



DRAFT PROGRAMME OF THE COURSE (24/8 1PM - 28/8 1 PM 2018)

Day 1:

- Welcome (by the author of the method), introduction to the method, knowing each other (2x45 minutes)
- Workshop: Mathematical environment Stepping (2x45 minutes)

Day 2:

- Workshop: Mathematical environment Staircase (2x45 minutes)
- Workshop: Mathematical environment Wooden Sticks (2x45 minutes)
- Workshop: Mathematical environment Bus (2x45 minutes)
- Workshop: Mathematical environment Bus and Video (2x45 minutes)

Day 3:

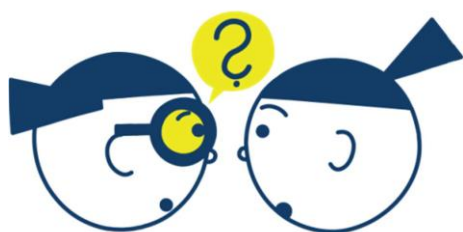
- Workshop: Mathematical environment Cube Buildings (2x45 minutes)
- Workshop: Mathematical environment Cube Nets (2x45 minutes)
- Workshop: Mathematical environment Father Woodland (2x45 minutes)
- Workshop: Mathematical environment Neighbours (2x45 minutes)

Day 4:

- Workshop: Mathematical environment Additive Triangles (2x45 minutes)
- Workshop: Mathematical environment Spider Webs (2x45 minutes)
- Workshop: Mathematical environment Geoboard (2x45 minutes)
- Workshop: Mathematical environment Grid (2x45 minutes)

Day 5:

- Workshop: Mathematical environment Snakes (2x45 minutes)
- Workshop: Mathematical environment Arrow Graphs (2x45 minutes)
- Closure and Certificate Ceremony (45 minutes)



Brief description of the environments:

ADDITIVE TRIANGLES – arithmetical environment. By many calculations pupils consolidate additive triads in their minds and learn interesting relationships in a simple number structure and solve simple equations and systems of equations.

ARROW GRAPHS – arithmetical graphical environment, which interlinks operations addition and multiplications and using trial and error solving strategy pupils build their experience with solution of more difficult linear equations.

BUS – using the form of game, pupils work with the models of numbers, build their understanding of numerical operations, discover the way how to record the process of bus ride and try to solve more

difficult tasks. They use trial and error solving strategy and search for more sophisticated problem-solving solutions.

CUBE BUILDINGS – manipulative environment of 3D geometry. Pupils learn how to represent 3D object by 2D drawings and develop their spatial visualization. Solving tasks pupils learn many attributes of 3D objects, and also develop pre-concepts of measure – volume, surface area, height. Manipulations and drawings are key activities. In many tasks, two areas – natural numbers, combinatorics and 3D geometry are interlinked

CUBE NETS (DRESSING Mr. CUBE) – metaphorical situation of dressing Mr. Cube enables to introduce difficult geometrical concept – cube net and nets of other solids. Solving tasks pupils develop their spatial visualization, they learn correspondence between 2D shapes (cuts for dress for Mr Cube) and related 3D object (cube), they learn many relationships between cube attributes like parallel faces and edges.

FATHER WOODLAND – working with animals and their tug – of – war games, pupils manage to start seeing numbers as arithmetic symbols. They use icons of animals to write down the numerical relationships, and by seeing the environment as a game, they get to know how to work with equations. The attendants will go through discussions about the task solutions, discover few solution strategies, and will understand the importance of environment.

GEOBOARD – wooden board with 9 pins arranged in 3x3 square. By stretching elastic bands pupils create various shapes and polygons. Learning process of polygons and their attributes starts with manipulation, continues by communication and culminates by formalisation of concepts and relationships.

GRID – geometrical graphical environment in which pupils more deeply develop their understanding of 2D geometrical objects and relationships between them. They naturally learn concept of measure – area, perimeter, measure of angle and thanks to easy interconnection with arithmetics, pupils can discover even deep mathematical ideas.

NEIGHBOURS – arithmetical environment. By many calculations pupils consolidate additive triads and learn more interesting mathematical phenomena in a simple number structure like periodicity.

SNAKES – arithmetical graphical environment. By many calculations pupils deepen their understanding of number operations, learn relationships between numbers and solve simple equations and also systems of equations.

SPIDER WEBS – environment working with (abstract) numbers interlinked in a graphic schema. From the end of the first grade, and/or the beginning of the second grade, the environment significantly contributes to development of not only addition and subtraction, but also to multiplication and division. Using the simple way, the environment leads pupils to explore deeper mathematics thoughts (e.g. arithmetic series and progression).

STAIRCASE – arithmetical semantic environment. Pupils work with number as an operator as well as an address, they get experience with number line. They learn models of number by their body movement and by their senses (acoustic, visual, tactile). The environment contributes to pupils' understanding of addition and subtraction of integer numbers and to solving simple equations.

STEPPING – arithmetical semantic environment developing understanding of small natural numbers. The model of number is represented by the number of steps and it is perceived by pupils' rhythmical movements of stepping which offer the combination of acoustic, visual and kinaesthetic perceptions. The environment enables understanding of addition and subtraction of integer numbers, solving simple equations, and forms the background for negative numbers. Learning process involves perception, followed by arrow notation and finalized by usual number notation.

WOODEN STICKS – geometrical manipulative environment in which pupils develop their understanding of 2D geometrical shapes and their attributes through solving appropriate tasks. They build their pre-concepts of concept area and perimeter. Many tasks contribute also to the development of concept of fraction as a part of whole.

During the whole course, the following topics will be discussed and trained:

- **The change of the role of a teacher** (*The teacher is just supposed to facilitate the learning process and oversee the students but without getting too involved, to try to let them figure it out by themselves or working in groups as well, and to help them to get the answer, to help with the steps in order for them to reach the conclusion on their own.*)
- **Graduated tasks and assessments**
- **Analysis of real lessons in classroom with pupils (from video recording)**
- **Simulated work with pupils, group review and reflection**

MORE DETAILS ABOUT THE COURSE: <https://www.h-mat.cz/en/course2018>