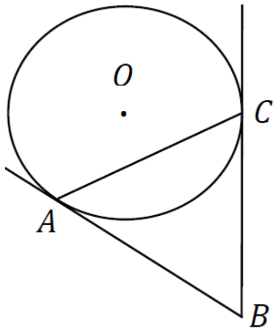
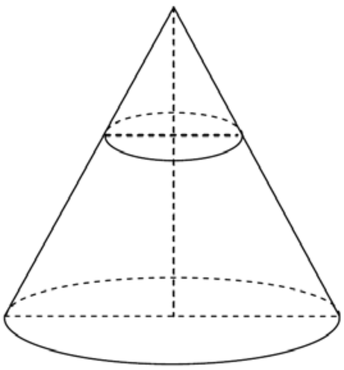
<table>
<tr><th>No.</th><th>Items</th><th colspan="2">Score</th></tr>
<tr><td>1.</td><td>Fill in the box with an integer number, so that the statement becomes true.
$$\left(\frac{2}{3}\right)^{\square} = \frac{81}{16}.$$</td><td>L 0 2</td><td>L 0 2</td></tr>
<tr><td>2.</td><td>Consider the numerical sequence $(a_n)_{n\geq 1}, a_n = 1 + \frac{2}{n}$.
Write in the box one of the expressions “monotonically increasing” or “monotonically decreasing”, so that the statement becomes true.
”The sequence $(a_n)_{n\geq 1}$ is ☐.”</td><td>L 0 2</td><td>L 0 2</td></tr>
<tr><td>3.</td><td>On the picture the straight lines BA and BC are tangent to the circle with the center O at the points A and C, respectively, and $m(\angle ABC) = 60°$.
Write in the box the length of the chord AC, if it is known that $AB = 7$ cm.
$AC =$ ☐ cm.

</td><td>L 0 2</td><td>L 0 2</td></tr>
<tr><td>4.</td><td>Using the digits 1 and 2, numbers of three digits are formed. Determine the probability that a randomly formed number has the first and the last digits equal.
Solution:

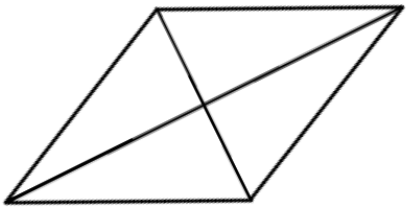
Answer:______________________________.</td><td>L 0 1 2 3 4</td><td>L 0 1 2 3 4</td></tr>
</table>

5.	Calculate the value of the expression: $\log_{\sqrt{3}} 6 - \log_3 4$. *Solution:* *Answer:*____.	L 0 1 2 3 4	L 0 1 2 3 4
6.	Consider $z = (2-i)(2+i) - 3i^3$, where $i^2 = -1$. Determine the complex conjugate of the number z. *Solution:* *Answer:*____.	L 0 1 2 3 4	L 0 1 2 3 4

7.	In a right circular cone, the altitude is 24 cm and the radius of the base is 10 cm. At the distance of 6 cm from the vertex a plane, parallel to the base, is considered. Determine the length of the slant height of the small cone, obtained after sectioning.  *Solution:* *Answer:*____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
8.	Consider the function $f\colon \mathbb{R} \to \mathbb{R},\ f(x) = 2x^3 - x^2 - 4x$. Determine the points of local extrema of the function f. *Solution:* *Answer:*____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5

<table>
<tr><td>9.</td><td>Diagonals of a rhombus are 12 cm and 16 cm. Determine the length of the height of the rhombus.

Solution:



Answer:______________________________.</td><td>L
0
1
2
3
4
5</td><td>L
0
1
2
3
4
5</td></tr>
<tr><td>10.</td><td>Consider the set $M = \left\{x \in \mathbb{R} \middle| \sqrt{x + A_5^1} = -3x - 1\right\}$. Determine $card\ M$.

Solution:

Answer:______________________________.</td><td>L
0
1
2
3
4
5
6</td><td>L
0
1
2
3
4
5
6</td></tr>
</table>

11.	Solve in the set $\mathbb{R} \times \mathbb{R}$ the system of equations $\begin{cases} 3^x + 2^y = 7 \\ 3^{x+1} + 2^{y-1} = 11. \end{cases}$ *Solution:* *Answer:* ____.	L 0 1 2 3 4 5	L 0 1 2 3 4 5
12.	Consider the function $f: [1; m] \to \mathbb{R},\ m > 1,\ f(x) = 4x^3 - 2x.$ Determine the real values of $m,$ such that the numerical value of the area under the graph of the function f is less than 12. *Solution:* *Answer:*____ .	L 0 1 2 3 4 5 6	L 0 1 2 3 4 5 6

Annex

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

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

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

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

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

$$(x^\alpha)' = \alpha\, x^{\alpha - 1}$$

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

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

$$\mathcal{A}_{rhombus} = a \cdot h$$