This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls — Loueizeh - Baabda

Stage Exam 01
06NOV2023

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

Subject :	Maths	
Class :	10B and 10C	
Teacher :	Taline Hawatian	
Duration :	1 hour	
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.

SE01/20232024/Maths/10BC

I.- (8 points)

Write whether the following statements are true or false. Justify your answer.

1) The equation $25x^2 + 1 = 5$ has a solution in Z.
2) The equation $x^2 + 9 = 0$ has a solution in R.
3) $\left\{-3; -\frac{\sqrt{10}}{5}; 0\right\} \subset Z \cap Q$
4) $\left\{0.5; \frac{\sqrt{3}}{\sqrt{27}}; -5.\overline{9}\right\} \subset Z^* \cup Q$
5) $\sqrt{9x^2} = -3x$ if x is negative.
6) $\{ x / x \in R \text{ and } x \leq -3 \} = [-3; +\infty[$
7) $\sqrt{x^2 + x^3} = |x|\sqrt{1 + x}$
8) E= $\{x / x \in Q$ and x is a solution of the equation $(x + 7)(x - \sqrt{5}) = 0\}$, then Card(E)= 2.

II.- (3 points)

110 university students were surveyed. 25 took physics. 45 took biology. 45 took mathematics. 10 took physics and mathematics. 8 took biology and mathematics. 6 took physics and biology. 5 took all three.

1) Represent the given on a Venn diagram.
2) How many students took biology, but neither physics nor mathematics?
3) How many students took biology, physics or mathematics?
4) How many students did not take any of the three subjects?
5) How many students took biology and physics, but not mathematics?

III.- (7 points)
Find the set of real numbers such that:

1) $|x - 7| + 4 = 8$ 2) $|5x - 3| < 7$ 3) $|3x + 4| > -4$
4) $|x - 12| + 6 \geq 12$.

IV.- (7 points)

Show all the steps of calculation.

1) Write without the absolute value: $|-8^{-7}|$; $|3\pi - 10|$.
2) Calculate the numerical value of E=$|x + 2y| - y - |y - x|$

   for $x=\sqrt{61}$ and $y=-4$. Justify your answer.
3) Determine x so that E is defined: E= $\dfrac{|7x+1|}{\sqrt{|x+11|-5}}$
4) Write the following expression without the absolute value.

   A= $\left|5x - \frac{10x}{x+2}\right|$

SE01/20232024/Maths/10BC

I.- 1) False
$25x^2+1=5 \quad 25x^2=4 \quad x^2=\frac{4}{25} \quad x=\pm\frac{2}{5} \quad \pm\frac{2}{5} \notin \mathbb{Z}$.

2) False $x^2+9=0 \quad x^2=-9$ No solution

3) False $\{-3; \frac{-\sqrt{10}}{5}; 0\} \notin \mathbb{Z}\cap\mathbb{Q} \quad \frac{-\sqrt{10}}{5} \notin \mathbb{Z}$.

4) True $0.5 \in \mathbb{Q}$, $\frac{\sqrt{3}}{\sqrt{27}}=\frac{\sqrt{3}}{3\sqrt{3}}=\frac{1}{3} \in \mathbb{Q} \quad -5.\overline{9} \in \mathbb{Q}$

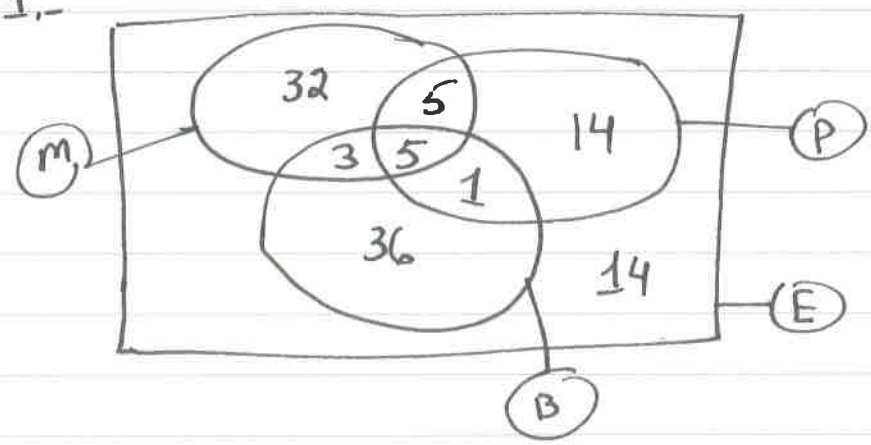
5) True $\sqrt{9x^2}=3|x|=-3x$ since $x<0$

6) False $\{x / x \in \mathbb{R} \text{ and } x \leq -3\} =]-\infty; -3]$

7) $\sqrt{x^2+x^3}=\sqrt{x^2(1+x)}=|x|\sqrt{1+x}$ True

8) False
$(x+7)(x-\sqrt{5})=0 \quad x=-7 \quad x=\sqrt{5} \quad \sqrt{5} \notin \mathbb{Q}$.
Card E = 1

II.- 1.-



2.- 36 student took biology, but neither physics nor mathematics.

3.- 96 student took biology, physics, or mathematics.

4.- $110-96=14$ 14 students

5.- 1 student took biology and physics and not mathematics.

III. 1) $|x-7|+4=8$

$|x-7|=4$

$x-7=4$ or $x-7=-4$ (1)

$x=11$ $x=3$ (0.5)

$S=\{3;11\}$ (0.5)

2) $|5x-3|<7$ (0.5)

$-7<5x-3<7$

$+3 \quad +3 \quad +3$ (0.5)

$-4<5x<10$ (0.5)

$\frac{-4}{5}<x<2$ (0.5)

$S=]-\frac{4}{5};2[$ (0.5)

3) $|3x+4|>-4$

$S=\mathbb{R}$ (1)

4) $|x-12|+6\geq 12$

$|x-12|\geq 6$

$x-12\leq -6$ $x-12\geq 6$ (1)

$x\leq 6$ $x\geq 18$ (0.5)

$S=]-\infty;6]\cup[18;+\infty[$ (0.5)

IV. 1) $|-8^{-7}|=8^{-7}$ (0.5) $|3\pi-10|=10-3\pi$ (0.5) $3\pi<10$

2) $E=|\sqrt{61}+2(-4)|-(-4)-|-4-\sqrt{61}|$

$=|\sqrt{61}-8|+4-(4+\sqrt{61})$ (1) $(-4-\sqrt{61}<0)$ (0.5)

$=8-\sqrt{61}+4-4-\sqrt{61}=8-2\sqrt{61}$ (0.5) $(\sqrt{61}<8)$

3) $E=\frac{|7x+11|}{\sqrt{|x+11|-5}}$ $|x+11|-5>0$ (0.5)

$|x+11|>5$

$x+11>5$ $x+11<-5$ (1)

$x>-6$ $x<-16$

E is defined for x in $]-\infty;-16[\cup]-6;+\infty[$ (0.5)

4) $A=|5x-\frac{10x}{x+2}|$ $x\neq -2$ (0.5)

$=|\frac{5x^2+10x-10x}{x+2}|$ (0.75)

$=|\frac{5x^2}{x+2}|=\frac{5x^2}{|x+2|}=\begin{cases}\frac{5x^2}{x+2} & \text{if } x>-2\\ \frac{-5x^2}{x+2} & \text{if } x<-2\end{cases}$ (1)