

Mathematics I

010

30 Oct. 2013 08.30am - 11.30am

REPUBLIC OF RWANDA



RWANDA EDUCATION BOARD

ORDINARY LEVEL NATIONAL EXAMINATIONS 2013

SUBJECT: MATHEMATICS I

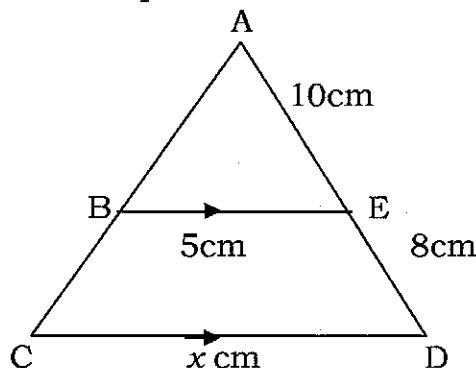
DURATION: 3 HOURS

INSTRUCTIONS:

- 1) Don't 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 INK PEN ONLY** TO WRITE YOUR ANSWERS AND A PENCIL TO DRAW DIAGRAMMS.
- 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. 100,000 Rwf was invested. The simple interest after 2 years was 16,000 Rwf. Find the percentage interest rate per year. **(3 marks)**
2. Solve for x : $8x^2 - 2 = 0$ **(3 marks)**
3. A straight line passes through points (2, 8) and (x, y). If the gradient of the line is 3, find the equation of the line. **(3 marks)**
4. Solve for (x, y):
 $8x + y = 21$
 $5x - 4y = -10$ **(3 marks)**
5. In a class of 50 pupils, 33 like Mathematics and 32 like Science. Each pupil likes at least one subject. Put this information on a Venn diagram and find the number of pupils who like both subjects. **(3 marks)**
6. It is given that $f(x) = 3x^2$ and $g(x) = 2x + 5$. If $f(x) = g(x)$, find x . **(4 marks)**
7. Simplify: $\sqrt{12} \times 3\sqrt{60} \times \sqrt{45}$. **(4 marks)**
8. Show that the points P(-3, -2), Q(3, 1) and R(5, 2) are collinear (i.e. Points are all lying on one straight line). **(4 marks)**
9. Solve: $\frac{1}{2}x - (x + 1) \geq 2$. Illustrate the answer on a graph. **(4 marks)**
10. Given that y varies inversely with x , and that $y = 4$ when $x = 3$;
a) find y when $x = 6$. **(3 marks)**
b) For which value is this relation not valid? **(1 mark)**
11. 10,000 Rwf is divided between three pupils in the ratio 2:3:5. Find each share. **(4 marks)**
12. A(x, y) and B(6, 10) are points in a Cartesian plane. If A is joined to B, the midpoint of AB is (4.5, 8). Find the values of x and y . **(4 marks)**
13. In the figure below $AE = 10\text{cm}$, $ED = 8\text{cm}$, $BE = 5\text{cm}$ and $CD = x\text{cm}$. BE is parallel to CD.



- a) Show that triangle ABE is similar to triangle ACD. **(2 marks)**
- b) Calculate x . **(2 marks)**

14. Solve for x : $(3x - 2)(x + 4) = -11$.

(4marks)

15. The figure below is a circle with centre O. Angle BDC = 40° .

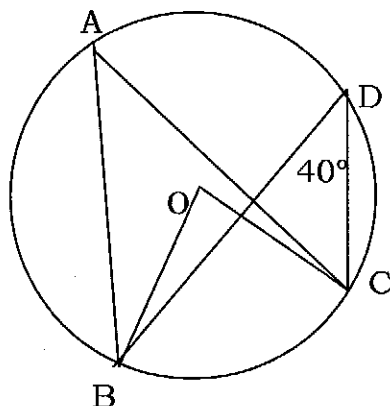
Find:

(2 marks)

a) Angle BOC.

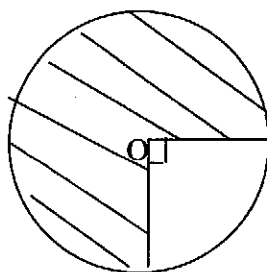
(2 marks)

b) Angle BAC.



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

16. a) The figure below shows a part of a circle with centre O and radius 14cm and $\pi = \frac{22}{7}$.



Calculate:

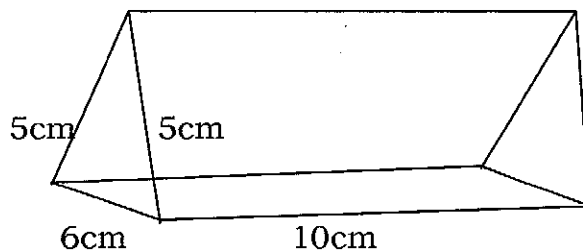
i. the area of the shaded part.

(3 marks)

ii. The circumference of the shaded part.

b) The prism below has an isosceles triangular base. The equal sides are each 5cm and the other side is 6cm. The height of the prism is 10cm.

(3 marks)



- Calculate i. the cross section area of the prism. **(4 marks)**
 ii. The total surface area of the prism. **(3 marks)**
 iii. The volume of the prism. **(2 marks)**
17. The heights, in centimeters, of 25 pupils are shown below.
 160 155 150 160 170 160 180 155 170 155
 190 160 155 170 180 150 160 180 155 160
 155 150 160 155 160.
 Make a frequency table and determine the mode height, the median and the mean. **(15 marks)**
18. a) If $x - 3$ is a factor of $x^3 - 6x^2 + 11x - 6$, find other factors of this polynomial. **(7 marks)**
 b) Solve: $x^3 + 5x^2 - 4x - 20 = 0$. **(8 marks)**
19. a) The cost of 3 pencils and 4 exercise books is 1,350 Rwf. The cost of 5 pencils and 6 exercise books is 2,050 Rwf. Find the cost of 10 pencils and 20 exercise books. Pencils and exercise books are all the same type. **(10 marks)**
 b) John spends $\frac{1}{3}$ of his monthly salary on accommodation. He spends $\frac{1}{4}$ of the remaining salary on a car loan and $\frac{1}{2}$ of the remaining on food. If the money left is 50,000 Rwf, find John's monthly salary. **(5 marks)**
20. A(0, 4), B(0, 0) and C(4, 4) are vertices of triangle ABC.
 a) Draw triangle ABC on a Cartesian plane. Find the coordinates of vertices A', B' and C' the images of vertices A, B and C under a -90° rotation about the origin. Draw triangle A'B'C' on the same Cartesian plane as that of triangle ABC. **(6 marks)**
 b) Find the coordinates of A'', B'' and C'' the images of A, B and C under a reflection in line $x = -1$. Draw triangle A''B''C'' on the same plane as of 20.a). **(4 marks)**
 c) A translation T maps A(0, 4) to A'''(-1, 3). Find T. Determine the coordinates of B''' and C''' images of B(0, 1) and C(3, 4) under translation T. Draw triangle A'''B'''C''' on the same Cartesian plane as 20.a). **(5 marks)**