

**Mathematics VI**

**113**

**07 Nov. 2006**

**8.30 a.m-11.30 a.m**

**RWANDA NATIONAL EXAMINATIONS COUNCIL**



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**ORDINARY LEVEL NATIONAL EXAMINATION 2006**

**SUBJECT : MATHEMATICS VI**

**DURATION : 3 HOURS**

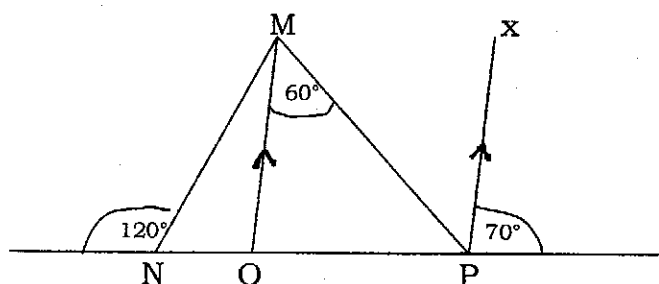
**INSTRUCTIONS :**

- Answer all questions in section A and any **THREE** questions in Section B.
- Show all working clearly.
- Calculators and mathematical instruments may be used.

**SECTION A (55 marks)**

1. Simplify completely :  $\left( 0.4 \times 1\frac{2}{3} \right) - \frac{1}{6}$ . **(3 marks)**
2. Solve :  $3(x + 2) - 2(3x - 4) = x + 18$ . **(3 marks)**
3. The simple interest on 200 000 frw for 5 years is 50 000 frw. Calculate percentage interest rate per year. **(3 marks)**
4. Evaluate without using a calculator:  
$$\frac{\sqrt{75} + \sqrt{27}}{\sqrt{12}}$$
 **(4 marks)**
5. Solve :  $2x - 4 < 3x + 7$ . Illustrate the solution on a graph. **(3 marks)**

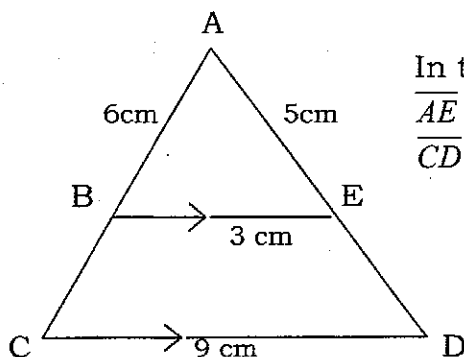
6.



From the diagram determine the size of

- (a) angle MOP **(½ mark)**
- (b) angle MPO **(1 ½ marks)**
- (c) angle NMO **(3 marks)**
7. Given that  $x = -2$  and  $y = 4$ , find the value of  $xy^2 - 2(x - y)$ . **(3 marks)**
8. Use vectors to show that points R (0,2), S (2,4) and T (5,7) are collinear (i.e. the three points lie on the same straight line). **(4 marks)**
9.  $m$  is inversely proportional to  $n$ . When  $m = 3$ ,  $n = 4$ . Find  $n$  when  $m = 2$ . **(3 marks)**
10. Given that functions  $f(x) = x^2 - 1$  and  $g(x) = 3x - 1$ , find  $x$  when  $fg(x) = 0$ . **(4 marks)**

11.



In the figure on the left,  $\overline{BE}$  is parallel to  $\overline{CD}$ ,  $\overline{AE} = 5\text{cm}$ ,  $\overline{AB} = 6\text{cm}$ ,  $\overline{BE} = 3\text{cm}$  and  $\overline{CD} = 9\text{cm}$ . Calculate

(a) length BC.

(b) length AD.

**(2 marks)**

**(2 marks)**

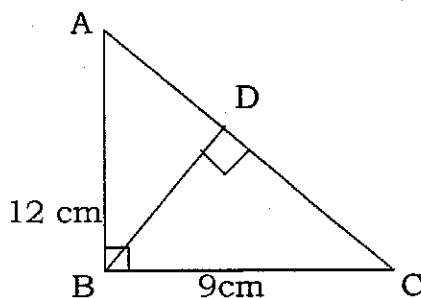
12. Solve the following simultaneous equations :

$$x + y = 1$$

$$3x - 2y = 8$$

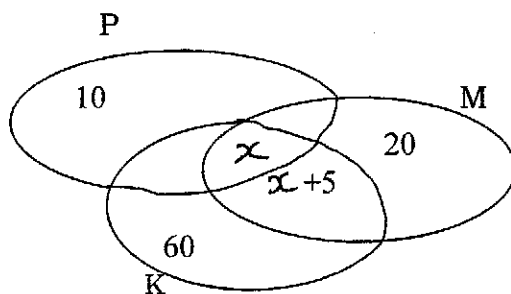
**(4 marks)**

13. In the figure below ABC is a right angled triangle and  $\overline{BD}$  is perpendicular to  $\overline{AC}$ . Calculate  $\overline{BD}$ .



**(4 marks)**

14. The Venn diagram below shows the number of senior three pupils, in a school, who like mathematics (M), Physics (P) and Kinyarwanda (K). 55 pupils like mathematics.



a) How many pupils like the three subjects ?

**(2marks)**

b) Find the total number of senior three pupils in the school. **(1 mark)**

- c) How many pupils like Physics and Kinyarwanda only ? **(1 mark)**
15. One solution of  $x^2 + ax + 6 = 0$  is -2. Find a and other solution. **(4 marks)**

### SECTION B (45 marks)

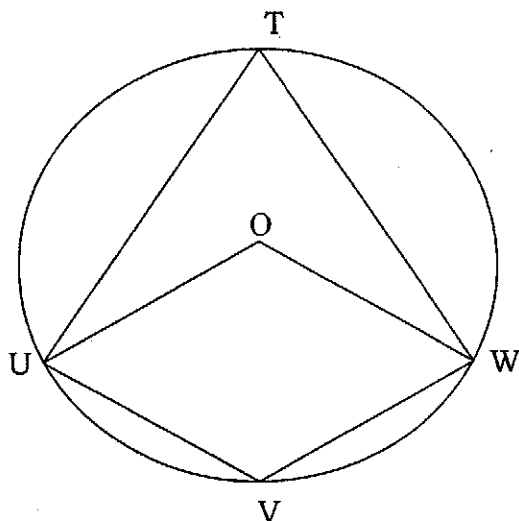
16. (a) Simplify completely :  $\frac{6x^2 + 13x + 6}{4x + 6}$ . **(5 marks)**
- (b) Solve :  $2x^3 + 9x^2 - 2x - 24 = 0$ . **(10marks)**

17. The masses of babies born during December 2005 at a hospital are given in the table below.

|              |     |     |     |     |     |     |     |     |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Mass in (kg) | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 | 2.7 | 2.8 | 3.0 |
| N° of babies | 4   | 2   | 1   | 5   | 6   | 8   | 4   | 9   |

- a) Find
- (i) the total number of babies born in December 2005. **(1mark)**
  - (ii) the number of babies weighing more than 2.5kg. **(1mark)**
  - (iii) the range of the masses. **(1mark)**
  - (iv) the mode mass. **(1mark)**
- b) Calculate
- (i) the median mass. **(2 marks)**
  - (ii) the mean mass. Correct the answer to one decimal place. **(5 marks)**
- c) If the ratio of baby girls to baby boys is 5 :8, find the number of
- (i) baby girls born in December 2005. **(2 marks)**
  - (ii) baby boys born in December 2005. **(2 marks)**
18. (a) At a hotel, 3 cups of tea and 2 cups of coffee altogether cost 2900frw.  
At the same hotel 4 cups of tea and 3 cups of coffee cost 4100frw.  
Find the cost of
- (i) a cup of tea.
  - (ii) a cup of coffee.
- (9 marks)**
- (b) A car can be bought on cash or on hire purchase terms.  
The cash price of the car is 5 000 000frw. By hire purchase the car can be bought by paying a 30% deposit of the cash price and 12 monthly instalment of 600 000frw.
- (i) Find the price of the car on hire purchase terms. **(4½ marks)**
  - (ii) Calculate extra money paid for the car by hire-purchase than by cash. **( 1½ marks)**

19. The figure below is a circle with centre O. Angle  $UTW = 70^\circ$ , angle  $TWO = 40^\circ$ , angle  $VUO = 35^\circ$ , angle  $UOW = y$ , angle  $TUO = z$  and angle  $UVW = x$ .



- (a) Calculate the size of angle
- |              |                  |
|--------------|------------------|
| (i) $x$ .    | <b>(1 mark)</b>  |
| (ii) $y$ .   | <b>(1 mark)</b>  |
| (iii) $z$ .  | <b>(3 marks)</b> |
| (iv) $UWT$ . | <b>(3 marks)</b> |
- (b) The length of minor arc  $UVW$  is 10.99 cm. Calculate the area of the circle.  
 $\pi = 3.14$ . Correct the answer to one decimal place. **(7 marks)**

20. Points A (5,4), B (2,2) and C (6,2) are vertices of triangle ABC.

- (a) Use the graph paper in your answer book and draw triangle ABC on a Cartesian plane. **(3 marks)**
- (b) Triangle ABC is rotated anti-clockwise about the origin. If the angle of rotation is  $+90^\circ$ , find
- the coordinates of  $A'$ ,  $B'$ , and  $C'$  the images of points A, B and C. **(3 marks)**
  - Draw triangle  $A'B'C'$  on the same graph as 20 (a). **(2 marks)**
- (c) The image of A (5,4) under a translation is (3,3). Find coordinates of images of points B (2,2) and C (6,2) under the same translation as that of point A (5,4). **(4 marks)**
- (d) The image of C (6,2) under a reflection is (2,2). Find the equation of the line of reflection and images of A and B. **(3 marks)**

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