

0-0

A checkered rectangle of size 10×12 was folded along the grid lines several times to form a 1×1 square. How many parts could there be if this square was cut along the segment connecting the midpoints of its two adjacent sides?

0-1

What is the largest value for c for which the equation $x^2 + 6x + c = 0$ has a solution?

0-2

Initially, all cells in a 3×3 table contain zeros. Several times, a 2×2 square is chosen and all the numbers within it are increased by 1. What number is written in the center of the table (see figure) if only the numbers in four cells of the original table are known?

	4	
5		
2		3

0-3

The clover collection contains 30 rare clovers, they have 3, 4 or 5 leaves. The total amount of leaves is 100. Are there more 3-leaved clovers or 5-leaved clovers and by how much?

0-4

Find all the integer solutions of the equation

$$2^x \cdot (4 - x) = 2x + 4.$$

0-5

What is a ones digit of a number $2023^2 + 2023^0 + 2023^2 + 2023^3$?

0-6

Find the largest natural number with distinct digits such that any six consecutive digits form a number divisible by 6.

1-1

What is the maximum value of N for which it is possible to place N ships of sizes 1×4 , 1×3 , and 1×2 on a 10×10 grid? The ships cannot touch each other. Provide the answer and an example.

0-1

0-0

0-3

0-2

0-5

0-4

1-1

0-6

1-2

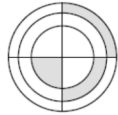
The product of all natural divisors of a natural number n is equal to 2^{45} . Find n .

1-3

The graphs of the functions $y = 2x^2 + bx + c$ and $y = x + 1$ are shown on a diagram. Find b .

**1-4**

In the figure below, there are three concentric circles and two perpendicular diameters. If the three shaded figures have equal areas and the radius of the smallest circle is 1, what is the product of the three radii?

**1-5**

Point M lies inside an equilateral triangle and is located 1 cm, 2 cm, and 2 cm away from its sides. Find the area of the triangle.

1-6

(Archimedes' problem) "If chords AB and CD intersect at point E at a right angle, then the sum of the squares of the segments AE , BE , CE , and DE is equal to..." What is it equal to?

2-2

Find the largest natural number with distinct digits, such that the sum of its digits is divisible by the product of its digits.

2-3

How many solutions does the puzzle have:
 $5 - U = C * I * R * C * L * E$? (The same letters represent the same digits, different letters represent different digits)

2-4

On a chessboard (without overlapping and following the grid lines), there are four-cell figures in the shape of the letter "T," covering all the black cells. How many of these figures can there be?

1-3

1-2

1-5

1-4

2-2

1-6

2-4

2-3

2-5

Cover the plane with non-convex pentagons without overlaps.

2-6

What is the largest value of N for which it is possible to place N black and N white kings on a chessboard such that black kings do not attack white kings and white kings do not attack black kings? Provide the answer and an example arrangement.

3-3

Find the largest natural number with distinct digits, such that the product of its digits is divisible by the sum of its digits.

3-4

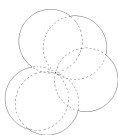
How many rational points lie on the sphere

$$(x - \sqrt{5})^2 + (y - \sqrt{2})^2 + (z - \sqrt{3})^2 = 10?$$

A rational point is a point where all three Cartesian coordinates are rational numbers.

3-5

n paper circles with a radius of 1 are arranged on a plane in such a way that their boundaries pass through a single point, and this point is located inside the entire region covered by the circles (see figure). This region forms a polygon with curvilinear sides. What can be the perimeter of such a curvilinear polygon?

**3-6**

A simple magic square is defined as a 3×3 square grid in which there are 9 natural numbers (not necessarily distinct), and the sums of the numbers in each row and column are equal to each other. Find the largest value of n for which there exists a simple magic square containing the first n prime numbers. Provide the answer and an example of such a square.

4-4

Points A and B are marked on a plane. Find the locus (all the possible positions) of the centers of rhombi with A and B as two of their vertices.

4-5

All natural numbers from 1 to n are written in a line in order. Under each pair of numbers in the next line, their sum is written. This process is repeated with the obtained line until only one number remains. Find this number.

2-6

2-5

3-4

3-3

3-6

3-5

4-5

4-4

4-6

A median of a triangle is a segment connecting a vertex with a midpoint of an opposite side. Find the length of the third median of a triangle if the other two medians are perpendicular to each other and have lengths 2 and 3.

5-5

Find all pairs of quadratic equations $x^2 + ax + b = 0$ and $x^2 + cx + d = 0$ such that a and b are the roots of the second equation, and c and d are the roots of the first equation.

5-6

The function $f(x)$ is defined for all real numbers x and satisfies the condition $2f(x) + f(1 - x) = x^2$. Find all such $f(x)$.

6-6

Let $2S$ be the total weight of a set of weights. A number k is called nice if it is possible to choose k weights from the set such that their total weight is equal to S . What is the largest number of nice numbers that can be in a set of 10 weights? Provide the answer and an example of a set of 10 weights with the maximum number of nice numbers.

5-5

4-6

6-6

5-6