


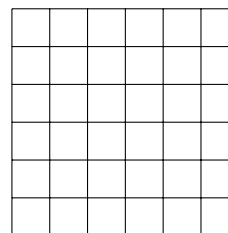


Problem 1

What is the largest prime factor in 899?

Problem 2

In the figure  there are 9 rectangles. How many rectangles may be found in the figure to the right?



Problem 3

When multiplying out the expression

$$\frac{(1+x)(2+x^2)(3+x^3)\cdots(103+x^{103})}{1\cdot 2\cdot 3\cdots 103},$$

we obtain a polynomial of the form $a_0 + a_1x + \dots + a_{5356}x^{5356}$. What is the sum of its coefficients, $a_0 + a_1 + \dots + a_{5356}$?

Problem 4

How many of the permutations of 1, 2, 3, 4, 5, 6 are such that each odd number is next to at least one even number?

Problem 5

In the rectangle $ABCD$, the side AB is of length 120 and the side BC of length 240. Let E be the midpoint of the segment BC , and let the points F and G lie on the segments AE and DE , respectively, such that the line FG is parallel to the line AD and the area of the triangle FEG is half the area of the triangle AED .

What is the length of the segment EF ?

Problem 6

How many positive integers less than 2013 are divisible by none of 2, 3, 4 and 5?



Problem 7

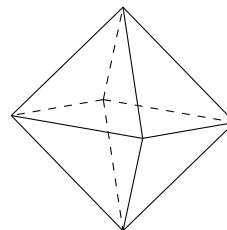
Two points O and P lie a distance $OP = 40$ apart. A circle of radius $10\sqrt{7}$ is centered at O , and a circle of radius 30 is centered at P . The two circles intersect in two points A and B . A point C is located such that AC is a diameter in the smaller circle. What is the distance BC ?

Problem 8

The sequence x_0, x_1, \dots is defined through $x_0 = 3$, $x_1 = 18$ and $x_{n+2} = 6x_{n+1} - 9x_n$ for $n = 0, 1, 2, \dots$. What is the smallest k such that x_k is divisible by 2013?

Problem 9

An octahedron is one of the Platonic solids. Its surface consists of eight equilateral triangles. If V denotes the volume of an octahedron in which the distance between two neighbouring vertices is $\sqrt{6}$, what is V^2 ?



Problem 10

Positive integers a , b , and c are such that $4abc + 2ab + 2bc + 2ca + a + b + c = 1006$. What is $a + b + c$?

<p>Solutions are posted on 18 January at 17.00 on abelkonkurransen.no</p>
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