This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Mock Exams : Pt1

9, 10, 11 MAY022

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

Subject :	Maths	
Class :	9BC	
Teacher :	Taline Hawatian	
Duration :	2 hours	
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.- (2.5 pts)

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

N	Questions	a	b	c
1	$3^{10} - 2x = 3^9$, then $x=$	3^9	3^5	3
2	If a= $2\sqrt{11} + 3\sqrt{5}$, then $\frac{1}{a} =$	$2\sqrt{11} - 3\sqrt{5}$	$-2\sqrt{11} - 3\sqrt{5}$	$3\sqrt{5} - 2\sqrt{11}$
3	The original price of an article is 50 000 LL ,and its price after the discount is 44000 LL . The percentage of discount is…	8%	10%	12%
4	A triangle ABC is right at A and M is the midpoint of [BC]. If AM = AB = 5 then AC=	10	$5\sqrt{3}$	$10\sqrt{3}$
5	In an orthonormal system, the two lines with equations y = −3x + 1 and 3y − x = 1 are…	perpendicular	parallel	intersecting at the point $(-2,7)$

II.- (5 pts)

Given the following polynomials:

$A(x) = (5x - 4)(3 - x) - 15x^2 + 12x$

$B(x) = 4(2x + 1)^2 - 25$

1) Factorize A(x) and deduce that $A(x) = (5x - 4)(3 - 4x)$.
2) Factorize $B(x)$.
3) Let $F(x) = \frac{(5x-4)(3-4x)}{(4x-3)(4x+7)}$
   a) Determine the domain of definition of $F(x)$.
   b) Simplify $F(x)$, then solve the equation $F(x) = 4$.
   c) Calculate $(F(\sqrt{5}))$ and write the answer in the form $a\sqrt{5} + b$ where a and b are integers.

III.- (2.5 pts)

Given $E = \frac{2\sqrt{60}-\sqrt{1500}+24}{2\sqrt{3}\times\sqrt{15}-6\sqrt{5}-6}$ and F=$\left(\sqrt{5} - \sqrt{3}\right)^2$.

1) Write E in the form $\sqrt{a} - b$ where a and b are integers.
2) Calculate F, and verify that F=−2E.

IV.- (6 pts)

In an orthonormal system of axes $x'Ox, y'Oy$, consider the points A$(-2; 1)$ and B$(2; 3)$. Let (d) be the straight line of equation $y = -2x+2$.

1) Locate the points A and B. Write the equation of the straight line (AB).
2) Plot the straight line (d).
3) Let I be the point of intersection of (d) with $y'Oy$. Calculate the coordinates of I.
4) Verify that (d) is the perpendicular bisector of [AB].
5) Given the point M$(-1; 4)$.
    a) Calculate MA and MB.
    b) What is the nature of triangle MAB? Justify you answer.
6) (C) is the circle circumscribed about triangle MAB. Calculate the radius and the coordinates of the center of the circle (C).
7) F is the symmetric of M with respect to I.
    a) Calculate the coordinates of F.
    b) What is the nature of quadrilateral MAFB? Justify your answer.

V.- (4 pts)

Let (C) be the circle of center O and radius 3 cm. [AB] is the diameter of (C). E is a point on the circle (C) such that AE=2cm. M is any point on (C). I is the midpoint of [OB]. The straight line passing through I and parallel to (OM) cuts (AM) in N.

1) Draw the figure.
2) Show that triangle AEB is right angled at E. Calculate the exact value of BE.
3) Calculate IN.

Mocks Pt 1
Mathematics
9BC

Answer Key

I.- 1.- a $3^{10} - 2x = 3^9$

$2x = 3^{10} - 3^9 \quad x = \frac{3^9(3-1)}{2} = \frac{3^9 \times 2}{2} = 3^9$ 0.5

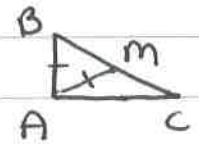
2.- c $\frac{1}{a} = \frac{1}{2\sqrt{11}+3\sqrt{5}} \times \frac{2\sqrt{11}-3\sqrt{5}}{2\sqrt{11}-3\sqrt{5}}$ 0.5

$= \frac{2\sqrt{11}-3\sqrt{5}}{44-45} = \frac{2\sqrt{11}-3\sqrt{5}}{-1} = 3\sqrt{5} - 2\sqrt{11}$

3.- c $a = \frac{y}{x} = \frac{44000}{50000} = 0.88$ discount $= 1 - 0.88$ 0.5

$= 0.12 = 12\%$

4.- b



$BC = 2AM = 2(5) = 10$

$AC^2 = BC^2 - AB^2$ (Pythagorean theorem)

$= 100 - 25 = 75$ 0.5

$AC = 5\sqrt{3}$

5.- a $(d): y = -3x + 1$

$(d'): 3y - x = 1$

$y = \frac{1}{3}x + \frac{1}{3}$

slope (d) x slope (d') $= (-3)(\frac{1}{3}) = -1$ 0.5

(d) and (d') are perpendicular.

II.- 1) $A(x) = (5x-4)(3-x) - 15x^2 + 12x$ 0.5

$= (5x-4)(3-x) - 3x(5x-4)$

$= (5x-4)(3-x-3x) = (5x-4)(3-4x)$ 0.5

0.5

2) $B(x) = 4(2x+1)^2 - 25$

$= [2(2x+1) - 5][2(2x+1) + 5]$ 0.5

$= (4x+2-5)(4x+2+5)$ 0.5

$= (4x-3)(4x+7)$ 0.5

3) a) $(4x-3)(4x+7) \neq 0$

$4x-3 \neq 0 \quad x \neq \frac{3}{4} \qquad 4x+7 \neq 0 \quad x \neq -\frac{7}{4}$ 0.5

$F(x)$ is defined for all x in $\mathbb{R}$ except $-\frac{7}{4}$ and $\frac{3}{4}$.

b) $F(x) = \frac{(5x-4)(3-4x)}{(4x-3)(4x+7)} = \frac{-(5x-4)(4x-3)}{(4x-3)(4x+7)}$ 0.5

$= \frac{4-5x}{4x+7}$

$\frac{4-5x}{4x+7} \times \frac{4}{1} \qquad 4(4x+7) = 4-5x$ 0.5

$16x+28 = 4-5x$

$21x = -24 \quad x = -\frac{24}{21} = -\frac{8}{7}$ accepted

c) $F(\sqrt{5}) = \frac{4-5\sqrt{5}}{4\sqrt{5}+7} \times \frac{4\sqrt{5}-7}{4\sqrt{5}-7}$ 0.5

$= \frac{16\sqrt{5}-28-100+35\sqrt{5}}{16\times 5-49} = \frac{51\sqrt{5}-128}{31}$

III) 1) $E = \frac{\sqrt{240}-5\sqrt{60}+24}{2\sqrt{3}\times\sqrt{15}-6\sqrt{5}-6}$

$= \frac{\sqrt{4^2\times 15}-5\sqrt{4\times 15}+24}{2\sqrt{45}-6\sqrt{5}-6}$

$= \frac{4\sqrt{15}-10\sqrt{15}+24}{6\sqrt{5}-6\sqrt{5}-6} = \frac{24-6\sqrt{15}}{-6} = -4+\sqrt{15}$ 1.5

$a = 15 \quad b = -4$

$F = (\sqrt{5}-\sqrt{3})^2 = 5-2\sqrt{15}+3$ 0.5

$= 8-2\sqrt{15}$

$-2E = -2(-4+\sqrt{15}) = 8-2\sqrt{15} = F$ verified 0.5

IV.- 1) slope (AB) $= \frac{y_B - y_A}{x_B - x_A} = \frac{3-1}{2+2} = \frac{2}{4} = \frac{1}{2}$. 0.5

$y - y_A = m(x - x_A)$ $\quad y - 1 = \frac{1}{2}(x+2)$

$(AB): \ y = \frac{1}{2}x + 2$ 0.5 0.5

2) graph

3) a) I belongs to y'Oy. $x_I = 0$

I belongs to (d). $y_I = -2x_I + 2 = -2(0) + 2 = 2$

$I(0;2)$ 0.5

4) slope (d) x slope (AB) $= (-2)\left(\frac{1}{2}\right) = -1$.

This implies that (d) is perpendicular to (AB) since the product of their slopes is -1. 0.5

$\frac{x_A + x_B}{2} = \frac{-2+2}{2} = \frac{0}{2} = 0 = x_I$.

$\frac{y_A + y_B}{2} = \frac{1+3}{2} = \frac{4}{2} = 2 = y_I$. 0.5

$\Rightarrow$ I is the midpt. of [AB].

Therefore (d) is the perpendicular bisector of [AB] since it cuts [AB] at its midpoint and is perpendicular to it.

5) a) $MA = \sqrt{(x_A - x_m)^2 + (y_A - y_m)^2}$ 0.5

$= \sqrt{(-2+1)^2 + (1-4)^2} = \sqrt{1+9} = \sqrt{10}$ u.

$MB = \sqrt{(2+1)^2 + (3-4)^2} = \sqrt{9+1} = \sqrt{10}$ u. 0.5

b) $AB = \sqrt{(2+2)^2 + (3-1)^2} = \sqrt{16+4} = \sqrt{20} = 2\sqrt{5}$ u

$MA^2 + MB^2 = 10 + 10 = 20 = AB^2$.

$\triangle MAB$ is a right $\triangle$, right angled at M. (converse of Pyth. thm) 0.5

$MA = MB = \sqrt{10}$ u

Therefore $\triangle MAB$ is right isosceles $\triangle$.

6) $\widehat{AMB} = 90°$ (proved above)
So [AB] is the diameter of the circle circumscribed about ΔAMB.
I (0; 2) is the center of circle (C) 0.5
and radius = $\frac{\text{diameter}}{2} = \frac{AB}{2} = \frac{2\sqrt{5}}{2} = \sqrt{5}$ u.

7) a) F is the symmetric of M with respect to I.
I is the midpoint of [MF].

$x_I = \frac{x_M + x_F}{2}$ $\quad y_I = \frac{y_M + y_F}{2}$ 0.5

$\frac{0}{1} = \frac{-1 + x_F}{2}$ $\quad \frac{2}{1} = \frac{4 + y_F}{2}$

$x_F = 1$ $\quad y_F + 4 = 4$ $\quad y_F = 0$ $\quad F(1; 0)$

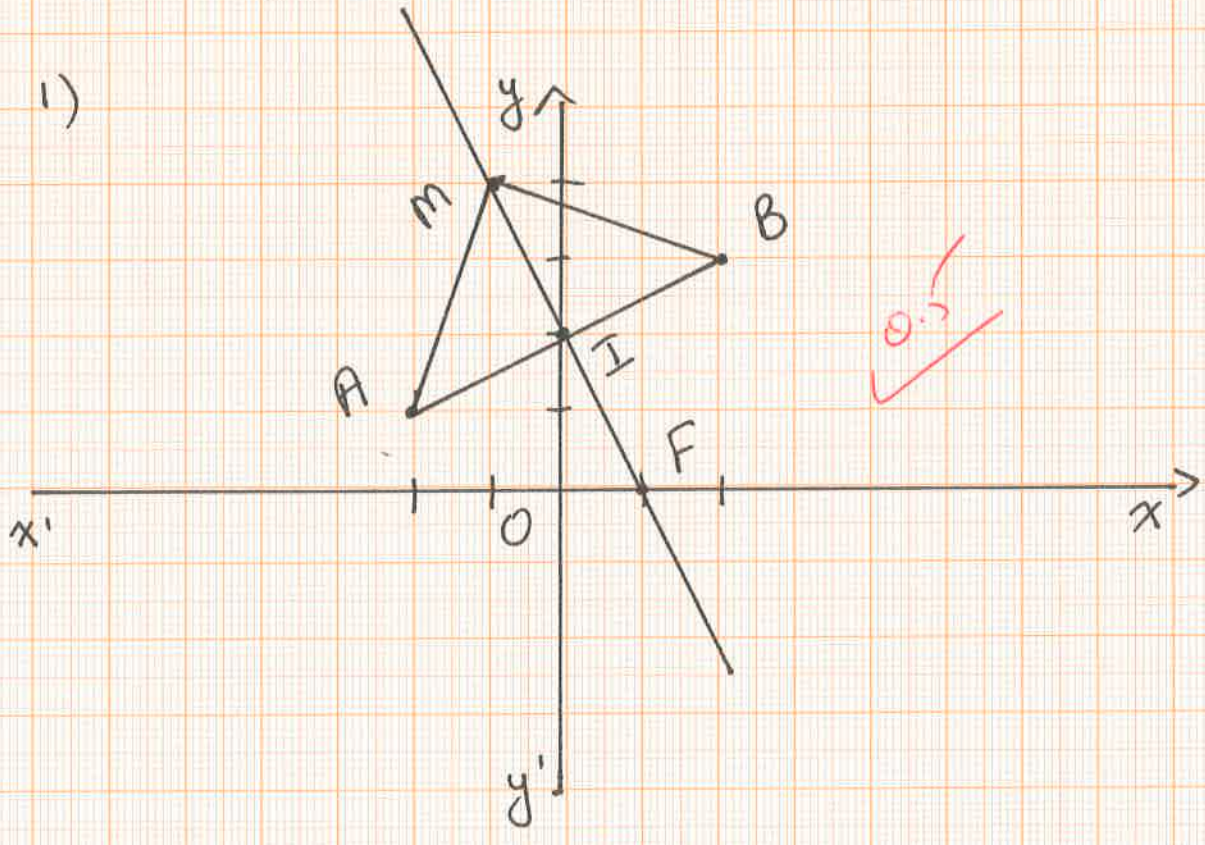
b) The diagonals [AB] and [MF] intersect at their midpoint I perpendicularly. (proved)
This implies that MAFB is a rhombus. 0.5
But $\widehat{AMB} = 90°$ (proved above)
Therefore MAFB is a square since it is a rhombus with 1 right angle.

V.- 1) Figure 0.5
2) $\widehat{AEB} = 90°$ (inscribed angular sector facing the diameter [AB]). 0.5
$BE^2 = AB^2 - AE^2$ (Pythagorean theorem).
$= 6^2 - 2^2 = 36 - 4 = 32$ $\quad BE = \sqrt{32} = 4\sqrt{2}$ cm. 1
3) In ΔAIN, (OM) is parallel to (IN) (given)
$\frac{AO}{AI} = \frac{AM}{AN} = \frac{OM}{IN}$ (Thales' property) 0.5
$OA = OM = 3$ cm (radii) $\quad OI = \frac{OB}{2} = \frac{3}{2} = 1.5$ cm
$AI = 3 + 1.5 = 4.5$ cm 0.5

$\frac{3}{4.5} = \frac{3}{IN}$ 1

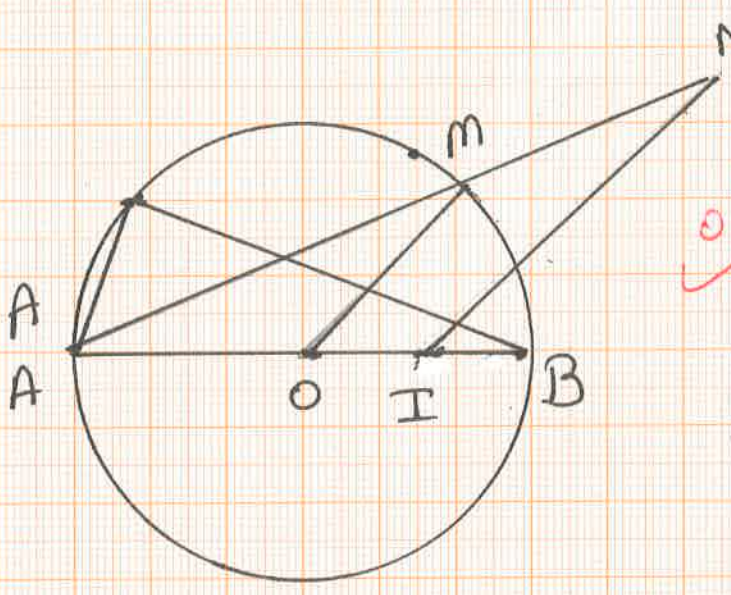
$IN = 4.5$ cm

IV. - 1)



0,5

V. - 1)



0,5