

Junior Wiskunde Olympiade

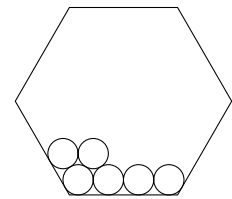
Problems part 1



Thursday 23 September 2021
online

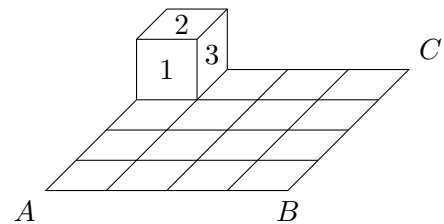
- The problems in part 1 are multiple choice questions. Exactly one of the five given options is correct. Please circle the letter of the correct answer on the form.
- A correct answer is awarded 2 points, for a wrong answer no points are deducted.
- You are allowed to use draft paper. The use of compass, ruler or set square is allowed. Calculators and comparable devices are not allowed.
- You have 45 minutes to finish these problems. **Good luck!**

1. A regular hexagon is filled with small circles of the same size, as illustrated in the figure. The circles can be tangent, but they do not overlap. Exactly four circles fit next to each other along the side of the hexagon. What is the maximum number of circles that fit in the hexagon in this way?



- A) 30 B) 37 C) 39 D) 41 E) 44

2. The dice in the figure on the right has a 6 on the back (opposite the 1), a 5 on the bottom (opposite the 2), and a 4 on the left side (opposite the 3). The dice is tilted along the side of a 4×4 grid, on the little squares, until it lies on the little square at point B . This can be done along the side of the grid via A , or along the side of the grid via C . How can the dice be positioned once it has arrived at B ?



- A) B) C) D) E)

3. Ahmed, Babeth, Casper, Daan, Emine, and Freek are sitting in a row, in this order. Ahmed and Babeth both write a positive integer on a piece of paper. Then Casper adds the numbers on the papers of Ahmed and Babeth and writes the result on his piece of paper. Afterwards, Daan adds the numbers on the papers of Babeth and Casper and writes the result on his piece of paper. Then Emine adds the numbers on the papers of Casper and Daan and writes the result on her piece of paper. Finally, Freek adds the numbers on the papers of Daan and Emine and writes the result on his piece of paper. Suppose that Emine wrote the number 19 on her paper, which number do you get if you add up the numbers on all papers?

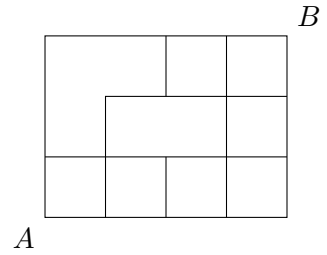
- A) 57 B) 76 C) 81 D) 89 E) 96

4. Farida makes a list of the integers between 1 and 10.000 that are divisible by 7. For every number on the list she adds the digits of the number. What is the smallest number that occurs as an outcome?

- A) 1 B) 2 C) 3 D) 4 E) 5

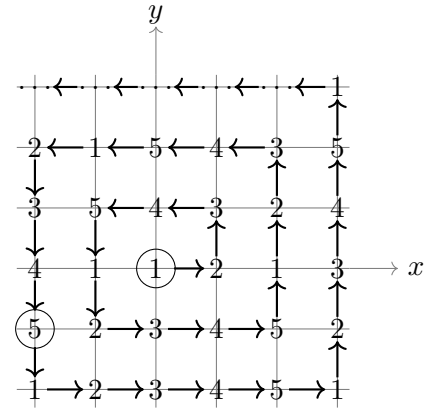
PLEASE CONTINUE ON THE OTHER SIDE

5. An ant walks over the lines in the figure on the right and takes a shortest route from A to B .
How many routes are possible for the ant?



- A) 7 B) 12 C) 18 D) 20 E) 30

6. In a grid the grid points are visited in a spiral, in counter clockwise direction. On every grid point a number from the list 1, 2, 3, 4, 5 is written by starting with 1 at the point $(0, 0)$ and repeating the list indefinitely, like in the figure. The circled 1 is at the point $(0, 0)$ and the circled 5 is at the grid point $(-2, -1)$. Which number is written at the grid point $(-20, 21)$?

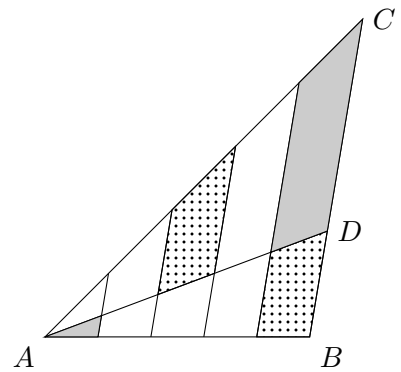


- A) 1 B) 2 C) 3 D) 4 E) 5

7. A watchmaker installed the big and small hand of a clock in the wrong way. This makes the small hand go with the speed of the big hand and the big hand with the speed of the small hand. It is known that every day at 8:00 the clock shows the right time. How many times a day (24 hours) does the clock show the right time?

- A) 1 B) 2 C) 6 D) 22 E) 24

8. Given is the triangle ABC . A line from point A intersects the side BC in D . Parallel to BC we draw four lines such that they divide AB and AC in five equal parts. From the ten pieces in which the triangle ABC is divided, the two dotted ones have the same area. Also, the area of the grey triangle at the bottom left next to A is 5. What is the area of the grey quadrilateral at the upper right next to C ?



- A) 50 B) 81 C) 100 D) 119 E) 121