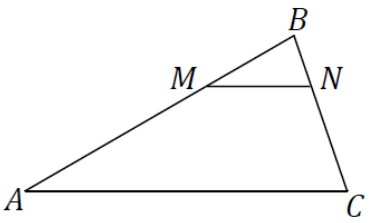
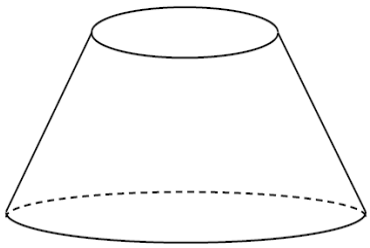
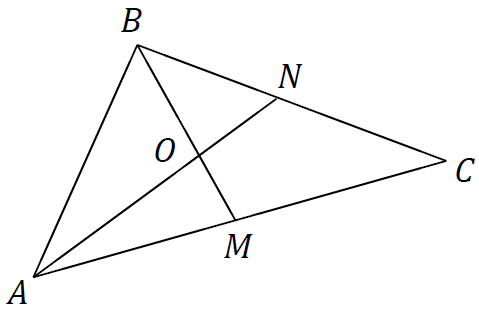
No.	Items	Score	
	ALGEBRA		
1.	Calculate the value of the expression: $\sqrt{9^{1,5}-2}$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
2.	Calculate the determinant of the matrix $A=\begin{pmatrix}1+3i & -6\\ i^3 & 1+3i\end{pmatrix}$, where $i^2=-1$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
3.	Solve in the set $\mathbb{R}$ the inequality $0{,}25^{x+3}\leq 8\cdot 2^{x}$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

4.	Calculate $\sin\left(\alpha+\frac{\pi}{3}\right)$, if it is known that $\cos\alpha=-\frac{3}{5}$ and $\alpha\in\left[\pi;\frac{3\pi}{2}\right]$. *Solution:* *Answer:*_____.	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 equation $\log_3^2(-x)-2\log_3\left(\frac{x^2}{27}\right)-6=0$. *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 $MN \parallel AC$, $M \in (AB)$, $N \in (BC)$. Determine the length of the line segment BN, if $MN = 4$ cm, $NC = 5$ cm, $AC = 14$ cm. *Solution:*  *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
7.	In a frustum of a right circular cone, the areas of the bases are equal to π cm^2 and 16π cm^2, and the volume is equal to 28π cm^3. Determine the lateral surface area of the frustum. *Solution:*  *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

8.	In the triangle ABC, $AB = 26$ cm and O is the point of intersection of the medians AN and BM, so that $m(\angle AOB) = 120°$. Determine the length of the median AN, if $BM = 24$ cm. *Solution:*  *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
	MATHEMATICAL ANALYSIS		
9.	Determine the common ratio of the geometric progression $(b_n)_{n\geq 1}$, if $b_3 = 20$ and $b_6 = 160$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
10.	Consider the function $f: \mathbb{R} \setminus \{1\} \to \mathbb{R}, \quad f(x) = \frac{x^2+3}{x-1}$.		
	a) Determine the local extrema of the function f. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

	b) Determine the oblique asymptote of the graph of the function f, as $x \to +\infty$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
	c) Calculate: $\int_2^3 f(x)\,dx$. *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.	With the digits 1, 2, 3, 4, 5, 6 a four-digits number is randomly formed. Determine the probability that the formed number has non-repeating digits and the first three digits are odd. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

12.	The sum of the binomial coefficients in the binomial expansion $\left(x+\frac{1}{\sqrt[3]{x}}\right)^n$ is equal to 4096. Determine the middle term of the expansion. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

Annex

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

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

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

$$(x^\alpha)' = \alpha\, x^{\alpha-1}, \qquad \alpha \in \mathbb{R}$$

$$\left(\frac{f}{g}\right)' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

$$\int x^\alpha dx = \frac{x^{\alpha+1}}{\alpha+1} + C, \qquad \alpha \in \mathbb{R} \setminus \{-1\}$$

$$\sin(\alpha+\beta) = \sin\alpha \cos\beta + \sin\beta \cos\alpha$$

$$c^2 = a^2 + b^2 - 2ab\cos\varphi$$

$$\mathcal{A}_{circle} = \pi R^2$$

$$\mathcal{A}_{lat.surf.frustum\ of\ cone} = \pi g(R+r)$$

$$\mathcal{V}_{frustum\ of\ cone} = \frac{\pi h}{3}(R^2 + r^2 + Rr)$$

$$y = mx + n, \qquad m = \lim_{x\to+\infty} \frac{f(x)}{x}, \qquad n = \lim_{x\to+\infty} (f(x) - mx)$$

$$(a+b)^n = C_n^0 a^n + C_n^1 a^{n-1} b + C_n^2 a^{n-2} b^2 + \cdots + C_n^k a^{n-k} b^k + \cdots + C_n^n b^n$$

$$T_{k+1} = C_n^k a^{n-k} b^k, k \in \{0, 1, 2, \ldots, n\}$$

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