

Mathematics VII

113

16 Nov. 2005

8h30 – 11h30

RWANDA NATIONAL EXAMINATIONS COUNCIL



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NATIONAL EXAMINATION 2005

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.
- Calculators and mathematical instruments may be used.

SECTION A : Answer ALL questions (55 Marks)

1. Simplify $(2\frac{1}{2} \div 7\frac{1}{2}) + \frac{1}{4}$. (3marks)

2. Given that $f(x) = 2(x - 1)$, find
 (a) $f(-2)$. (1mark)
 (b) the value of x such that $f(x) = -8$. (2marks)

3. Simplify the following completely: $\frac{3(m-y) - 2(m-3y)}{m^2 - 9y^2}$. (3marks)

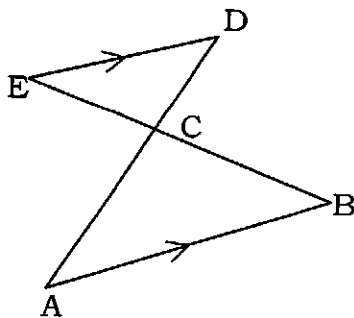
4. At a certain factory, the salary of a worker for 40 hours per week is 20 000frw. The worker is paid 10% of the weekly salary for every 2 hours that he works overtime. If at the end of a certain week he received 36 000frw, find the number of hours he worked overtime. (3marks)

5. Solve the inequality: $2y - \frac{7(y-1)}{2} > 17$. (3marks)

6. It is given that $\vec{x} = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$ and $\vec{y} = \begin{pmatrix} 12 \\ 9 \end{pmatrix}$. Find
 (a) the column vector of $\vec{y} - \vec{x}$. (1mark)
 (b) the value of $|\vec{x}| + |\vec{y}|$. (3marks)

7. The equation of line A is $2y = 3x + 4$. Line B passes through points (1;0) and (a;2). If line A is parallel to line B, find the value of a. (4marks)

8. In the diagram below show that triangle CDE is similar to triangle CAB.



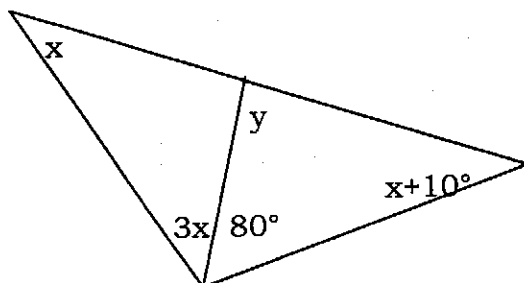
(4marks)

9. Musa, Sarah and Peter share 1000kg of sugar in the ratio 2:x:5 respectively. If Musa gets 200kg of sugar, how much sugar does Sarah get? (4marks)

10. Solve $(x + 3)(x - 4) = 18$.

(4marks)

11. In the figure below find the value of y .



(4marks)

12. (a) Copy the table below and complete it.

x	1	2	4	8		20
y			5		2	1

(3marks)

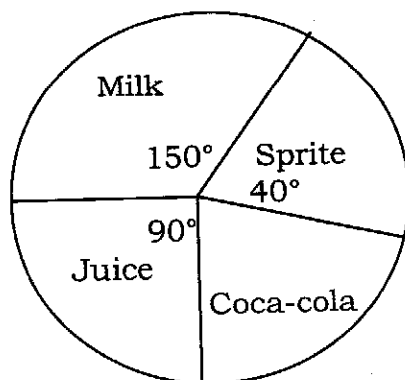
(b) Find the equation connecting x and y .

(1mark)

13. Determine the area enclosed by the lines $x = 3$, $y = -1$ and $x + y = 5$.

(4marks)

14. The pie chart below shows the drinks popularly liked by students in a certain school.



If 60 students like sprite, determine

- the number of students who like each type of drink.
- the total number of students in the school.

(3marks)

(1mark)

15. A (3,0) is a point in a Cartesian plane.

- If A(3,0) is mapped on to point B(5,2) by a translation, find the image of C(2,-3) under the same translation.
- Find the coordinates of image of A
 - under a reflection in y -axis.
 - under a quarter turn rotation about the origin.

(2marks)

(1mark)

(1mark)

SECTION B: Answer any THREE questions (45 Marks)

16. (a) Solve simultaneously:

$$\begin{aligned} x + y &= 3 \\ 2x^2 + y^2 + 3x &= 15 \end{aligned}$$

(10marks)

(b) Use answer from 16(a) and solve: $\frac{m^2y - 3m + 2}{4 - y} = 0$.

(5marks)

17. The table below shows the ages of 31 secondary school students:

15	14	15	16	17	18	14	20	17
16	20	17	19	19	14	15	20	14
18	19	17	20	17	14	14	15	18
20	19	14	19					

(a) Copy the table below and complete it.

Ages (x)	Frequency (f)	fx	Commutative frequency
	$\Sigma f =$	$\Sigma fx =$	

(b) State the mode.

(1½marks)

(c) Find the median age.

(1mark)

(d) Calculate the average age.

(1½marks)

(1mark)

18. (a) Solve: $2x^3 - 5x^2 - 9x + 18 = 0$, $x \in \mathbb{R}$.

(10marks)

(b) Factorise and simplify completely: $\frac{x^4 - 6x^3 + 9x^2}{x^3 - 3x^2}$.

(5marks)

19. The distance between two schools G and K is 432km. A bus transporting students leaves school G at 7.00 a.m for school K. The bus travels at an average speed of 72 km/h. One and half hours later a mini-bus leaves school G at a steady speed of 108km/h heading for school K. All the two vehicles travel non stop until they arrive in school K.

(a) Calculate the times when the two vehicles arrive in school K. **(3marks)**

(b) On a graph and on the same axes show the journeys of the two vehicles.

(8marks)

(c) Use your graph to estimate the

(i) time and distance from school G when the min-bus overtakes the bus. **(2marks)**

(ii) the distance at 10.00 a.m between the two vehicles. **(1mark)**

(iii) the time when the bus is 16km behind the mini-bus. **(1mark)**

20. A sample of 100 men was taken to find out how many were literate (L), married (M) or had an income generating project (P).

The following were the findings:

$$n(L) = 47, n(M) = 59, n(P) = 52, n(L \cap M) = 30$$

$$n(L \cap P) = 24 \text{ and } n(M \cap P) = 34.$$

14 of the men were literate, unmarried and without an income generating project.

(a) Represent this information on Venn diagram. **(9marks)**

(b) Determine the number of men who were

(i) literate, married and had an income generating project. **(3marks)**

(ii) neither literate nor married. **(3marks)**

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