

Good practices MATH_107BC_EN

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Description of the problem / exercise: **Area calculation**

The following task belongs to the topic of geometry- calculation of area. Used sets: square, triangle, and circle.

There is a bird on the following picture



1. Determine how many pieces of each element were used to create the bird!
To create the bird, 2 squares, 9 triangles, and a circle were used.
2. Find the area of the shape, if the length of the side of the square is 8 cm!

The area of each element:

Square: $T_1 = a^2 = 64 \text{ cm}^2$, where a is the length of the side of the square.

Triangle: $T_2 = \frac{a \cdot m_a}{2}$, where a is the length of the side of the equilateral triangle, and m_a is the height of the triangle.

We can calculate the height of the triangle using Pythagoras' theorem:

$$m_a = \sqrt{a^2 - \left(\frac{a}{2}\right)^2} = \sqrt{64 - 16} = \sqrt{48} = 6,93 \text{ cm}.$$

The area of the triangle: $T_2 = \frac{a \cdot m_a}{2} = \frac{8 \cdot 6,93}{2} = 27,72 \text{ cm}^2$.

The diameter of the circle symbolizing the bird's head is equal to the side length of the square, from which the radius is $r = 4 \text{ cm}$.

The area of the circle: $T_3 = \pi \cdot r^2 = \pi \cdot 16 = 50,24 \text{ cm}^2$.

Area of the shape (bird):

$$T = 2 \cdot T_1 + 9 \cdot T_2 + T_3 = 2 \cdot 64 + 9 \cdot 27,72 + 50,24 = 427,72 \text{ cm}^2$$

- *Why this exercise is good:* Develops problem solving, logical thinking, inductive thinking, combinatorial thinking.
- *Level of teacher training:* Primary school upper grade, secondary school
- *School subject(s):* Mathematics