

CONSEIL NATIONAL DES EXAMENS AU RWANDA



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Mathematics VII

113

06 Oct 2004 8h30 – 11h30

NATIONAL EXAMINATION 2003/2004

SUBJECT : MATHEMATICS VII

LEVEL : TRONC COMMUN

DURATION : 3 HOURS

INSTRUCTIONS :

- This paper has two Sections A and B.
- Answer ALL questions in section A and any THREE questions in section B.
- Show all your working clearly.
- Calculators and mathematical instruments may be used.

SECTION A: /55 Marks

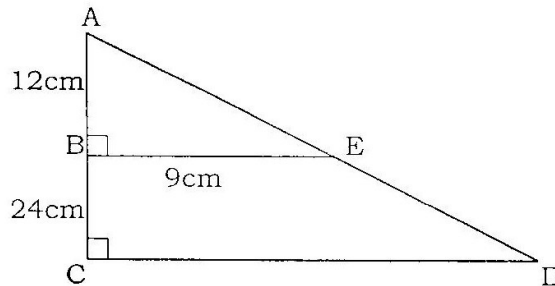
1. Evaluate the following completely: $\frac{0.54 \times 0.04 \times 0.08}{0.9 \times 0.16}$.

(3marks)

2. Determine the equation of a line which passes through points (0;-1) and (3;5).

(3½marks)

3. In the figure below calculate the length AD.



(3½marks)

4. The curved surface area of a cone is 47.1 cm^2 and the radius of the base is 3cm. Calculate the volume of the cone. Take $\pi = 3.14$.

(3½marks)

5. Solve for x : $(125)^x \div (25)^{2x+1} = 1$.

(3marks)

6. Solve the following simultaneous equations by elimination method:

$$x + 2y = 40$$

$$y = 60 - 3x$$

(3marks)

7. \overline{AB} and \overline{CD} are two line segments such that coordinates of their terminal points are A(-2;1), B(3;6), C(0; -4) and D(3; -1). Use vectors to show that \overline{AB} is parallel to \overline{CD} .

(3½marks)

8. The average age of 3 students is 15 years. The youngest student is $\frac{1}{2}$ times as old as the oldest student while the oldest student is $1\frac{1}{3}$ times as old as the third student. Find the age of each student.

(4½marks)

9. Given that $m = 5$, $n = 1$, $x = 6$ and $y = 9$, find the value of

$$\left(\frac{m}{y} - \frac{n}{x}\right) \div \left(\frac{m}{x} + \frac{n}{y}\right)$$

(4marks)

10. Solve: $\sqrt{x^2 + 2x + 1} = 3$.

(3½marks)

11. Simplify $\frac{\sqrt{45} + \sqrt{125}}{\sqrt{80} - \sqrt{20}}$ completely. **(3½marks)**
12. Solve the inequality $\frac{1}{3}x - (x+1) \geq 3$ and illustrate the answer on graph. **(3marks)**
13. In a class of 40 pupils, 26 play football and 20 play volleyball. 17 pupils play both games. How many pupils play no game at all? **(4½marks)**
14. The size of the exterior angle of a regular polygon is 60° less than the interior angle.
Find: (a) the size of interior angle. **(2½marks)**
(b) the number of sides of the polygon. **(2marks)**
15. John invested a sum of money at 6%. Sally invested 2000frw less than John at 9%. They each earned the same interest. How much money had John invested? The money was invested for the same period. **(4½marks)**

SECTION B: /45 Marks

16. (a) Work out the values of y in the table below given that $y = x^2 - x - 2$. Complete the table.

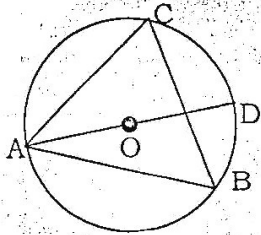
x	-3	-2	-1	0	1	2	3
y							

(7marks)

- (b) Draw the graph of the function $y = x^2 - x - 2$ for $-3 \leq x \leq 3$. Use a scale of 2cm to represent 1 unit on x - axis and 1cm to represent 1 unit on y -axis. **(6½marks)**
- (c) From the graph determine:
(i) the value of y when $x = 0.5$. **(½mark)**
(ii) the values of x when $y = -1$. **(1mark)**
17. (a) Given that $f(x) = 10x^3 - 3x^2 - 31x - 6$
(i) show that $(x - 2)$ is a factor of $f(x)$. **(3marks)**
(ii) find the values of x when $f(x) = 0$. **(5marks)**

(b) Solve : $\frac{5}{3x^2 + 7x + 2} + \frac{2x - 3}{x + 2} = 0, x \neq -2$ or $x \neq -\frac{1}{3}$. **(7marks)**

18. (a)



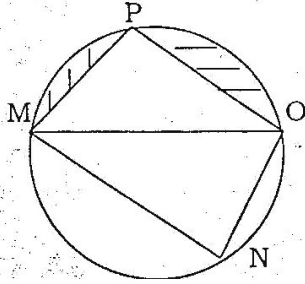
In the figure on the left, O is the centre of the circle and line AD is the diameter. Angle ACB = 50°. Find size (giving reasons for your answer) of

- (i) angle ADB.
- (ii) angle DAB.

(1½marks)

(2½marks)

b)



In the figure on the left, line MO is the diameter of the circle.

- (i) Given that line MP = a, line PO = b, line ON = c and line MN = d, show that $a = \sqrt{c^2 + d^2 - b^2}$.

(4marks)

- (ii) If $MO = 10\text{cm}$ and $MP = 8\text{cm}$, calculate the area of the shaded part. Take $\pi = 3.14$.

(4marks)

- (iii) Show that triangle MNO is congruent to triangle OPM given that line MN = line OP.

(3marks)

19. Below are the weights of 30 pupils in kilograms.

45	62	35	54	48	35
48	59	52	40	54	46
59	51	32	37	49	42
53	38	37	35	53	46
48	44	33	52	54	44

- (a) Make a grouped frequency table using interval of 5kg starting with 30 - 34. Complete the table below.

Weights (kg)	Mid point, x	Frequency, f	$f \cdot (x)$
30 - 34	32		

$\Sigma f(x) = \dots\dots\dots$

(14marks)

- (b) Calculate the mean weight of the pupils.

(1mark)

20. The coordinates of points A, B and C are (0;3) , (0;1) and (4;3) respectively.

(a) Plot these points on a Cartesian plane. Use 1cm to represent 1 unit on both axes. Join the points to form triangle ABC. **(4marks)**

(b) Find the coordinates of points A', B' and C' the images of A, B and C under translation $\begin{pmatrix} -4 \\ -3 \end{pmatrix}$. Plot these points on the same graph as in 20(a) and join them to form triangle A'B'C'. **(5marks)**

(c) Determine the coordinates of points A'', B'' and C'' after 90° rotation about the origin of triangle ABC. Draw triangle A''B''C'' on the same graph as 20(a). **(5marks)**

(d) Which single transformation that would map triangle A'B'C' onto triangle ABC? **(1mark)**