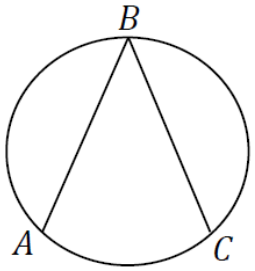
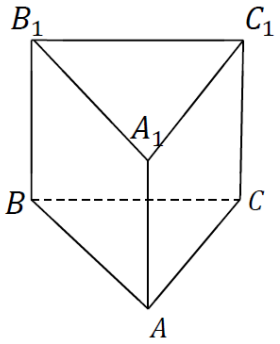
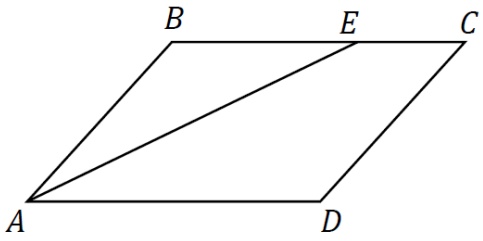
No.	Items	Score	
	ALGEBRA		
1.	Calculate the value of the expression: $16^{0,75} + \log_2 \frac{1}{32}$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
2.	Consider the polynomial $P(X) = -X^3 + aX^2 + 3X + 2a + 1$. Determine the real values of a, for which the remainder of the division of $P(X)$ by $X - 1$ is equal to 6. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
3.	Solve in the set $\mathbb{R}$ the equation $3\left(\sqrt{4-x}-1\right) = x - 3$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

4.	Determine the complex numbers $z = a + bi,\ i^2 = -1$, that verify the condition $\begin{vmatrix} 1 & z & 2i \\ -i & \bar{z} & 1 \\ 1 & 1+i & 0 \end{vmatrix} = -4 + 5i$, where $\bar{z}$ is the conjugate of the complex number z. *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 inequality $5^{2-\lvert x\rvert} + 5^{\lvert x\rvert} - 26 \geq 0$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

GEOMETRY			
6.	Points $A,\ B$ and C lie on a circle, so that $m(\angle ABC) = 45°$. Determine the length of the circle, if it is known that the length of the minor arc AC is equal to 2π cm. *Solution:*  *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
7.	The base of the right prism $ABCA_1B_1C_1$ is the right isosceles triangle ABC, in which $m(\angle BAC) = 90°$. It is known that $B_1C = 8$ cm and $m(\angle B_1CB) = 60°$. Determine the volume of the prism. *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 parallelogram $ABCD$, point E lies on the side BC, such that $BE = 5$ cm and $AE = 8$ cm. Determine the length of the height of the parallelogram corresponding to side AD, if angles BAE and DAE are congruent.  *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.	Consider the arithmetic progression $(a_n)_{n\geq 1}$, where $a_1 = -1$ and $a_3 = 3$. Determine the value of a_{2026}. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
10.	Consider the functions $f, g: (0; +\infty) \to \mathbb{R}$, $f(x) = \ln x + \frac{1}{x}$, $g(x) = \frac{1}{x}$.		
	a) Determine the intervals of monotonicity 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) Compare the value of the limit $\lim\limits_{x\to+\infty}\left(\frac{x^2+7}{x}-\frac{x^2-1}{x+2}\right)$ with the value of the function $f\left(\frac{1}{3}\right)$. *Solution:* *Answer:* _____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
	c) Determine the numeric value of the area of the figure bounded by the graphs of the functions f and g, by the straight lines $x=\frac{1}{e}$ and $x=1$. *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 class there are 13 students who prepared gifts for children from an orphanage. Five students prepared 3 gifts each, seven students prepared 2 gifts each, and one student prepared one gift. Determine the probability that three students chosen at random prepared together 7 gifts. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
12.	The difference between the binomial coefficients of the third and second terms in the binomial expansion $\left(\sqrt[3]{x}+\frac{1}{x}\right)^n$ is equal to 35. Determine the coefficient of $\frac{1}{x^2}$ in 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

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

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

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

$$\int f(x)g'(x)dx = f(x)g(x) - \int f'(x)g(x)dx$$

$$\mathcal{A}_\Delta = \frac{1}{2}ah_a, \quad \mathcal{V}_{prism} = \mathcal{A}_b \cdot H$$

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

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

$$T_{k+1} = C_n^k a^{n-k}b^k, k \in \{0, 1, 2, \ldots, n\}, \quad C_n^k = \frac{n!}{k!(n-k)!},\ 0 \le k \le n$$

$$a_n = a_1 + (n-1)r$$