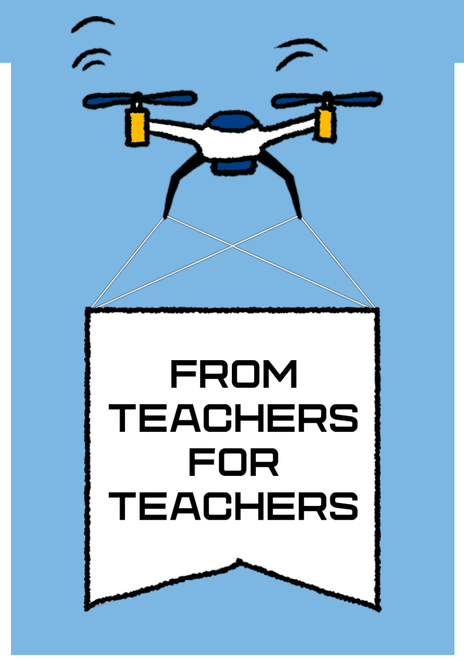


DIVERSITY IN STEM EDUCATION

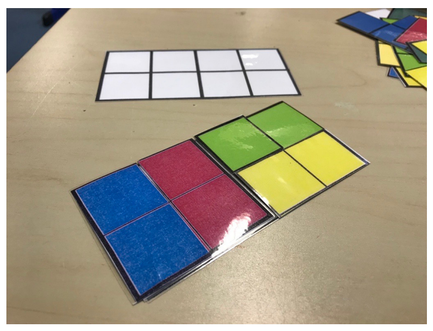
Daniel Vybíral | GALILEO SCHOOL | Frýdek-Místek | Czech Republic

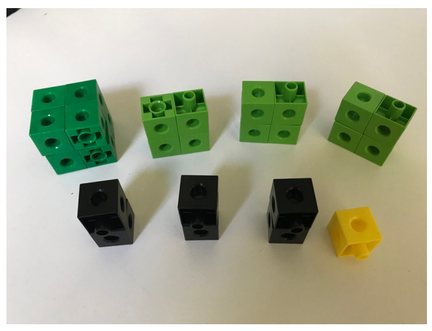
Manipulation to Understanding & Discovery

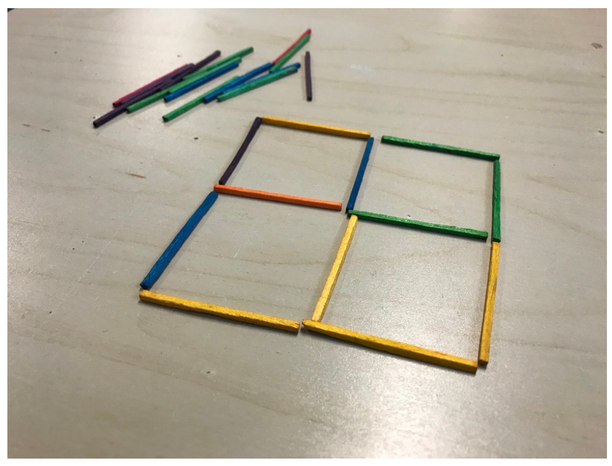
Abstract mathematical knowledge brought closer to students through manipulation with specific objects

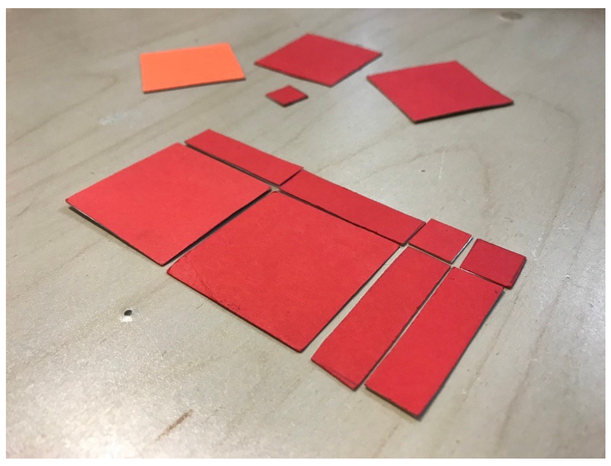
Grades 6-9

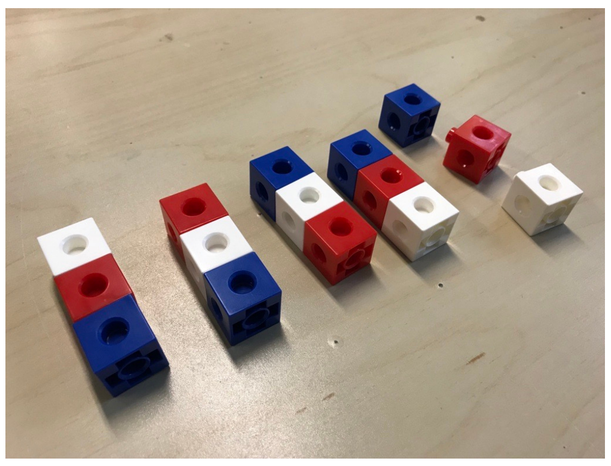
- Understand factorization of polynomials
- Discover the Fibonacci sequence
- Discover the factorial
- Find out the formula for the n-th member of an arithmetic sequence
- Solve combinatorics problems











Problem 1 - Sticks (6th grade)

Make a double window from 7 sticks. We will add more double windows to the right. In the picture, there are two double windows attached to each other. How many sticks do you need to make a) 3, b) 4, c) 5, d) 6, e) 7, f) 16, g) 50 double windows?

Problem 3 - Cubes (8th grade):

How many different towers can be built using a) white and red cube, b) white, red and blue cube, c) white, red, blue, and green, d) five cubes of different colors? In every case, all cubes have to be used.

Problem 4 - Squares and rectangles (8th grade):

Make a rectangle with 1 big square, 4 rectangles, and 4 small squares. What is its area?

$$a^2 + 4ab + 4b^2$$

Problem 6 - Candy (9th grade)

Frank got a bag of candy from his grandmother. When he emptied it, he counted 42 pieces of candy. "Tomorrow I will eat or give away half of the pieces to my friends. The next day I'll take half of the rest again. If it is not possible to divide the number in half exactly, I will take half a piece more than the exact half."

a) How many days will the candy last?

b) How many pieces of candy would he have to have at the beginning to make them last 10 days? What is the maximum and the minimum number of pieces he can have?

Problems are suitable for students of different levels.

Students with learning difficulties solve problems by manipulating shapes and objects.

Gifted students are able to discover how the sequences work or create formulas for different mathematical phenomena.

$$(n+1)!$$

$$a_n = 3n \cdot (n+1)^2$$

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