MATHEMATICS I	
010	
20/11/2018 8.30AM - 11.30AM	

REB
Rwanda Education Board

ORDINARY LEVEL NATIONAL EXAMINATIONS, 2018

SUBJECT: MATHEMATICS I

DURATION: 3 HOURS

INSTRUCTIONS:

1) Write your names and index number on the answer booklet as they appear on your registration form, and **DO NOT** write your names and index number on additional answer sheets of paper if provided.

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

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

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

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

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

5) Use a **blue or black ink pen only** to write your answers and a **pencil** to draw diagrams.

6) Show clearly all the working. **Marks will not be awarded for the answer without all working steps.**

SECTION A: ATTEMPT ALL QUESTIONS (55Marks)

1) Expand the following: $(64x^2 - 25y^2)$ **(2marks)**

2) If $a - b = 2$ and $a^2 + b^2 = 20$, find the value of ab. **(3marks)**

3) Find the cardinal of Z set if $Z = \{$Natural numbers between 20 and 50, which are divisible by 7$\}$ **(3marks)**

4) Solve the following inequality in IR: $\dfrac{3}{4}x - \dfrac{4}{5}x \geq \dfrac{1}{2}$, **(3marks)**

5) The number of elements in each region of the Venn diagram is given.
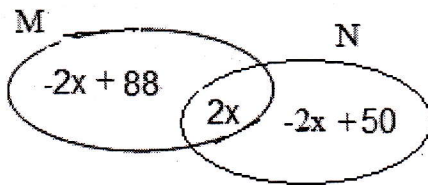
If $n(M \cup N) = 98$; find x. **(4marks)**

6) Rationalize the denominator:
$$\dfrac{-7\sqrt{2} + 3\sqrt{6}}{5\sqrt{6} + 2\sqrt{2}} =$$ **(4marks)**

7) Think of a number, I add 7 to it and double the result; the answer is 44. What is the number? **(4marks)**

8) A business woman has 8,000,000 Frw in the bank. The bank pays her an interest rate of 7% per year. How much money does she have after two years? **(4marks)**

9) A cell map is drawn to a scale of 4:80 000. What length on the map represents a distance of 10 000m? **(4marks)**

10) Find the coordinates of point T, given that $\overrightarrow{OT} = \overrightarrow{OA} + \overrightarrow{OB}$ if A= (12, 20) and B= (20, -8). **(4marks)**

11) At sellers of mobile phone, the price of a phone was marked down by 10 %. If the old price was 400,000Frw, calculate its actual selling price. **(4marks)**

12) In a group of 70 people, 32 like soft drinks and 47 like beer and each person likes at least one of the two drinks. How many like both soft drinks and beer? **(4marks)**
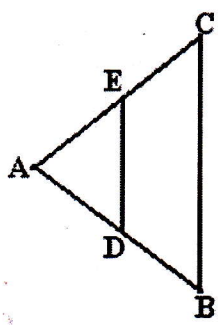
13) Solve the following simultaneous equations. **(4marks)**

$$\begin{cases} 3y + 2x = 5 \\ 4y + 3x = 7 \end{cases}$$

14) In the following figure, the length of the segment EH=44cm, find the value of the real number m, then find the length of EF and FH. **(4marks)**
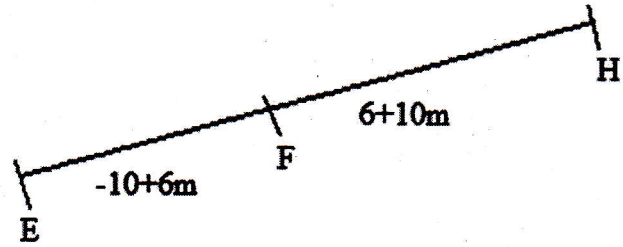
15) In the figure given below, DE ||BC. If AD = x cm, DB = x-2 cm, AE = x-1 cm, then find the value of x. **(4marks)**

SECTION B: ATTEMPT ONLY THREE QUESTIONS (45 Marks)

16) (a) In a group of 100 persons, 72 people can speak English and 43 can speak French.
   (i) How many people can speak English only? **(3marks)**
   (ii) How many people can speak French only? **(3marks)**
   (iii) How many people can speak both English and French? **(3marks)**

(b) Given that $\vec{x} = \begin{pmatrix} 0 \\ 12 \end{pmatrix}$, $\vec{y} = \begin{pmatrix} -8 \\ 6 \end{pmatrix}$, $\vec{z} = \begin{pmatrix} -8 \\ 6 \end{pmatrix}$

Calculate:

(i) $\vec{x} + \vec{y} - \vec{z}$ **(2marks)**

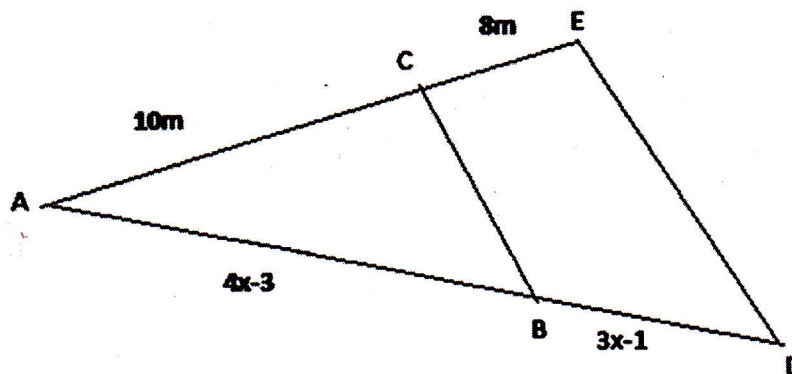(ii) $3\vec{x} - 2\vec{y} + 2\vec{z}$ **(2marks)**

(iii) $\frac{1}{2}(\vec{x} - \vec{y}) - 3\vec{z}$ **(2marks)**

17) (a) A father is 33 years older than his son and one year ago he was four times as old as his son.
  (i) Find the present age of the father. **(3marks)**
  (ii) Find the present age of the son. **(3marks)**

(b) In the triangle *AED*

(i) Use Thales Theorem to find the value of x in m. **(3marks)**

(ii) Find the length of side $\overline{AB}$ of the triangle. **(2marks)**

(iii) Find the length of side $\overline{BD}$ of the triangle. **(2marks)**

(iv) Find the length of side $\overline{AD}$ of the triangle. **(2marks)**

18) (a) Study the rectangle given below and answer the questions that follow.
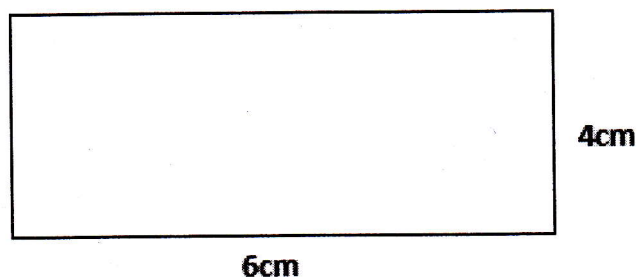
(i) Calculate its area. **(2marks)**
(ii) If it is enlarged with a scale factor of 6, find its area. **(3marks)**

(b) A garden on the map has an area of 20cm². Calculate its actual
   area if the map scale is 1:500   **(3marks)**
(c) If f (x) =2+x and g(x) =3-x
   Calculate:
   (i) f(2)=   **(1mark)**
   (ii) fog(x)=   **(2marks)**
   (iii) gof(x)=   **(2marks)**
   (iv) gof(-5)=   **(2marks)**

19) Study the following table which shows the score obtained by students
   of senior two in Mathematics Midi-term Test out of 20 marks and
   answer the questions that follow:

16	12	11	12	11	12	12	11	12	11	16
18	18	11	20	11	12	13	11	13	13	16
18	13	14	13	14	14	13	13	19	19	17
18	15	14	14	13	15	15	15	15	15	17

(a) Copy the frequency table given below and complete it with the
    above data.   **(10marks)**

Marks, x	Frequency, f	fx	Cumulative frequency
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
	$\sum f =$	$\sum fx =$	

(b) What is the mode mark? Explain your answer.   **(1mark)**
(c) Determine the mean mark.   **(2marks)**
(d) Calculate the number of Students in S2 if all students attended
   the Test.   **(2marks)**

20)(a) A triangle with vertices M, N and P whose coordinates are $\frac{10}{5}$, O),

$(\frac{15}{3}, \frac{24}{6})$ and $(\frac{12}{2}, 1)$ respectively is given a translation $\tilde{t} = \begin{pmatrix} -\frac{12}{4} \\ 7 \end{pmatrix}$.

Find the image vertices:
  (i)   J'   (3marks)
  (ii) K'   (3marks)
  (iii) P'   (3marks)

(b) If A (1,2) and B (3,1) are two points on the line:
  (i) Find the slope of the line.   (2marks)
  (ii)Find the equation of the line passing through the given
      point A and B.   (3marks)
  (iii) Find its y- intercept.   (1mark)