This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Loueizeh - Baabda

Stage Exam 02

08DEC2023

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

Subject :	Maths
Class :	9C and 9E
Teacher :	Nicolas Imad
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.
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I.- (4 points)

In the table below, only one of the proposed answers is correct. Write the number of each question and give with **justification** the correct answer.

Number	Questions		Answers	
		a	b	c
1	$5^{20} - 5^{18} =$	25	24×5^{18}	4×5^{18}
2	$\frac{9}{8} - \frac{5}{8} \times \frac{16}{10} =$	$\frac{1}{8}$	$\frac{3}{5}$	$-\frac{1}{8}$
3	The scientific notation of 0.000257 is	257×10^{-6}	2.57×10^{-6}	2.57×10^{-4}
4	If $(\sqrt{3}+1)x = 2$, then $x =$	$2\sqrt{3}+2$	$2\sqrt{3}-2$	$\sqrt{3}-1$

II.- (7 points)

Show all the steps of calculation.

Consider the three numbers A, B, and C such that:

$$A = \left(3\sqrt{2} - \sqrt{3}\right)^2 - \left(\sqrt{5} - 2\sqrt{3}\right)\left(\sqrt{5} + 2\sqrt{3}\right) + 2\sqrt{3}\left(\sqrt{18} - \sqrt{27}\right)$$

$$B = \frac{1}{7} - \frac{6}{7} \div \left(\frac{1}{3} - 5\right)$$

$$C = \frac{0.9 \times 10^{-4} \times 15 \times \left(10^{-4}\right)^3}{(0.5)^2 \times 48 \times 10^{-3}}$$

1) Verify that A is a natural number.

2) Write B in its simplest form.

3) Write C in scientific notation.

III.- (9 points)

Given the following polynomials:

$A(x) = (5x-3)^2 - 16x^2$

$B(x) = x^2 - 10x + 25 - (10 - 2x)(x + 2)$

1) Expand $A(x)$ and solve the equation $A(x) = 9$.
2) Factorize $A(x)$ and deduce that $A(x) = 3(x-3)(3x-1)$.
3) Factorize $B(x)$.
4) Let $F(x) = \frac{A(x)}{(x-5)(3x-1)}$
   a) Determine the domain of definition of $F(x)$.
   b) Simplify $F(x)$ and then solve the equation $F(x) = 0$.
   c) Does the equation $F(x) = \frac{12}{7}$ have a solution? Justify.
   d) Calculate $F(\sqrt{2})$ and write the answer in the form $a + b\sqrt{2}$, where a and b are rational numbers.

Class 1

Solution for SED2

9CE - Maths

I. 1) $5^{20} - 5^{18} = 5^{18}(5^2 - 1) = 5^{18} \times 24$ (b) (1)

2) $\frac{9}{8} - \frac{\cancel{8}^{1}}{\cancel{8}_{1}} \times \frac{\cancel{16}^{2}}{\cancel{10}_{2}} = \frac{9}{8} - 1 = \frac{9}{8} - \frac{8}{8} = \frac{1}{8}$ (a) (1)

3) $0.000257 = 2.57 \times 10^{-4}$ (c) (1)

4) $(\sqrt{3}+1)x = 2 \quad x = \frac{2}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1} = \frac{2(\sqrt{3}-1)}{2} = \sqrt{3}-1$ (c) (1)

II. 1) $A = (3\sqrt{2} - \sqrt{3})^2 - (\sqrt{5} - 2\sqrt{3})(\sqrt{5} + 2\sqrt{5}) + 2\sqrt{3}(\sqrt{18} - \sqrt{27})$

$= 18 - 6\sqrt{6} + 3 - (5 - 12) + 2\sqrt{3}(3\sqrt{2} - 3\sqrt{3})$

$= 18 - 6\sqrt{6} + 3 + 7 + 6\sqrt{6} - 18$

$= 10$ Natural number (2)

2) $B = \frac{1}{7} - \frac{6}{7} \div \left(\frac{1}{3} - 5\right)$

$= \frac{1}{7} - \frac{6}{7} \div \left(\frac{1-15}{3}\right)$

$= \frac{1}{7} - \frac{6}{7} \div \frac{(-14)}{3}$

$= \frac{1}{7} - \frac{\cancel{6}^{3}}{7} \times \frac{3}{-\cancel{14}_{7}}$

$= \frac{1}{7} + \frac{9}{49} = \frac{16}{49}$ (2)

3) $C = \dfrac{0.9\times10^{-4}\times15\times(10^{-4})^3}{(0.5)^2\times48\times10^{-3}} = \dfrac{9\times10^{-1}\times10^{-4}\times15\times10^{-12}}{5^2\times10^{-2}\times2^4\times3\times10^{-3}}$ (1)

$= \dfrac{9\times10^{-17}}{80\times10^{-5}} = \dfrac{9}{8}\times10^{-13} = 1.125\times10^{-13}$ (2)

III. $A(x) = (5x-3)^2 - 16x^2$ $\quad B(x) = x^2-10x+25-(10-2x)(x+2)$

1) $A(x) = 25x^2 - 30x + 9 - 16x^2$

$= 9x^2 - 30x + 9$ (1)

$A(x) = 9$

$9x^2 - 30x + 9 = 9$

$9x^2 - 30x = 0$

$x(9x-30) = 0$ $\quad x = 0$ or $9x-30=0$

$x = \dfrac{30}{9} = \dfrac{10}{3}$ (1)

2) $A(x) = (5x-3-4x)(5x-3+4x)$

$= (x-3)(9x-3)$

$= 3(x-3)(3x-1)$ (1.5)

3) $B(x) = (x-5)^2 + 2(x-5)(x+2)$

$= (x-5)(x-5+2x+4)$

$= (x-5)(3x-1)$ (1.5)

4) $F(x) = \dfrac{A(x)}{(x-5)(3x-1)} = \dfrac{3(x-3)(3x-1)}{(x-5)(3x-1)}$

a) $(x-5)(3x-1) \neq 0$

$x-5 \neq 0$ and $3x-1 \neq 0$

$x \neq 5$ $\quad x \neq \dfrac{1}{3}$ (1) $D_f = \mathbb{R} - \left\{\dfrac{1}{3}; 5\right\}$

(2)

b) $F(x) = \frac{3(x-3)(3x-1)}{(x-5)(3x-1)} = \frac{3(x-3)}{x-5}$

$F(x) = 0$

$\frac{3(x-3)}{x-5} = 0$

$3(x-3) = 0$

$x - 3 = 0$

$x = 3$ Accepted (1)

c) $\frac{3(x-3)}{x-5} = \frac{12}{7}$

$21(x-3) = 12(x-5)$

$21x - 63 = 12x - 60$

$9x = 3$

$x = \frac{3}{9} = \frac{1}{3}$ rejected (1)

d) $F(\sqrt{2}) = \frac{3(\sqrt{2}-3)}{\sqrt{2}-5} \times \frac{\sqrt{2}+5}{\sqrt{2}+5}$

$= \frac{(3\sqrt{2}-9)(\sqrt{2}+5)}{(\sqrt{2}-5)(\sqrt{2}+5)} = \frac{6+15\sqrt{2}-9\sqrt{2}-45}{2-25}$

$= \frac{6\sqrt{2}-39}{-23}$ (1)

$= \frac{6\sqrt{2}}{-23} + \frac{-39}{-23}$

$= \frac{39}{23} - \frac{6\sqrt{2}}{23}$