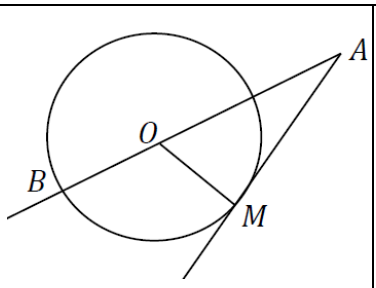
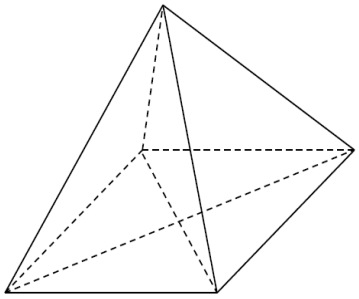
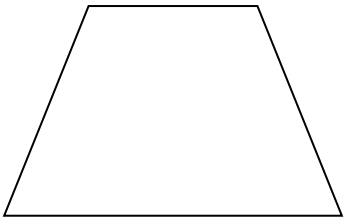
No.	Items	Score	
	ALGEBRA		
1.	Calculate the value of the expression: $\log_3 36 - 2\log_3 2$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
2.	Solve in the set $\mathbb{R}$ the equation $\sqrt{4x+12} = x$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
3.	Consider the matrix $A = \begin{pmatrix} \frac{1}{x-1} & 9 \\ x & x^3(x-1) \end{pmatrix}$. Determine the real values of x, such that the matrix A is invertible. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

4.	Consider the expression $E(z) = pz^2 + p^2z + 2 - 6i$. Determine the real values of p, such that $E(1 + 2i)$ is a real nonzero number. *Solution:*	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
5.	Solve in the set $\mathbb{R}$ the inequality $\log_{3-x} 0{,}25 \leq -2$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

GEOMETRY			
6.	On the picture, AM is a tangent line to the circle at the point M, and the point B lies on the circle, so that the center O lies on the line segment AB. Determine the measure in degrees of the angle OAM, if it is known that $AB = 3$ cm and the radius of the circle is 1 cm.  *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
7.	Determine the volume of a regular quadrilateral pyramid with all the edges of 6 cm.  *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

8.	In a trapezoid, a circle can be inscribed. The small base of the trapezoid is 3 cm and the angle on the larger base is 60°. Determine the length of the radius of the circle circumscribed about the trapezoid.  *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
	ANALIZĂ MATEMATICĂ		
9.	Establish the monotonicity of the sequence $(a_n)_{n\geq 1},\ a_n = \frac{2n}{n+1}$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
10.	Consider the function $f\colon (0;\ +\infty) \to \mathbb{R},\quad f(x) = 8\ln x - x^2$.		
	a) Write the equation of the tangent line to the graph of the function f at the point with the abscissa $x_0 = 1$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

	b) Calculate: $\lim\limits_{x\to 0}\frac{f(x+1)+x^2+2x+1}{2x}$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
	c) Calculate: $\int_1^e f(x)dx$ *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
ELEMENTS OF COMBINATORICS. NEWTON'S BINOMIAL THEOREM. ELEMENTS OF PROBABILITY THEORY AND MATHEMATICAL STATISTICS			
11.	In a store, sections A, B, C are working. During an hour 7 persons enter the store. Each person can randomly enter one of the sections. Determine the probability that 3 persons enter the section A, 2 persons enter the section B and 2 persons enter the section C. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

12.	Determine the number of rational terms in the binomial expansion $\left(\sqrt{5}+\sqrt[3]{5}\right)^{100}$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

Annex

$$\log_a b - \log_a c = \log_a \frac{b}{c},\ a \in \mathbb{R}_+^* \setminus \{1\},\ b, c \in \mathbb{R}_+^*$$
$$\log_a b^c = c \log_a b\,,\ a \in \mathbb{R}_+^* \setminus \{1\},\ b \in \mathbb{R}_+^*, c \in \mathbb{R}$$

$$(x^\alpha)' = \alpha\, x^{\alpha-1}, \qquad \alpha \in \mathbb{R}$$
$$(\ln x)' = \frac{1}{x}$$
$$y = f(x_0) + f'(x_0)(x - x_0)$$
$$\int x^\alpha dx = \frac{x^{\alpha+1}}{\alpha+1} + C, \qquad \alpha \in \mathbb{R} \setminus \{-1\}$$
$$\int f(x)g'(x)dx = f(x)g(x) - \int f'(x)g(x)dx$$
$$\int udv = uv - \int vdu$$
$$\lim_{x\to 0} \frac{\ln(1+x)}{x} = 1$$
$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma} = 2R$$
$$\mathcal{V}_{pyr.} = \frac{1}{3}\mathcal{A}_b \cdot H$$
$$(a+b)^n = C_n^0 a^n + C_n^1 a^{n-1}b + C_n^2 a^{n-2}b^2 + \cdots + C_n^k a^{n-k}b^k + \cdots + C_n^n b^n$$
$$T_{k+1} = C_n^k a^{n-k}b^k, k \in \{0, 1, 2, \ldots, n\}$$
$$C_n^m = \frac{n!}{m!\,(n-m)!}, \qquad 0 \le m \le n$$