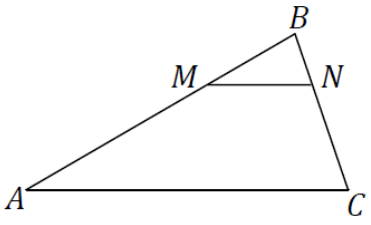
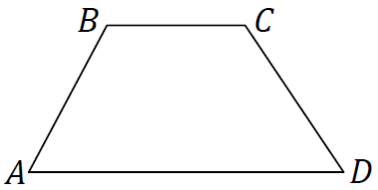
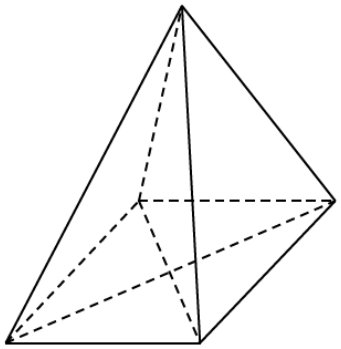
No.	Items	Score	
	ALGEBRA		
1.	Calculate: $\sqrt{\left(\frac{1}{27}\right)^{-2/3}}$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
2.	Consider the matrix $B = 2A - I_3$, where $A = \begin{pmatrix} 0 & -1 & 2 \\ 3 & 1 & -1 \\ 1 & 2 & 0 \end{pmatrix}, I_3 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$. Determine if the matrix B is invertible. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
3.	Calculate: $\log_3 72 + \frac{1}{2}\log_{\frac{1}{3}} 64$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
4.	Solve in the set $\mathbb{C}$ the equation $(2 - 3i)(1 + 2i) - iz = i - z$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

5.	Determine the real values of a, such that the real solutions x_1 and x_2 of the equation $x^2 - 4ax + a^2 - 5 = 0$ satisfy the condition $\frac{1}{x_1} + \frac{1}{x_2} = 1$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
	GEOMETRY		
6.	Consider the triangle ABC, where $MN \parallel AC$, $M \in (AB)$, $N \in (BC)$, $AM = 25$ cm, $BN = 2$ cm, $NC = 3$ cm. Determine the length of the line segment AM. *Solution:*  *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
7.	Determine the volume of the sphere, if the surface area of the sphere is equal to 36π cm^2. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5

8.	Consider the trapezoid $ABCD$, where $AD \parallel BC$, $BC = 4$ cm, $m(\angle A) = 60°$, $m(\angle D) = 45°$. Determine the length of the base AD, if it is known that the height is $3\sqrt{3}$ cm. *Solution:* *Answer:*_____.		L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
9.	The area of the base of a regular quadrilateral pyramid is equal to 32 cm^2. Determine the length of the lateral edge of the pyramid, if it is known that the volume of the pyramid is equal to 32 cm^3. *Solution:* *Answer:*_____.		L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

FUNCTIONS			
10.	Consider the function $f:(0;+\infty)\to\mathbb{R},\ f(x)=\log_{\frac{\sqrt{5}}{2}}x.$ Establish the monotonicity of the function $f.$ *Solution:* *Answer:* _____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
11.	In a geometrical progression, the sum of the first and the third terms is equal to 15, and the sum of the second and the fourth term is equal to 30. Determine the first term of the progression. *Solution:* *Answer:* _____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
12.	Consider the function $f:\mathbb{R}\to\mathbb{R},\ f(x)=(12-m-m^2)x+2.$ Determine the integer values of m, such that the function f is strictly increasing on $\mathbb{R}$. *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, MATHEMATICAL STATISTICS, FINANCIAL CALCULUS AND PROBABILITY THEORY			
13.	In an urn there are 5 red balls, 4 blue balls and a yellow ball. Four balls are taken at random. Determine the probability that balls of all three colors are taken. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
14.	A market has bought strawberry from the producer at the price of 20 lei per kilogram and applied a surcharge of 30%. After 3 days the market decreased the price by 10%. Determine the price of a kilogram of strawberries after the decreasing of the price. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

Annex

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

$$\log_{a^c} b = \frac{1}{\mathrm{c}} \log_a b\,,\ a \in \mathbb{R}_+^* \setminus \{1\},\ b \in \mathbb{R}_+^*, c \neq 0$$

$$\mathcal{A}_{sphere.} = 4\pi R^2$$

$$\mathcal{V}_{sphere} = \frac{4}{3}\pi R^3$$

$$\mathcal{V}_{pyr.} = \frac{1}{3}\mathcal{A}_b H$$

$$b_n = b_1 q^{n-1}$$

$$C_n^m = \frac{n!}{m!\,(n-m)!}, \qquad 0 \leq m \leq n$$