# ABOUT THE DEVELOPING OF MATHEMATICAL THINKING IN CHILDREN: A WORKSHOP EXPERIENCE WITH MEXICAN STUDENTS

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# INTRODUCTION.

- In the frames of the National Plan of Development 2001-2006 the Council of Basic Education in Mexico has assumed a compromise to attend the special educational necessity of children with extraordinary aptitudes in primary education [1].
- Thus at the state level, Morelos State University took part of this program within the Pilot Project
- Which offered a program of logic Mathematics Thinking for 160 children selected from different public schools on the base of special tests.
- There have been formed four groups for each category, starting from 3-4 grade of primary school up to 3d grade of secondary school.
- Compared to the traditional methods used to teach mathematics. In our sessions there have been applied different techniques.

# MATHEMATICS: PRACTICE AND DIDACTIC. DESCRIPTION OF SOME PRACTICES REALIZED IN THE PROCESS OF SOLVING SOME PROBLEM SITUATIONS

# DESCRIPTION OF SOME PRACTICES REALIZED IN THE PROCESS OF SOLVING SOME PROBLEM SITUATIONS

We have proposed some problem situations for children to initiate their activities which aim to generate a process of personalization so that they could construct a mathematical object and/or the logic procedure which leads to a solution.
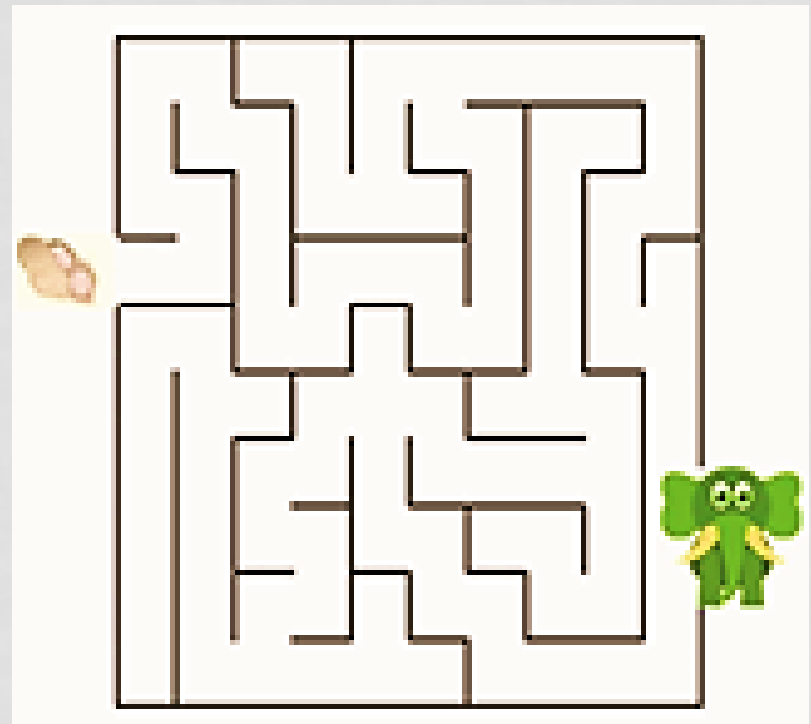
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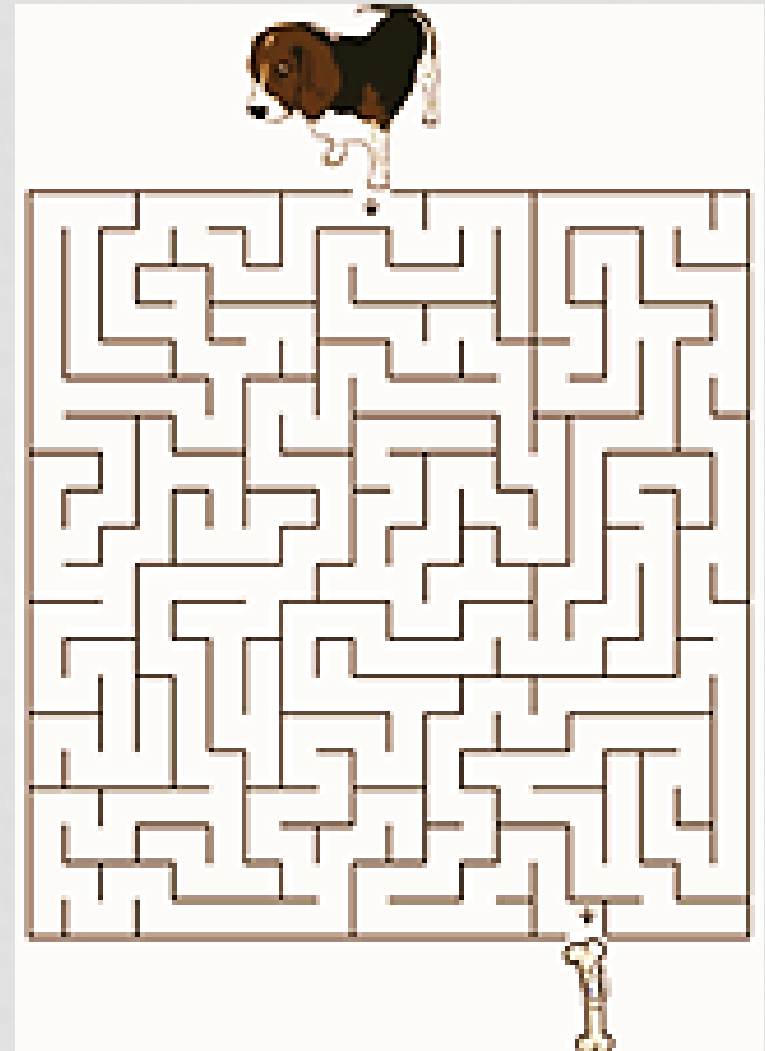
## *Labyrinths*

Children have been asked to find the exit of a series of labyrinths.

At the first step every child received a labyrinth corresponding to a level lower than that it is supposed to be for their age, so that could familiarize with the problem and to gain believe and assurance to such sort of tasks
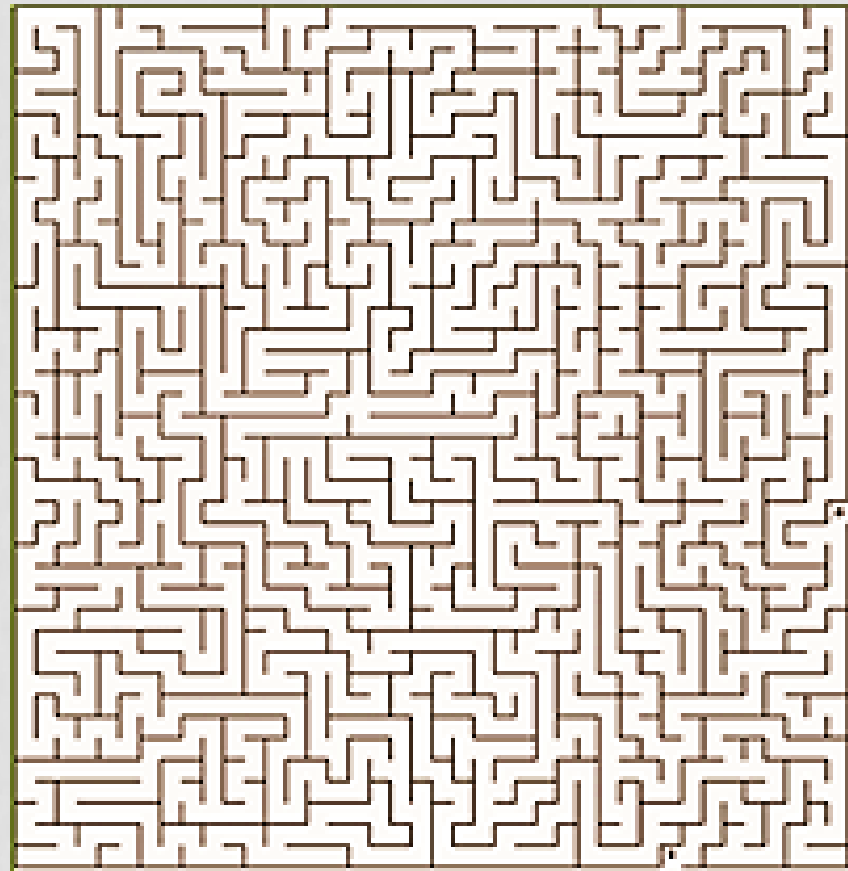
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The second step required a little more effort and initiative but still in accordance to their school level, 3 and 4 primary grade

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Finally, the third labyrinth, which was designed supposing for the higher level of primary school, for the age corresponding to 5 and 6 grade. The purpose was to see whether children can follow the same type of strategy although the level of complexity grew up considerably
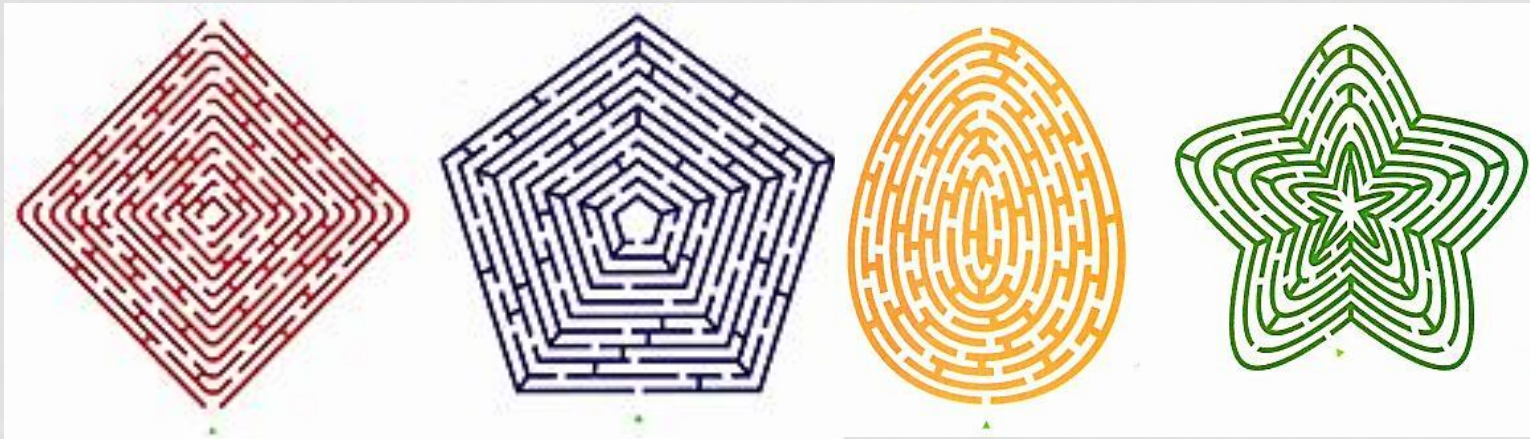
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Children accepted this Challenge with enthusiasm and to our surprise accomplished with their task almost within the same time range (approximately 5 minutes for each labyrinth).

During another session of Workshops, children were given the so called "impossible" labyrinths, so named due to rather irregular shapes, with contours far away from the rectangular one as in the previous task. The reaction was to choose firs the labyrinth with a form which resembled the familiar one or which seemed to be more attractive to some respect. Every child has been found identified with one particular type of the representations.

# DESCRIPTION OF SOME PRACTICES REALIZED IN THE PROCESS OF SOLVING SOME PROBLEM SITUATIONS



Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Do not use abbreviations in the title or heads unless they are unavoidable

# DESCRIPTION OF SOME PRACTICES REALIZED IN THE PROCESS OF SOLVING SOME PROBLEM SITUATIONS

*Tantrix*

Tantrix is a game from New Zealand, which has quickly become more popular worldwide thanks to the properties that provides recreational and educational. In recognition of this, has been awarded many times in different countries [2].
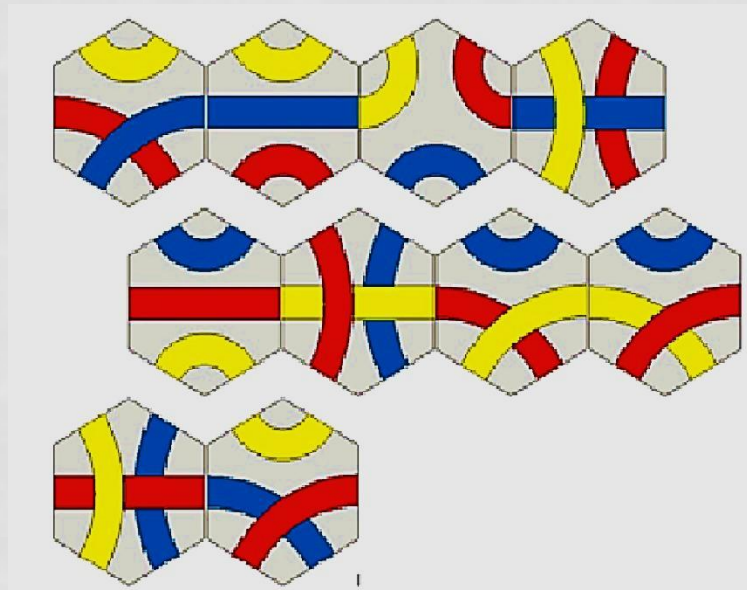
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Children formed two teams and each was given puzzle pieces unconventional: Tantrix. The challenge was to get a ring of a certain colour, using all hexagonal pieces of the puzzle. Considering that wherever stay connected hexagons, the colours should match. Moreover, they must not be holes in the solution.

# DESCRIPTION OF SOME PRACTICES REALIZED IN THE PROCESS OF SOLVING SOME PROBLEM SITUATIONS

The activity took place outside the classroom. The pieces were 50 cm. The implementation of this dynamic and interdisciplinary interconnection was first performed with very good results in the group. They worked in collaboration with students of outstanding student group of 5th and 6th grade. Both, boys and girls teams, included the 4 degrees

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The purpose of these game activities was different due to another perspective compared to problems with labyrinths. It was expected the performing of an adequate distribution of the plastic figures in the space so that the correct edges of hexagons emerged would coincide generating closed simple curves of the indicated colour.

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The solution should be selected as the result of a collective decision. The colours and big size of figures played a motivational role to initiate the activities

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It was observed that a team formed by male pupils as a major part arrived to a solution by means of previous explorations of the figures placed on the yard. Meanwhile as the team with the majority of female pupils arrived to their solution by trail and errors approaches to small patrons emerged as the solution of early attempt.

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Despite of the distinct approaches of perception of the task and exploration of the solution both teams obtained (gained) the equivalent results. Finally it was announced 50/50

Children often demonstrated better acceptance of the tasks proposed in Workshop sessions when the presentation of the problems possessed colors, pictures, figures, etc.

# DESCRIPTION OF SOME PRACTICES REALIZED IN THE PROCESS OF SOLVING SOME PROBLEM SITUATIONS

Among the problems that have been preferred and resolved with notable interest there are problems of the Olympiad type suggested for the national competition *Kangaroo.*
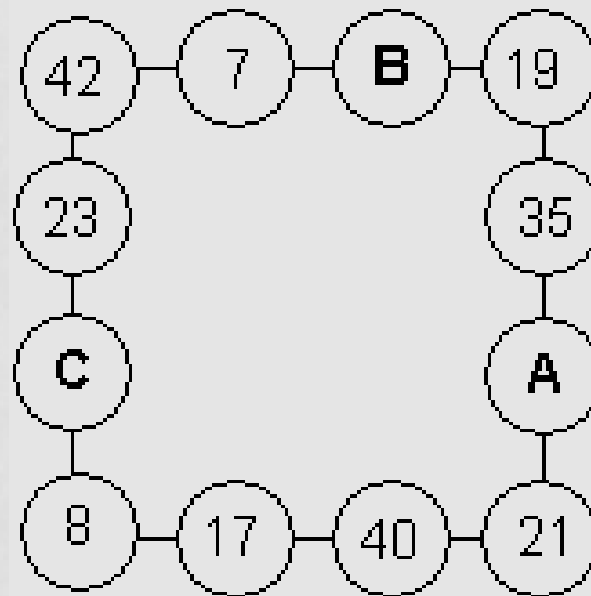
**Problem K3**

- The figures of the same shape represent the same Lumber. Which values could correspond to a triangle?
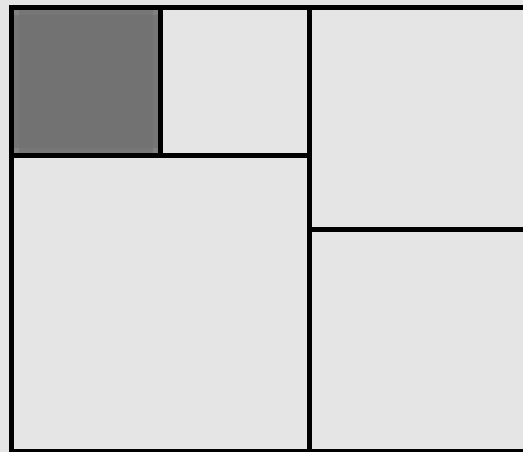
**Problem K1**

- The Square on the Figure has four circles en every one of its Edge. The sum of the numbers which are found inside the four circles of each edge is the same. Find the value of the sum (A+B+C).

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**Problem K2**

- The rectangle on the Figure is formed by the squares. The edge of shaded square has longitude 2 cm. Find the longitude of the mayor edge of the rectangle.

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**Problem K3**

- The figures of the same shape represent the same Lumber. Which values could correspond to a triangle?

$$+\begin{array}{c} 2\ \square \\ \triangle\ \square \end{array}$$
$$\overline{\quad 7\quad 6\quad}$$

# CHILDREN'S OPINIONS ABOUT ACTIVITIES OF WORKSHOP

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At the end of the semester there has been applied an interview in order to have an idea what opinions have children with respect to the mathematics and the activities which have been undertaken within the project:

Among the 11 questions there was one as follows:

➢ What is the mathematics for you?
➢ Do you believe that to do mathematics means only to treats numbers?
➢ How would you like to be taught the mathematics?

# CHILDREN'S OPINIONS ABOUT ACTIVITIES OF WORKSHOP

➢*What is the mathematics for you?*

✓25% of children responded that it may be considered as a tool instrument for achieving a triumph.

✓35% consider the mathematics activities as a sort of mental game.

✓And 40% have written that it is series of activities where the arithmetic operations are involved

# CHILDREN'S OPINIONS ABOUT ACTIVITIES OF WORKSHOP

➢ Do you believe that to do mathematics means only to treats numbers?

✓ All children responded negatively, pointing out that there are mental problems also.

# CHILDREN'S OPINIONS ABOUT ACTIVITIES OF WORKSHOP

➢How would you like to be taught the mathematics?

Giving the following answers:

✓"Playing games"—----35%,
✓"Reading"------------—10%
✓"Solving problems"—15%
✓And 40% of responds included these tree answers.

# REFERENCES

[1] Secretaría de Educación Pública (2006). Propuesta de intervención: Atención educativa a alumnos y alumnas con aptitudes sobresalientes.

[2] http://www.tantrix.com.es/