Mathematics I

010

29 Oct. 2014   08.30AM - 11.30AM

REB

Rwanda Education Board

ORDINARY LEVEL NATIONAL EXAMINATIONS, 2014

SUBJECT: MATHEMATICS I

DURATION: 3 HOURS

INSTRUCTIONS:

1) Do not open this paper until you are told to do so.

2) This paper has **TWO** sections: **A** and **B**.

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

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

3) You may use mathematical instruments and calculators **where necessary.**

4) USE A **BLUE or BLACK INK PEN ONLY** TO WRITE YOUR ANSWERS AND A PENCIL TO DRAW DIAGRAMS.

5) SHOW CLEARLY ALL THE WORKING. **Marks will not be awarded for the answer without all working steps.**

SECTION A : ATTEMPT ALL QUESTIONS. (55 marks)

1. Simplify: $0.42^2 - 0.58^2$ without using a calculator. **(3 marks)**

2. Simplify the fractions completely : $\left(2\frac{2}{5} \div 1\frac{6}{10}\right) \times 0.02$ **(3 marks)**

3. Find the inverse function of $g(x) = 3+4x$. **(2 marks)**

4. A piece of land is represented by a rectangle of 300cm² on a map. Determine the actual area of the land in hectares (ha). The scale is 1: 15,000. **(3 marks)**

5. Solve : $\dfrac{2x-5}{x^2-4} = \dfrac{5}{x-2}$ **(5 marks)**

6. To pass a certain interview, a candidate must pass both oral test(R) and a written test(W).
   Of the candidates who attend the interview 70% passed R, 65% passed W and 15% passed R but not W.
   Four candidates failed both tests . How many candidates passed the interview ? **(4 marks)**

7. Solve the following simultaneous equations : **(4 marks)**
   $$2x + 3y = 5$$
   $$3x + 2y = 10$$

8. Solve the following inequality: $2x - \dfrac{1}{3}(4x - 1) < \dfrac{3}{4} + x$. Illustrate the solution on the number line . **(4 marks)**

9. Calculate the distance between points A(-5,4) and B(3,-2). **(4 marks)**

10. Find the magnitude of vector $\vec{z} + 2\vec{w}$, given that $\vec{z} = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$ and $\vec{w} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$. **(4 marks)**

11. (a)Find the sum of the interior angles of a pentagon. **(2 marks)**
    (b) The sum of the interior angles of a polygon is 900°.
        How many sides has the polygon ? **(2 marks)**

12. The longest side of a right angled triangle is 15cm and the other two sides are x cm and (x + 3) cm respectively. Find x and calculate the area of the triangle. **(4 marks)**

13. A (1,4) , B (1,0) and C (3,-2) are three of the vertices of a quadrilateral ABCD. $\vec{AD} = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$ and X is the mid-point of AC. **(4 marks)**
    Find the coordinates of D and X .

14. Solve: $6x^2 + x - 2 = 0$. **(3 marks)**

15   (a) Simplify : $36^{½} + 27^{2/3}$.   *(2 marks)*

     (b) Solve for x : $4^x = 32$.   *(2 marks)*

SECTION B : ATTEMPT THREE QUESTIONS ONLY.   (45 marks)

16. a) Two lines, one passing through points (0, 4) and (3, 1) and
        the other passing through point (-3, 2), are parallel. Find the
        equations of these lines.

     b) If f(x) = 2x + 3 and g(x) = 3x - 1, calculate :
            (i) f(-1)   *(7 marks)*
            (ii) g(-4)

            (iii) fog(x)

            (iv) gof(x)

            (v) $gof\left(-\dfrac{1}{6}\right)$ *(8 marks)*

            (vi) $fog\left(-\dfrac{1}{6}\right)$

17. a) A triangle with vertices A, B and C whose coordinates are   *(5 marks)*
        (2, 0), (5, 4) and (6, 1) respectively is given a translation $\vec{t}=\left(\begin{smallmatrix}-3\\7\end{smallmatrix}\right)$.

     Find the images vertices: (i) A'; (ii) B'; (iii) C'.

     b) A (-5, -1), B (-2, -1) and C (-4, -2) are vertices of triangle ABC.
        (i) Plot points A, B and C on a graph paper using a scale of 1cm   *(4 marks)*
            to represent 1 unit on each axis. Join the points to form
            triangle ABC.
        (ii) Triangle ABC is enlarged by a scale factor of -2 with the
             origin (0,0) as the centre of enlargement. On the same graph
             as 17.b)(i) above, draw the image A'B'C' of triangle ABC.   *(3marks)*

        (iii) Draw triangle A" B" C" which is the image of triangle ABC

             under a reflection in line y = 0. Use the same graph as that   *(3 marks)*
             of 17.b) (i) above .

18. a) Mr. RWEMA buys a certain number of pens for £1.40 and the   *(5 marks)*
        number of pence that each one costs him is 4 more than the
        number of pens that he buys. Find the cost of each pen.
        £=pound (British currency) and 1£=100 pence.

     b) Solve : $6x^3 + 11x^2 - 3x - 2 = 0$.   *(10 marks)*

19. The table below shows the marks scored by 52 students in a test marked out of 50

12   18   24   29   37   45   47   38   31   24

19   13   14   20   25   32   39   40   33   25

21   14   40   33   26   21   15   16   22   27

34   41   41   35   27   22   16   17   27   22

28   44   42   35   18   22   28   36   43   18

23   36

a) Make a grouped frequency table for the marks starting with 12 – 19.

b) Find the modal class and its limits. Calculate the mean .

(15 marks)

20. a) Given that the points (4, -1), (1, 5) and (-3, k) lie on a straight line, calculate the value of k.

(5 marks)

b) The data below show a relation between x and y.

x	3	4	5	6	7
y	10	13	16	19	22

(10 marks)

By plotting y against x on a graph, determine the gradient of the graph hence deduce the relation between y and x . Write the equation connecting y and x .