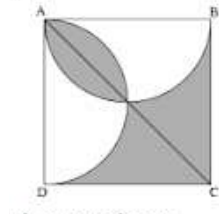# Areas and slicing

1) Which part of the figure on the right is colored?
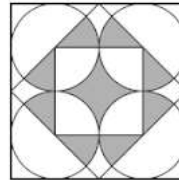
   Source: [1], 2021, grade 7-8, #2

2) On the right you see the square ABCD and the semicircles with diameter AB or AD. If AB = 2, then the shaded area is equal to

   Source: [2], 2004, grade 7-8, #14

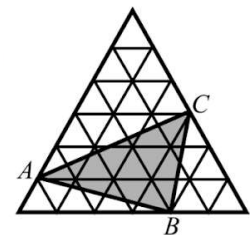3) What fraction of the largest square is grey?

   Source: [2], 2009, grade 7-8, #14

4) Count the area of the figure with the following vertices:
   - $A(0, 0)$, $B(3, 0)$, $C(3, 2)$
   - $A(0, 1)$, $B(2, 1)$, $C(3, 0)$
   - $A_1(0, 3)$, $A_2(2, 2)$, $A_3(3, 0)$, $A_4(2, -2)$, $A_5(0, -3)$, $A_6(-2, -2)$, $A_7(-3, 0)$, $A_8(-2, 2)$

   Source: Projekt MmF

5) The big equilateral triangle consists of 36 small equilateral triangles so that each has an area of 1 cm². Determine the area of ABC.
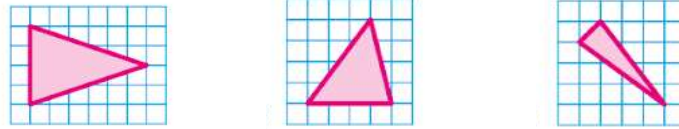
   Source: [2], 2010, grade 7-8, #29

6) The square of a big square is 16 and square of every small square is 1. Find the square of the yellow flower.
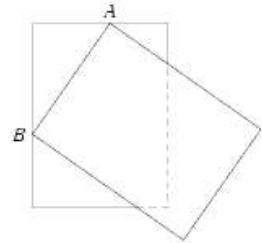
   Source: [1], 2021, grade 7-8, #12

7) Draw right triangles on a coordinate plane, whose areas are equal to the areas of the following triangles.


Source: [1], 2021, grade 9-10, #12

8) A sheet of A4 paper is covered by another sheet of A4 paper. Which part of the underlying sheet is larger, covered or uncovered?

Source: [3], #88095

9) The square pictured, is split into two squares and two rectangles. The vertices of the shaded quadrilateral with area 3 are the midpoints of the sides of the smaller squares. What is the area of the non-shaded part of the big square?
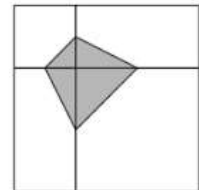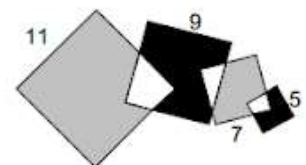
Source: [2], 2022, grade 11, #14

10) Using cubes with the edge length equal 2 we built a tower and then painted its faces. What is the square of the painted part?
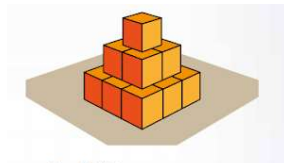
Source: [1], 2020, grade 7-8, # 28

11) 4 squares with side lengths 11cm, 9cm, 7cm and 5cm overlap each other. How much larger is the area of the grey part than the area of the black part (in cm^2)?

Source: [2], 2003, grade 9-10, #15

12) On sides AB and BC are located the points M and N respectively (see the picture). The rectangle is sliced by some lines into several parts and the areas of some parts are known.
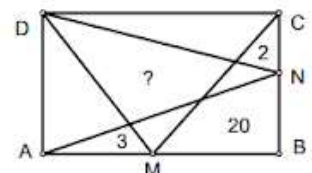
Determine the area of the part, which is marked with "?".

Source: [2], 2006, grade 11, #25

Bibliography

This problem set has been composed by the team of Projekt MmF. The sources of all problems are given. The translations and slight adaptations are due to us.

[1] Archive of problem sets from Ukrainian Kangaroo for 2013 - 2022 years:
http://kangaroo.com.ua

[2] Archive of problem sets from Austrian Kangaroo for 2001 - 2022 years:
www.kaenguru.at

[3] Archive of problems for mathematical olympiads:
https://problems.ru/