This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 01

17FEB2025

Do NOT write in this box. Your MARK will be placed here.

Subject :	Maths
Class :	10B, 10C and 10E
Teacher :	Taline Hawatian
Duration :	1 hour
You are to answer the questions to this exam on : Squared paper	

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

I.- (9 points)

1) Solve the following equations and inequalities. Write the solution set.
   a) $|2x - 3| \leq 4$
   b) $7 - 2|5 - x| = -3$
   c) $8 + 2|x - 2| \geq 6$
2) Write the following expression without the absolute value: E= $\left|2x + \frac{6x}{x-3}\right|$
3) Determine, the value of x, for which $f(x)$ is defined. Write your answer in interval form.

$$f(x) = \frac{3x+7}{\sqrt{|8+x|-5}}$$

II.- (4.5 points)

In a class, **40** students take music lessons, **32** students take drama lessons and **28** students take dance lessons. **12** students take music and drama, **14** students take drama and dance, **19** students take music and dance. **7** students take music, drama and dance lessons. **8** students do not take music, drama or dance lessons.

1) Represent the above given in a Venn diagram, where M represents Music, D drama, and A dance.
2) Determine the total number of students in this class.
3) Determine the number of students who take dance and music but not drama.
4) Determine the number of students who study only music.
5) Determine the number of students who study drama or music.
6) Determine the number of students who are taking lessons only in one form of arts (music, drama, dance).

III.- (5 points)

State whether the following statements are true or false. Correct the false.

1) The equation $2x^2 + 5 = 3$ has solutions in R.
2) $\left\{\frac{-7}{17}, \sqrt{1.69},\ 4.1111\ldots\right\} \subset Q$
3) If the cardinal of parts of E is 16, then the cardinal of E is 2.

4) If E={x/ x ∈ Q and x is a solution of the equation $(x-\sqrt{3})(x+\pi)=0$}, then CardE=1.
5) If $\|\vec{u}\|=4, \|\vec{v}\|=7, \|\vec{u}+\vec{v}\|=3$, then $\vec{u}$ and $\vec{v}$ are opposite vectors.

IV.- (6.5 points)

EFGH is a parallelogram. The diagonals [EG] and [FH] intersect at O. Mark the points M, N, P such that $\overrightarrow{FM}=\frac{1}{2}\overrightarrow{FG}$, $\overrightarrow{HN}=2\overrightarrow{HG}$, $\overrightarrow{FP}=\frac{1}{3}\overrightarrow{FH}$.

1) Show that $\overrightarrow{EP}=\frac{2}{3}\overrightarrow{EF}+\frac{1}{3}\overrightarrow{EH}$.
2) Express $\overrightarrow{EN}$ in terms of $\overrightarrow{EF}$ and $\overrightarrow{EH}$.
   Deduce that E, P, N are collinear.
3) Show that $\overrightarrow{FP}=\frac{2}{3}\overrightarrow{FO}$. What does P represent for triangle EFG?

SE01/20242025/Maths/10BCE

I.- 1) a) $|2x-3| \leq 4$

$-4 \leq 2x-3 \leq 4$ (1.5)

$-1 \leq 2x \leq 7$

$-\frac{1}{2} \leq x \leq \frac{7}{2}$ $\quad S=[-\frac{1}{2};\frac{7}{2}]$ (0.5)

b) $7-2|5-x|=-3$

$-2|5-x|=-10$ (0.5)

$|5-x|=5$

$5-x=-5$ (0.5) $\quad -x=-10$ (0.5) $\quad x=10$

$5-x=5$ (0.5) $\quad -x=0$ (0.5) $\quad x=0$ (0.5) $\quad S=\{0;10\}$

c) $8+2|x-2| \geq 6$ $\quad 2|x-2| \geq -2$ $\quad |x-2| \geq -1$ $\quad S=\mathbb{R}$ (1)

2) $E=\left|2x+\frac{6x}{x-3}\right|=\left|\frac{2x^2-6x+6x}{x-3}\right|=\left|\frac{2x^2}{x-3}\right|=\frac{2x^2}{|x-3|}$ (0.5)

$E=\frac{2x^2}{|x-3|}=\begin{cases}\frac{2x^2}{x-3} & \text{if } x>3\\ \frac{2x^2}{3-x} & \text{if } x<3\end{cases}$ (1.5)

3) $f(x)=\frac{3x+7}{\sqrt{|8+x|-5}}$ $\quad |8+x|-5>0$

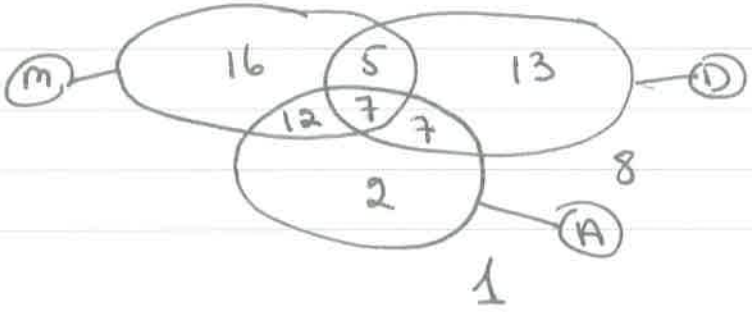
$|8+x|>5$

$8+x<-5$ or $8+x>5$ (1.5)

$x<-13$ $\quad x>-3$

$S=]-\infty;-13[\ \cup\ ]-3;+\infty[$ (0.5)

II.- 1)



(1.5)

2) Number of students = 40 + 13 + 7 + 2 + 8 = 70 1

3) 12 students take dance and music but not drama. 0.5

4) 16 students study only music. 0.5

5) 40 + 7 + 13 = 60 0.5
60 students study drama or music

6) 16 + 13 + 2 = 31 31 students study only one. 0.5

III.- 1) False 0.5
$2x^2 + 5 = 3$ $2x^2 = -2$ $x^2 = -1$ no solution. 0.5

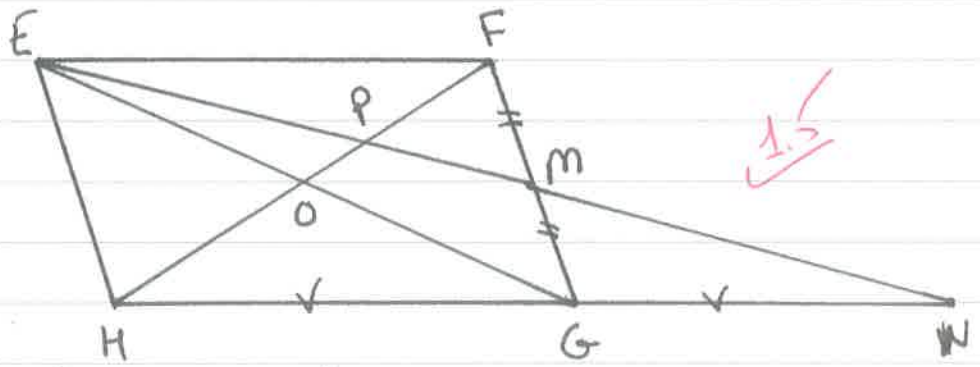
2) True 1

3) False 0.5 Card $\mathcal{P}(E) = 2^n$ $n = \text{card } E$ 0.5
$2^n = 16$ $n = 4$

4) False 0.5
$(x - \sqrt{3})(x + \pi) = 0$
$x - \sqrt{3} = 0$ $x = \sqrt{3}$ $x + \pi = 0$ $x = -\pi$ 0.5
$\sqrt{3}$ and $-\pi$ are irrational numbers.
Card E = 0.

5) False 0.5 $\vec{u}$ and $\vec{v}$ have opposite senses. 0.5

IV.-



1.5

1) $\overrightarrow{EP} = \overrightarrow{EF} + \overrightarrow{FP}$
$= \overrightarrow{EF} + \frac{1}{3}\overrightarrow{FH}$
$= \overrightarrow{EF} + \frac{1}{3}(\overrightarrow{FE} + \overrightarrow{EH})$
$= \overrightarrow{EF} + \frac{1}{3}\overrightarrow{FE} + \frac{1}{3}\overrightarrow{EH}$
$= \overrightarrow{EF} - \frac{1}{3}\overrightarrow{EF} + \frac{1}{3}\overrightarrow{EH}$
$\overrightarrow{EP} = \frac{2}{3}\overrightarrow{EF} + \frac{1}{3}\overrightarrow{EH}$

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2) $\overrightarrow{EN} = \overrightarrow{EH} + \overrightarrow{HN}$

$= \overrightarrow{EH} + 2\overrightarrow{HG}$

$\overrightarrow{EN} = \overrightarrow{EH} + 2\overrightarrow{EF}$

$\overrightarrow{EP} = \frac{2}{3}\overrightarrow{EF} + \frac{1}{3}\overrightarrow{EH} = \frac{1}{3}(2\overrightarrow{EF} + \overrightarrow{EH}) = \frac{1}{3}\overrightarrow{EN}$ 1.5

$\overrightarrow{EP} = \frac{1}{3}\overrightarrow{EN}$ $\Rightarrow$ $\overrightarrow{EP}$ and $\overrightarrow{EN}$ are collinear vectors

E is a common point. 0.5

E, P, N are collinear points.

3) $\overrightarrow{FP} = \frac{1}{3}\overrightarrow{FH} = \frac{1}{2}(2\overrightarrow{FO}) = \frac{2}{3}\overrightarrow{FO}$ 0.5

In $\triangle EFG$,

O is the midpoint of [EG] (diagonals of parallelogram bisect each other)

[FO] is the median relative to [EG].

and $FP = \frac{2}{3}FO$. 0.5

Therefore P is the center of gravity of $\triangle EFG$.