

# Developing visual logic and problemsolving by logical games and toys

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VISUALITY &  
MATHEMATICS  
EXPERIENTIAL EDUCATION  
OF MATHEMATICS THROUGH  
VISUAL ARTS, SCIENCES  
AND PLAYFUL ACTIVITIES

European Summer School for Visual  
Mathematics and Education

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# Mathematical Competencies

## **Abilities to ask and answer question with and in mathematics:**

1. Mathematical thinking
2. Problem posing and solving
3. Modelling
4. Reasoning and proofs

## **Abilities to deal with and manage mathematical language and tools:**

5. Representation
6. Symbols and formalism
7. Mathematical communication
8. Making use of aids and tools



# Skills and abilities, thinking processes

## **1. Mathematical thinking:**

- systematization, combinativity, analysis, synthesis, analogical thinking, logical conclusion, probability conclusion,...

## **2. Problem posing and solving:**

- problem sensibility, problem representation, textual understanding, reading, originality, flexibility of thinking, pliability, transferring, divergent and convergent thinking, task keeping, creativity,...



# Skills and abilities, thinking processes

## **3. Modelling:**

- planning, purposivity, whole-partial perception, looking for connections, associative memory, metacognition,...

## **4. Reasoning and proofs:**

- deductive and inductive conclusion, judgement, truth sensibility, generalization, logical conclusion, recognizing cause and effect relations,...



# Skills and abilities, thinking processes

## **5.Representation:**

- image creating skills, spatial seeing, perception of spatial relations, transferring, presentation, whole-partial perception,...

## **6.Symbols and formalism:**

- ability of symbolical thinking, associative and reason-based memory, thinking in functions and algorithms, recognizing relations,...



# Skills and abilities, thinking processes

## **7. Mathematical communication:**

- relation vocabulary, reasoning, self-reflection, metacognition, narrative memory, textual understanding, reading, attention keeping,...

## **8. Using mathematical aids and tools (IT included):**

- counting and calculating skills, guessing, quantitative conclusion, measuring, deductive and inductive thinking, speed of exercise-solving, algorithmical thinking,...



# Some games for development:

- Matchstick puzzles
- Mechanical puzzles
- Towers of Hanoi
- Tangram and other area partitions

## Tasks:

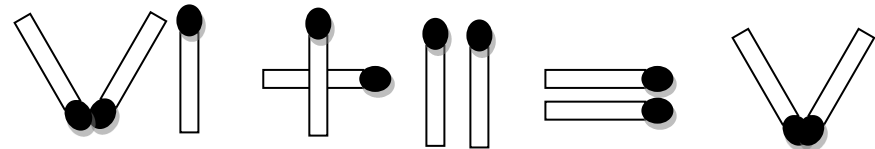
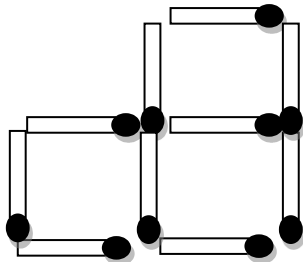
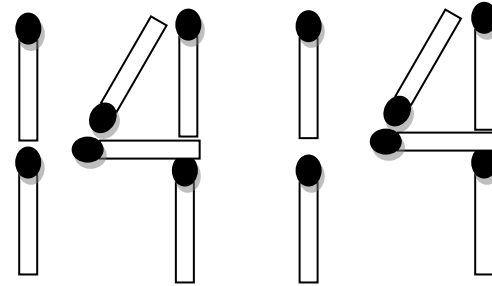
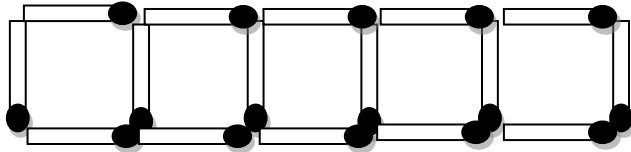
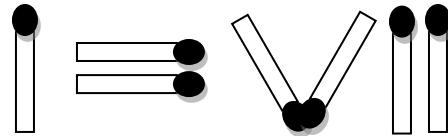
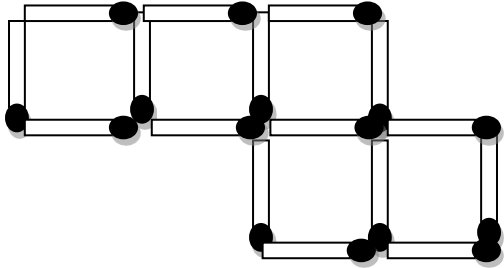
- 1. Think over the skills and abilities that can be developed through these games!*
- 2. Find the fields of mathematics curriculum, where these games could be used!*



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# Matchstick puzzles





# Mechanical puzzles



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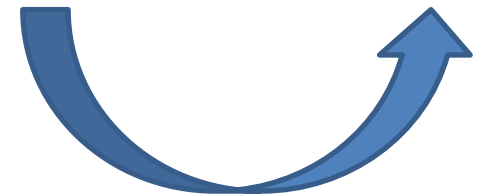
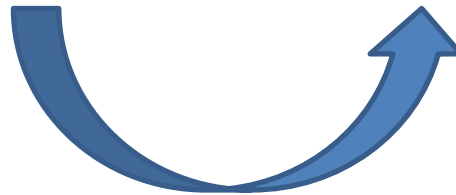
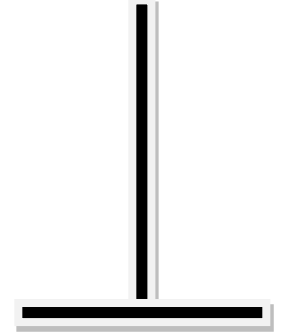
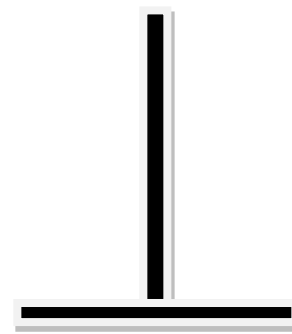
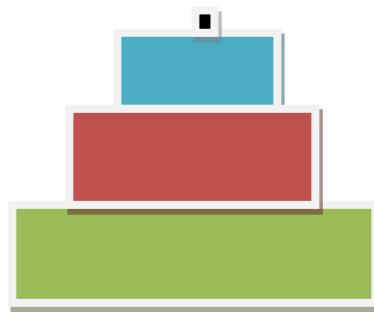
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# Towers of hanoi



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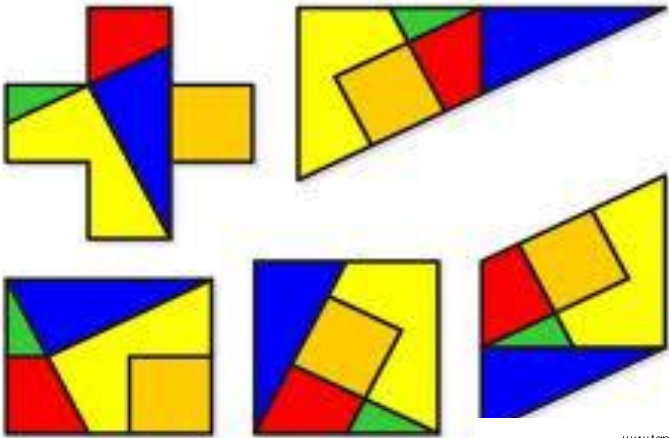


# Tangram and other area partitions

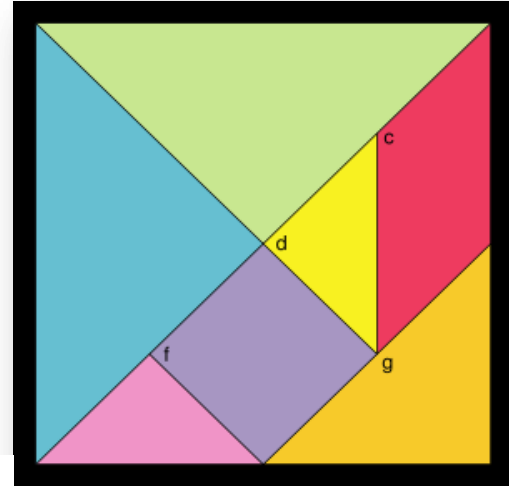
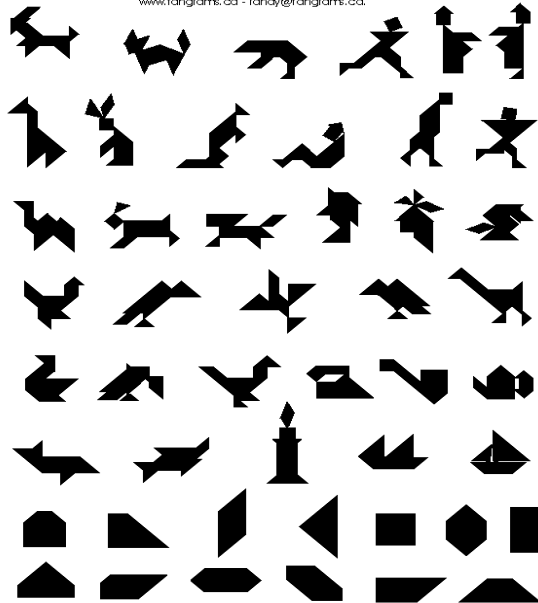


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Tangrams  
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Thank you for your attention!