This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Lebanon Evangelical School

for Boys and Girls Loueizeh - Baabda

Stage Exam 02

19DEC2022

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

Subject :	Maths
Class :	9B and 9C
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.

I.- (6 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	The price of an article is increased by 15%, followed by another increase of 20%. The price has increased by:	38%	30%	35%
2	This table is a proportion table. $\begin{array}{\|c\|c\|}\hline \sqrt{5}-3 & x \\ \hline \frac{4}{9} & \sqrt{5}+3 \\ \hline \end{array}$ $x =$	-9	-4	9
3	The original salary of an employee is 6,000,000L.L. His new salary after a raise is 7,020,000L.L. The percentage of raise is:	15%	17%	20%

II.- (7 points)

Given a circle (C) of center O, radius 4cm, and diameter [AB]. H is the midpoint of [AO]. Through H, draw the perpendicular to (AB) that cuts the circle in two points M and N. Draw the tangent (d) to (C) at A and the tangent (d') to (C) at M. (d) and (d') intersect at P. (ON) cuts (AP) at F.

1) Prove that (OP) is the perpendicular bisector of [AM].
2) What is the nature of triangle AON? Justify.
3) Calculate HN.
4) Prove that triangle ANB is a semi-equilateral triangle. Calculate NB.
5) Prove that N is the midpoint of [OF]. Deduce the length of [AF].

III.- (4 points)

Show all the steps of calculation.

1) The measures, in cm, of sides of a triangle ABC are: AB=$\sqrt{11}-3$ BC= $\sqrt{11}+3$ and AC= $2\sqrt{10}$. Show that ABC is a right triangle.

2) Given the number $E=\frac{(10\sqrt{15})^4}{25\times10^3\times6+4.2\times5\times10^4}$. Show that E is a decimal number.

IV.- (3 points)

Before the holidays, the prices in a store are increased by 12%. Let x designate the original price and y the price after the increase.

1) Write a relation between x and y.
2) The price of an article after the raise is 3,000,000L.L. What was the original price?
3) After the holidays, the prices are decreased by 12%.
   Do the articles regain their original price? Explain.
   Find a relation between the original price x and the final price z after the increase followed by a decrease.

SE02/20222023/Maths/9BC

I- 1) a

$y = \left(1 + \frac{15}{100}\right)\left(1 + \frac{20}{100}\right)x = 1.38x = \left(1 + \frac{38}{100}\right)x$ 2

2) a

$\frac{\sqrt{5}-3}{\frac{4}{9}} = \frac{x}{\sqrt{5}+3}$ $\quad \frac{4}{9}x = (\sqrt{5}-3)(\sqrt{5}+3)$ 2

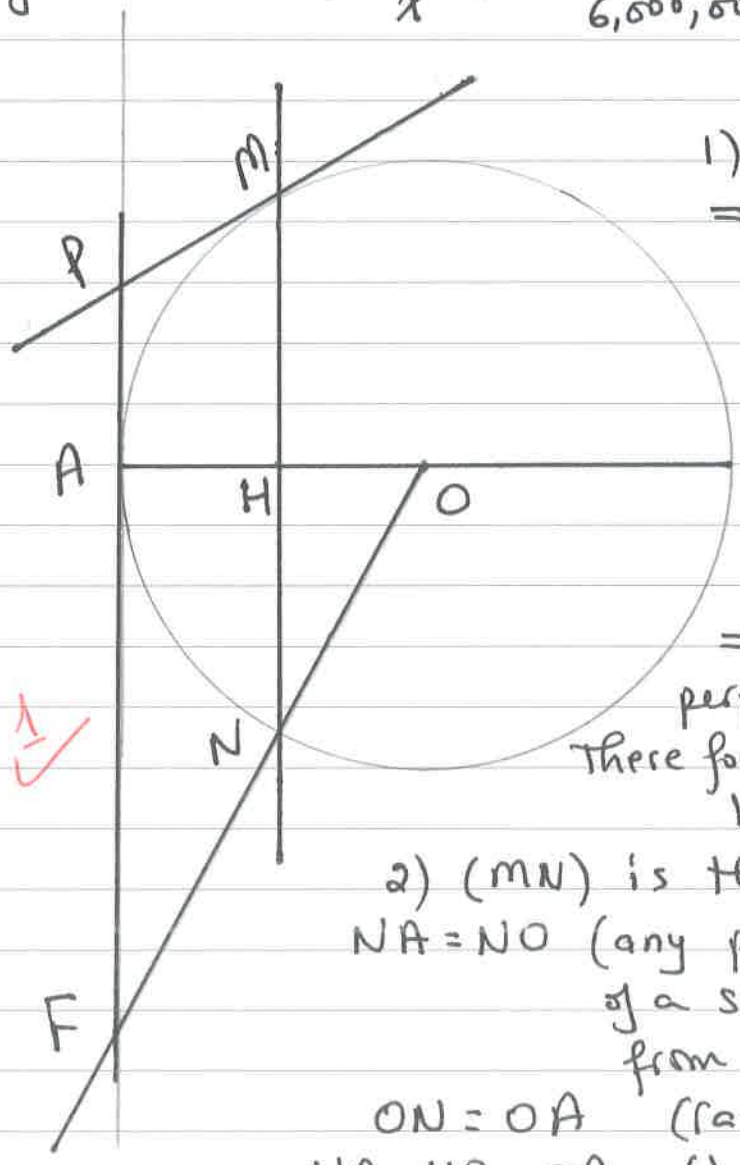
$\frac{4}{9}x = 5 - 9 \quad \frac{4x}{9} = -4$

$x = \frac{-4 \times 9}{4} = -9$

3) b

$y = ax \quad a = \frac{y}{x} = \frac{7,020,000}{6,000,000} = 1.17 = 1 + \frac{17}{100}$ 2

II-



1) OM = OA (radii)
⇒ O belongs to the perpendicular bisector of [AM]
PM = PA (2 tangents issued from the same point to the same circle)
⇒ P belongs to the perpendicular bisector of [AM].
Therefore (OP) is the perpendicular bisector of [AM]. 1.5

1

2) (MN) is the perp. bisector of [OA].
NA = NO (any point on the perp. bisector of a segment is equidistant from the extremities)
ON = OA (radii of the same circle)
NA = NO = OA (by substitution) 1.5

Therefore Δ AON is an equilateral Δ since the 3 sides are equal.

3) In Δ OHN, $\hat{OHN} = 90°$ $OH = \frac{OA}{2} = \frac{4}{2} = 2$ cm

$HN^2 = ON^2 - OH^2 = 4^2 - 2^2 = 16 - 4 = 12$ (Pythagorean theorem)

$HN = \sqrt{12} = 2\sqrt{3}$ cm 1

4) In Δ ANB,

$\hat{NAB} = 60°$ (Δ OAN is an equilateral Δ)

$\hat{ANB} = 90°$ (inscribed angular sector facing the diameter) 0.5

$\hat{ABN} = 180° - (\hat{ANB} + \hat{NAB}) = 180° - (90° + 60°) = 30°$.

Therefore Δ ANB is a semi-equilateral Δ.

$AN = OA = 4$cm (sides of an equilateral Δ are equal)

$NB^2 = AB^2 - AN^2 = 8^2 - 4^2 = 64 - 16 = 48$ (Pythagorean theorem) 1

$NB = \sqrt{48} = 4\sqrt{3}$ cm

5) $\left.\begin{matrix}(OA) \perp (AF) \\ (HN) \perp (AO)\end{matrix}\right\}$ (Tangent and radius) (given). 0.5

$\Rightarrow$ (HN) is parallel to (AF)

(2 lines perpendicular to the same straight line are parallel)

In Δ OAF,

H is the midpoint of [OA] (given)

(HN) is parallel to (AF) (proved above)

Therefore N is the midpoint of [AF]. (converse of midpoint theorem)

III,

1) $AB = \sqrt{11} - 3$ $BC = \sqrt{11} + 3$ $AC = 2\sqrt{10}$

$AB^2 + BC^2 = (\sqrt{11} - 3)^2 + (\sqrt{11} + 3)^2$

$= 11 - 6\sqrt{11} + 9 + 11 + 6\sqrt{11} + 9 = 40$

$AC^2 = (2\sqrt{10})^2 = 4 \times 10 = 40$. 2

$AB^2 + BC^2 = AC^2 = 40$

Therefore Δ ABC is a right Δ, right angled at B.

(converse of Pythagorean theorem)

2) $E = \dfrac{(10\sqrt{15})^4}{25\times10^3\times6 + 4.2\times5\times10^4}$

$= \dfrac{10^4\times(\sqrt{15})^4}{25\times10^3\times6 + 42\times5\times10^3}$ 2

$= \dfrac{10^4\times15\times15}{5\times6\times10^3(5+7)} = \dfrac{10^4\times3^2\times5^2}{5\times6\times10^3\times12}$

$= \dfrac{10\times5}{8} = 6.25$

6.25 is a decimal number.

IV- 1) $y = \left(1+\dfrac{12}{100}\right)x = 1.12x$ 1

2) $x = \dfrac{y}{1.12} = \dfrac{3000000}{1.12} = 2,678,571$ L.L. 1

3) $z = \left(1+\dfrac{12}{100}\right)\left(1-\dfrac{12}{100}\right)x$

$= 0.9856x$ 1

The prices were reduced by 1.4%.