Annex

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

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

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

$$y = f(x_0) + f'(x_0)(x - x_0)$$

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

$$\int \frac{dx}{x} = \ln|x| + C$$

$$\mathcal{A}_\Delta = \frac{1}{2} a h_a$$

$$\mathcal{A}_{parallelogram} = a h_a$$

$$\mathcal{A}_{parallelogram} = \frac{1}{2} d_1 d_2 \sin\varphi$$

$$\mathcal{A}_{lat.surf.cone} = \pi R G$$

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

$$\sin(2\alpha) = 2\sin\alpha\cos\alpha$$

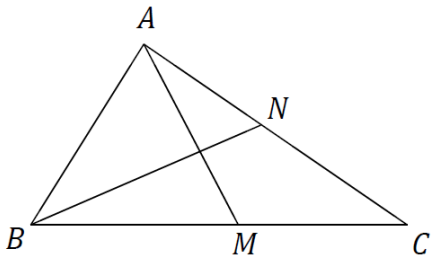
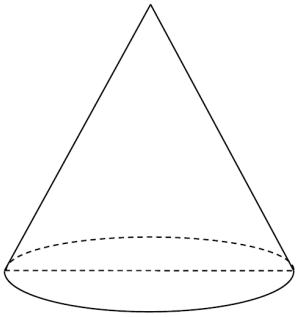
$$(a+b)^n = C_n^0 a^n + C_n^1 a^{n-1} b + C_n^2 a^{n-2} b^2 + \cdots + C_n^k a^{n-k} b^k + \cdots + C_n^n b^n$$

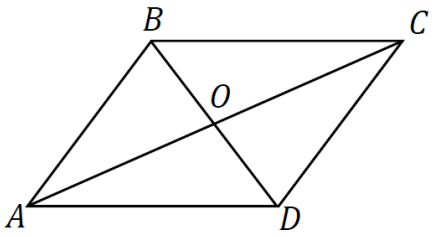
$$T_{k+1} = C_n^k a^{n-k} b^k, k \in \{0, 1, 2, \ldots, n\}$$

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

No.	Items	Score	
	ALGEBRA		
1.	Calculate the value of the expression: $\sqrt[3]{32^{0,4} - 12}$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
2.	Consider the complex number $z = (1 - 3i)^2 + 12i$, where $i^2 = -1$. Determine the absolute value of the number z. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
3.	Determine the integer solutions of the equation $125^{x^2} = 25^{x+4}$. *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 $\mathbb{R}$ the inequality $\log_{\frac{1}{2}}\lvert 2-x\rvert \geq -2$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
5.	Consider the matrix $A = \begin{pmatrix} \sin(2x) & 1 & \cos x \\ 1 & 4 & 1 \\ \sin x & 1 & 1 \end{pmatrix}$, where $\sin x + \cos x = m$, $m \in \left[-\frac{1}{2}; \frac{1}{2}\right]$. Show 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

GEOMETRY			
6.	In the triangle ABC the medians AM and BN are perpendicular and have the length of 9 cm și 12 cm respectively. Determine the length of the side AB. *Solution:*  *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
7.	The area of the axial section of a right circular cone is equal to 60 cm^2. Determine the area of the lateral surface of the cone, if it is known that the diameter of the base is of 10 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 the parallelogram $ABCD$, O is the point of intersection of the diagonals, so that $m(\angle AOB) = 60°$. Determine the length of the altitude of the parallelogram, coresponding to the side AB, if it is known that $AC = 16$ cm and $BD = 10$ 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 maximum value of the function $f: [0; +\infty) \to \mathbb{R}, f(x) = 2 - \sqrt{x}$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5

10. Consider the function $f: \mathbb{R} \setminus \{-2\} \to \mathbb{R}, \quad f(x) = \frac{x^2-1}{x+2}$.

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) 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:

$$\int_0^2 |f(x)|\, dx.$$

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.	A die is thrown 5 times. Determine the probability that only twice the number of appeared points is divizible by 3. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
12.	The binomial coefficient of the third term in the binomial expansion $\left(\sqrt[3]{x^5}+\frac{1}{\sqrt[3]{x^2}}\right)^n$ is equal to 105. Determine the binomial coefficient of x^{-3}. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8