Subject: Mathematics

Grade 9

I- (1.5 pts)

Indicate the correct answer with justification:

No"	Statements	A	B	C
1	$\frac{-(x-5)}{x^2+1}$ is positive for	x > -1	x > 5	x < 5
2	The area of a garden is $90cm^2$. If we reduce this area by a scale $\frac{1}{3}$, then it becomes	270 cm^2	10 cm^2	30 cm^2
3	If F(x)=3 for every x ,then F(2010)=	2010	3	The value is not defined
4	$Sin^2 20^o - cos^2 70^o$ =	1	0	-1

II- (1.25 pts)

Given $x=(\sqrt{3}+1)(\sqrt{2})^{-1}$.

1) Calculate x^2 and $\frac{1}{x^2}$.
2) Deduce that $x^2 + \frac{1}{x^2}$ is a positive integer.

III- (2.75 pts)

1) Develop and reduce (x-2) (4-x).
2) Let $A(x) = \frac{(x-2)-(x^2-4x+4)}{-x^2+6x-8}$.

   a) For which values of x is A(x) defined?
   b) Show that $A(x) = \frac{x-3}{x-4}$.
   c) Evaluate A(x) for x=0 and for x=2.
   d) Solve A(x) =1.

IV- (2.5 pts)

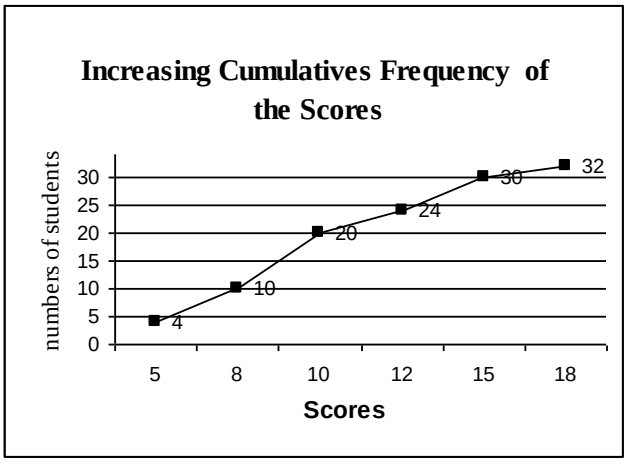
Mariam bought 5 books and 2 pens for 52000 LL. If she bought 4 books of the same quality after their price was increased by 5%, and she bought 3 pens of the same previous quality after their price was decreased by 10%, then Mariam would pay 44700 LL.

1) Show that the paragraph above is transformed to $\begin{cases} 5x+2y=52000 \\ 14x+9y=149000 \end{cases}$
2) Calculate the initial prices of **one** book and **one** pen.

V- (2.5 pts)

The adjacent figure represents the increasing cumulative frequency of the scores (over 20) for the students of Grade 9 in a math test.

1) What is the total number of students?
2) Construct a table of frequency.
3) Calculate the mean score of the class.
4) What is the percentage of students who passed the test?



VI- (4.5 pts)

In an orthonormal system x'0x; y'oy, given the points A (1; 2) and B (2; 4), let (d) be the straight line of slope $-\frac{1}{2}$ and passing through the point A.

1) Verify that the equation of (d) is $y=-\frac{x}{2}+\frac{5}{2}$.
2) Plot A and B, and trace (d).
3) Let (d') be the straight line passing through the point A perpendicular to (d).
   a) Find the equation of (d').
   b) Deduce that O belongs to (d').
   c) Draw (d').
4) Show that A, O and B are collinear.
5) (d) cuts (x'x) in E.
   a) Construct point F the image of B by the translation $\overrightarrow{EO}$.
   b) Show that FBEO is a rhombus.
6) (C) is the circle of centre O and tangent to (d).
   a) Calculate the radius of (C).
   b) Draw (C).
7) (d') cuts (C) in another point D. Find the equation of line (L) passing through the point D and parallel to x-axis.
8) Deduce the acute angle α between (L) and (d').

VII- (4.5 pts)

(C) is a semi circle of diameter [AB] , center O, and radius R. I is a point on [AB] outside [AB] such that BI< R. The tangent from I to (C) cuts it in M.

1) Draw the figure.
2)
   a) Show that the 2 triangles IBM and IAM are similar.
   b) Deduce that IM^2=IB.IA.
3) The perpendicular on (AB) at O cuts (AM) and (BM) in H and K respectively, (BH) cuts (AK) in J.
   a) What is the nature of the triangle ABM? Justify.
   b) Show that J belongs to (C).
4) Show that A, O, M and K belong to the same circle whose diameter is to be determined.
5) N is the midpoint of [BK].
   a) Find the locus of N as I varies.
   b) Show that (NO) is the perpendicular bisector of [BJ].