, determine the number of times the patient ate
(c)   Fish
(d)   Meat and Vegetables
(e)   Meat and Fish only
(f)   Vegetables only

When the patient ate neither Meat nor Fish nor Vegetables, she ate Fruit Salad.
(g)   Determine the number of times the patient ate Fruit Salad and shade this region on the Venn diagram.
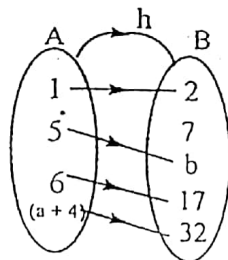
3.   (i)

Figure 2

The arrow diagram in figure 2 represents a relation defined by $h: x \longmapsto 3x - 1$
(a)   Find the values of a and b.

Hence determine
(b)   the image of 11
(c)   the range

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(ii) The functions f and g are defined as $f: x \mapsto 2x + 3$, $g: x \mapsto mx - 2$, where $x \in \mathfrak{R}$, the set of real numbers, and m is a constant.

Find:
(a) $f(\frac{-5}{2})$
(b) $f^{-1}(13)$
(c) $fg(x)$ in terms of m
(d) the value of m for which $fg(x) = gf(x)$

4. Given that $y = f(x)$ where $f(x) + x^2 = x + 2$.
(a) Construct a table of values of $f(x)$ for which $-2 \leq x \leq 3$, $x \in \mathbb{Z}$, the set of integers.
(b) Taking 2 cm for 1 unit on both axes, draw the graph of $y = f(x)$.

Using your graph:
(c) Find the y value at the turning point.
(d) By drawing a suitable straight line solve the equation $x^2 - 1 = 0$.
(e) Estimate to one decimal place the gradient of the curve at the point $(1, 2)$.

5. 60 students were asked to harvest mangoes in a school farm. The number of mangoes harvested per student was recorded in the frequency distribution table below:

No. of mangoes harvested	3	4	5	6	7	8	9	10	12	13	14
No. of students	2	1	4	6	6	7	9	16	5	2	2

(a) (i) State the mode
    (ii) Find the median
    (iii) Calculate the mean number of harvested mangoes to, one decimal place.

(b) (i) Draw a grouped frequency table for the classes: $3 - 5$, $6 - 8$, $9 - 11$, $12 - 14$.
    (ii) Represent the grouped data on a histogram.

(c) A student is chosen at random. Find the probability that the student picked 12 or more mangoes.

6. (i) A point $P(4, 2)$ is on a Cartesian plane. Given a position Vector $\overline{OA}$, where $\overline{OA} = 2i + 4j$ and using a scale of 1 cm for 1 unit on both axes:

(a) Draw vectors $\overline{OA}$ and $\overline{PB}$, where $\overline{OA} = \overline{PB}$.
(b) Write down the co-ordinates of B. Join the points to obtain OABP
(c) Name the figure.
(d) Express $\overline{OB}$ in terms of i and j and find its magnitude and direction.

(ii) The expression $f(x)$ where $f(x) = x^3 - x^2 + ax + b$ is divisible by $x - 1$ and leaves a remainder of 1 when divided by $x - 2$.
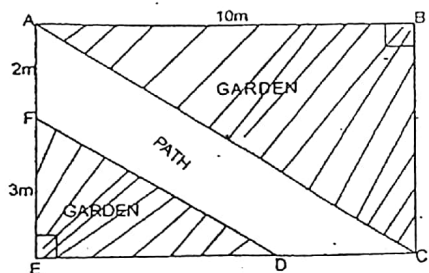Find the values of a and b.

7. (i)

Figure 3

A path is made across a rectangular garden as shown in figure 3.
Given that AB = 10m, AF = 2m, FE = 3m and that AC is parallel to FD.

    (a)   Find the length of ED.

Calculate:

    (b)   the area of triangle ABC.

    (c)   the area of the path.

(ii)   The nth term of a certain sequence is given by $U_n = \frac{6}{2^n}$. Find:

    (a)   the first three terms of this sequence.

    (b)   show that the sequence is a Geometric progression.

    (c)   find the sum of the first five terms of the progression.

8. (i)   From a point P, a boy walks a distance of 2km on a bearing of 060° to a point Q. He changes direction and walks a distance of 5km to another point R, on a bearing of 150°.

    (a)   Draw a diagram showing the positions of P, Q and R.

Calculate:

    (b)   the distance PR, giving your answer to one decimal place.

    (c)   the angle PRQ correct to one decimal place.

    (d)   the bearing of Q from R to the nearest degree.

(ii)   A boy at B flying a kite, K, sees his kite at an angle of elevation of 45°. The kite is 100m directly above another boy at Q, who is some distance away from B, on the same horizontal level. Find

    (a)   the distance between the boys.

    (b)   the length of the string attached to the kite, given that the string is taut. Give your answer correct to one decimal place.
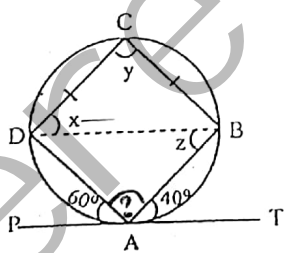
9. (i)

Figure 4

[handwritten annotations]: Z is alternate to 60°, ∴ Z = 60° ; y is opposite to ? , ∴ 60+40+y=180 , y+100=180, y=80 ; x = 40 since they are alternate

Figure 4 shows a cyclic quadrilateral ABCD with CD = BC, angle BAT = 40°, angle DAP = 60° and PT is a tangent to the circle at A.

Find the values of the angles marked:

    (a)   y

    (b)   x

    (c)   z

(ii)   Use a pair a compasses and ruler only in this question. In the middle of a page and showing all construction lines;

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

    (b)   Construct a triangle ABC such that AC = 10cm and angle ABC = 90°

    (c)   Construct the bisector of angle ABC and the bisector of AC.

    (d)   Mark X, the point of intersection of these bisectors and then measure and state the length of BC and AX.