Mathematics I

009

15 Nov. 2012   08.30am- 11.30am

REPUBLIC OF RWANDA

RWANDA EDUCATION BOARD (REB)

ORDINARY LEVEL NATIONAL EXAMINATIONS 2012

SUBJECT: MATHEMATICS I

DURATION: 3 HOURS

INSTRUCTIONS:

- This paper has **TWO** sections: **A** and **B**.

SECTION A: Attempt **ALL** questions.   **(55 marks)**

SECTION B: Attempt any **THREE** questions.   **(45 marks)**

- You may use mathematical instruments and calculators

   where necessary.

- USE A **BLUE INK PEN ONLY**

   USE A PENCIL TO DRAW DIAGRAMS.

- SHOW CLEARLY ALL THE WORKING. **Marks will not be awarded**

   for answers without all working steps.

**SECTION A : Attempt all questions.**   **(55 marks)**

01.   Express 900 as a product of its prime factors. Hence find the square root of 900.   *(3 marks)*

02.   (a) Calculate without using a calculator: $3.45^2 - 1.55^2$.   *(2 marks)*
      (b) Divide without using a calculator: $0.09 \div 30$.   *(1 mark)*

03.   In a school food store, there is enough food to feed 300 students for 17 days.
      For how long will the food last if 40 more students join the group?   *(3 marks)*

04.   Solve the equation: $5x^2 + 21x - 20 = 0$ *(3 marks)*

05.   The right triangles below are similar. Find the area of the larger triangle.   *(3 marks)*

4cm   5cm   20cm   3cm
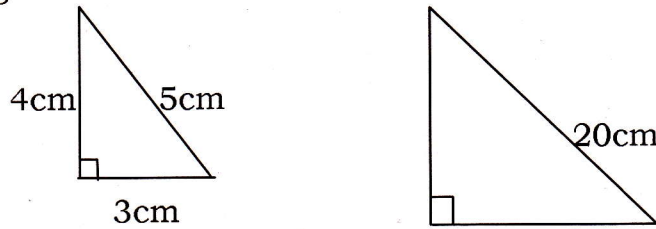
06.   Solve simultaneously: $x + 2y = 40$
                             $3x = 60 - y$ *(4 marks)*

07.   Find the equation of the line which passes through the points $(-1, 3)$ and $(4, 2)$.   *(4 marks)*

08.   Given that $f(x) = ax^2 - 7$ and $f(2) = 13$, find the value of $f(-1)$.   *(4 marks)*

09.   In a class of 40 students, 24 like Mathematics and 30 like Kinyarwanda. All students like at least one of the subjects.
      Draw a Venn diagram to represent this information.
      How many students like both Mathematics and Kinyarwanda?   *(4 marks)*

10.   Solve the inequality: $\dfrac{3x}{2} \geq \dfrac{x}{4} - 10$.
      Illustrate the answer on a number line.   *(4 marks)*

11.   A point **m** divides a line segment AB, 10 cm long into two parts such that one part is 4cm longer than the other.
      Find the length of the two parts.   *(4 marks)*

12.   The diagrams below show a flag **T** and two mirrors m_1 and m_2 intersecting at an angle **Y°**.
      Copy the diagram and show images **M1(T)** in m_1 and **M₂M₁(T)** in m_2.   *(4 marks)*
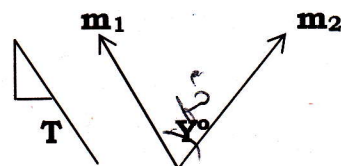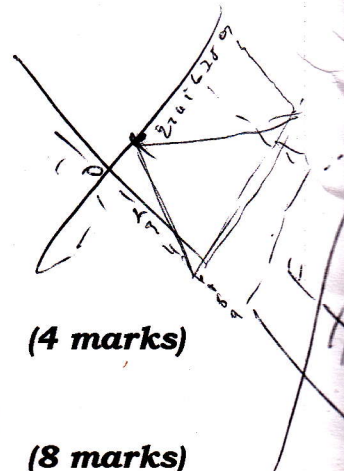
m_1 m_2

T   Y°

13.   Given $152_n = 68_{ten}$, find n.   *(4 marks)*

14. Find the mid-point M of the line joining the points $A(1, 0)$ and $B(9, 6)$. Find length $\overline{MB}$. **(4 marks)**

15. The diagram below shows a rectangle **MNOP** of length 88cm and width 30cm.

    M   88cm   N

    30cm

    P   O
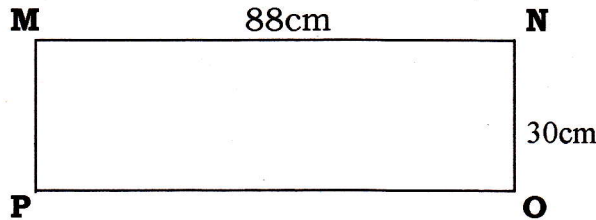
    If it is curved in such a way that **MP** and **NO** meet to form a hollow cylindrical figure, find the volume of the cylindrical figure formed. $\pi = \dfrac{22}{7}$. **(4 marks)**

    SECTION B: Attempt ONLY three questions. **(45 marks)**

16. (a) Solve for x: $\dfrac{1}{x^2 - 1} + \dfrac{1}{x^2 - 4x + 3} + \dfrac{1}{x - 3} = 0$ **(8 marks)**

    (b) Factorize completely: $f(x) = 2x^3 + 5x^2 + x - 2$.
    Hence find the values of x when $f(x) = 0$. **(7 marks)**

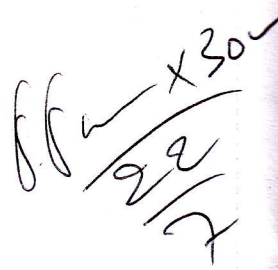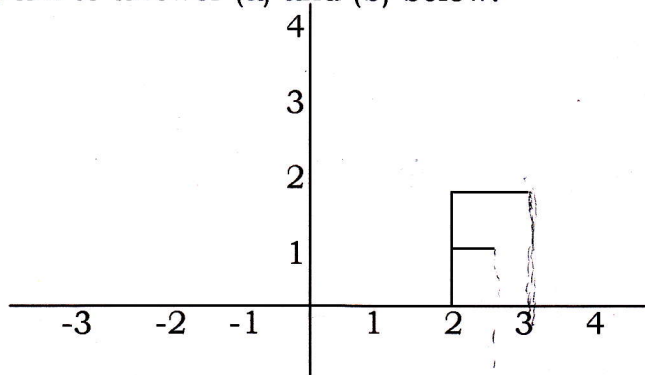17. The table below shows the ages of 73 students.

Age in years	14	15	16	17	18	19	20
Frequency	5	9	13	11	12	15	8

    Make frequency table using above data.

    (a) Find the median age. **(4 marks)**

    (b) Calculate the mean age. **(11 marks)**

18. Use the diagram to answer (a) and (b) below.

    (a) Copy the diagram and sketch the image   under **(3 marks)**
        (i) a + 90° rotation about origin. **(2 marks)**
        (ii) a − 180° rotation about origin.

    (b) Copy the diagram again and sketch the image of under a translation **(3 marks)**
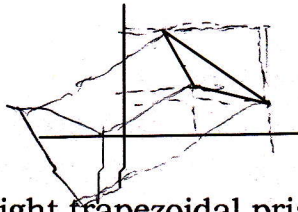
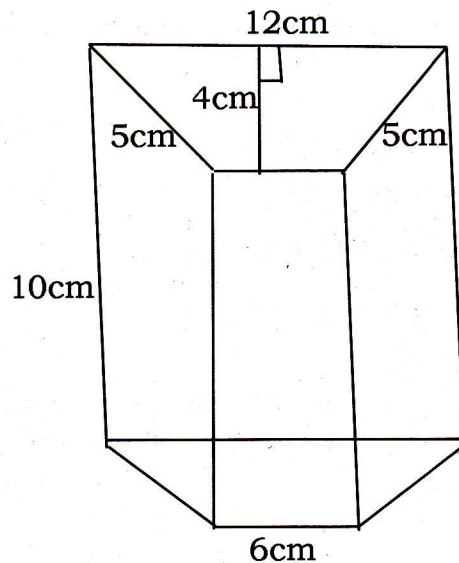(i) $\mathbf{T} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$. **(2 marks)**

(ii) $\mathbf{T} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$. **(5 marks)**

(c) Copy the diagram and sketch the image of triangle under enlargement with scale factor 2.

19. The figure below is a right trapezoidal prism.

Calculate its

(a) lateral area. **(5 marks)**

(b) total surface area. **(7 marks)**

(c) volume. **(3 marks)**

20.
(a) Rationalise the denominator : $\dfrac{\sqrt{2}}{2\sqrt{5}+\sqrt{3}}$. **(4 marks)**

(b) Simplify: $\sqrt{12} \times 3\sqrt{60} \times \sqrt{45}$. **(4 marks)**

(c) Simplify: $\sqrt{8} \times \sqrt{50} + \sqrt{121}$. **(4 marks)**

(d) Simplify : $\dfrac{5\sqrt{7}}{\sqrt{45}} \times \dfrac{2\sqrt{3}}{\sqrt{21}}$ **(3 marks)**