No.	Items	Sco	ore
	ALGEBRA		
1.	Calculate: $\log_4 32 - 4.5$. Solution: Answer:	L 0 1 2 3 4 5	L 0 1 2 3 4 5
2.	Consider the matrix $A = \begin{pmatrix} 2 & 1 \\ -1 & 3 \end{pmatrix}$. Calculate the determinant of the matrix $X = A^2 - 3I_2$, where $I_2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$. Solution:	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
3.	Determine the value of the expression: $\sqrt[3]{\left(6\frac{1}{4}\right)^{\frac{1}{2}} - \left(\frac{1}{81}\right)^{-0.25} + \frac{3}{8}}$. 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 $z = a + bi$, $a, b \in \mathbb{R}$, $i^2 = -1$, such that $i \bar{z} + 2z = 5 - 2i$, where \bar{z} is the complex conjugate of the 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.	Determine the real values of a , such that the equation $x^2 + ax + 3 - a = 0$ has two distinct real solutions, which are positive. <i>Solution:</i> Answer:	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

6. On the picture, the points A, B and C lie on the circle with the center O , so that $m(\angle ABC) = 50^\circ$ and $m(\angle ABC) = (3x - 50)^\circ$. Determine the value of x . Solution: 7. The total surface area of a cube is equal to 12 cm^2 . Determine the length of the diagonal of a face of the cube. Solution: 8. The obtuse angle of a rhombus is 120° . Determine the length of the largest diagonal of the rhombus, if the perimeter of the rhombus is equal to 40 cm . Solution: 8. Solution: 1. L 0 0 0 1 1 2 2 2 3 3 3 4 4 4 5 5 5 5		GEOMETRY		
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Angway	8.	The obtuse angle of a rhombus is 120°. Determine the length of the largest diagonal of the rhombus, if the perimeter of the rhombus is equal to 40 cm.	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7

9.	In a right circular cone, the height is 8 cm and the slant height is 10 cm. Through the point that divides the height of the cone in the ratio 1:2 from the vertex, a plane parallel to the base is taken. Determine the area of the section, obtained at the intersection of the cone with the plane. Solution: Answer:	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
	FUNCTIONS		<u> </u>
10.	Consider the function $f: \mathbb{R}^* \to \mathbb{R}$, $f(x) = \frac{2}{x}$. Determine, if the point $M(\sqrt{3}-1;\sqrt{3}+1)$ lies on the graph of the function f . Solution:	L 0 1 2 3 4 5	L 0 1 2 3 4 5

11.	Determine the sum of the first 20 terms of the arithmetic progression $(a_n)_{n\geq 1}$, if $a_4=15$ and $a_7=9$. Solution:	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
12.	Consider the function $f: \mathbb{R} \to \mathbb{R}$, $f(x) = x^2 + (p-1)x + q^2 + 2$. Determine the real values of p and q , such that the point $A\left(-\frac{3}{2};0\right)$ is the vertex of the parabola, which represents the graph of the function f . Solution:	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,		
13.	FINANCIAL CALCULUS AND PROBABILITY THEORY With the digits 1, 3, 4, 7, a three-digit number, with non-repeating digits, is randomly formed. Determine the probability that the number is divisible by 3. Solution:	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
14.	Answer: A ticket for a journey in the public transport costs 6 lei, and a 6-months subscription for a pupil costs 486 lei. A pupil makes 54 trips per month. Determine the percentage of the ticket cost paid by the pupil with the subscription. Solution: Answer:	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

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

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

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

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

$$a_{n} = a_{1} + (n - 1)r$$

$$S_{n} = \frac{a_{1} + a_{n}}{2} \cdot n$$

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