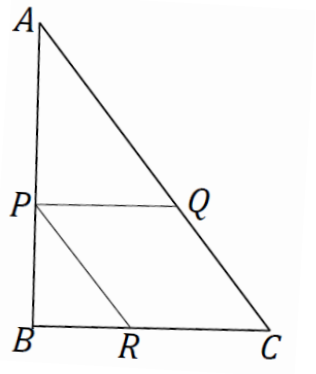
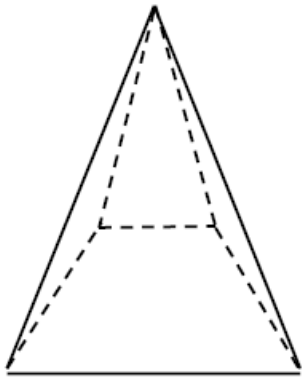
No.	Items	Score	
	ALGEBRA		
1.	Calculate the value of the expression: $32^{\frac{3}{5}} - 8$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
2.	Determine the remainder of the division of the polynomial $P(X) = 2X^3 + X^2 - 5X + 1$ by the binomial $X - 2$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
3.	Solve in the set $\mathbb{R}$ the equation $\sqrt{4 - x} = x - 2$. *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 $$\begin{vmatrix} 2z + 6i & \bar{z} \\ 3 + i & 1 \end{vmatrix} = 0.$$ *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
5.	In a triangle, α is the measure in degrees of an angle. Determine α, if it is known that $\cos(2\alpha) + \sin\alpha - 1 = 0$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

GEOMETRY			
6.	Determine the total surface area of a cube, if it is known that its volume is equal to 8 cm^3. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
7.	Consider the right-angled triangle ABC, where $m(\angle ABC) = 90°$ and $BC = 36$ cm. On the sides AB, AC and BC the points P, Q and R are respectively taken, so that $PQCR$ is a rhombus with the side of 20 cm. Determine the area of the triangle APQ. *Solution:* *Answer:*_____. 	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

8.	The base of a pyramid is a circumscriptible isosceles trapezoid with the bases of 4 cm and 16 cm. All the dihedral angles between the lateral faces and the base of the pyramid are of 60°. Determine the length of the altitude of the pyramid. *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 sequence $(b_n)_{n\geq 1}$, $b_{n+1} = 3\, b_n,\ b_1 = 2$. Determine the third term of the sequence. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5

10.	Consider the function $f:(0;+\infty)\to\mathbb{R},\quad f(x)=4\ln x-x.$		
	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 $\lim_{x\to+\infty}\left(x-\frac{x^2-2x+3}{x}\right)$ and $f(e)$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
	c) Calculate: $\int_1^e \frac{f(x)}{x}dx.$ *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.	Four dice are rolled simultaneously. Determine the probability that the product of the numbers appearing on the dice is equal to 15. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8
12.	Determine the term containing a^{10} in the binomial expansion $\left(\sqrt{a}+\frac{1}{\sqrt[3]{a}}\right)^{25}$. *Solution:* *Answer:*_____.	L 0 1 2 3 4 5 6 7 8	L 0 1 2 3 4 5 6 7 8

Annex

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

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

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

$$(\ln x)' = \frac{1}{x}$$

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

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

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

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

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

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

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