

**Visual Logic Games That Challenge
All Kids to Play, Reason,
and Talk about Mathematics**



(PreK–5) Gallery Workshop

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NCTM – Washington, D.C.

First things first ...

- What do we mean by “ALL”?
 - All language backgrounds
 - All racial and ethnic backgrounds
 - All reading abilities
 - All readiness levels
 - ▲ Below, at, and above grade level
 - All ages
 - All SES levels
 - All genders

Goals

- Children

- Playing

- ▲ being **engaged** in mathematics

- Reasoning

- ▲ **logically**

- ▲ **independently**

- Talking

- ▲ **communicating** their reasoning

Why is this important?

If the children are able to

- **engage** with mathematical tasks,
- reason **logically**,
- reason **independently**, and
- **communicate** their reasoning,

what can they do **better**?

Young children reasoning logically

- Psychologists used to think
 - Inductive reasoning develops first
 - Deductive reasoning (logic) develops at 12 years of age
- More recent findings
 - Very young children (2-3 years old) are capable of many different types of reasoning
 - ▲ Inductive
 - ▲ Deductive
 - ▲ Analogical

Young children reasoning logically

- Pre-school children logical reasoning
 - Non-complex tasks
 - ▲ Few things to remember
 - ▲ Few steps
 - Familiar contexts
 - Use of visualization and imagination
- As children grow
 - Complexity increases
 - Familiarity with more contexts
 - Learn to visualize and imagine more accurately

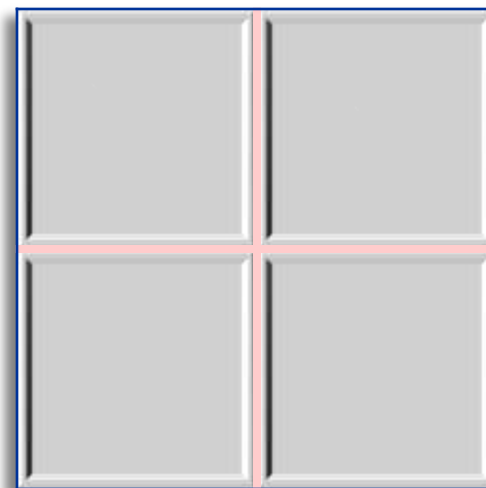
Let's warm up a little:

Put the shapes below in each of the grids.
Follow the clues carefully.



Clues:

- A. The large shapes are in the top row.
- B. The circles are on the right.



Source: Defi Mathematique, by Michel and Robert Lyons

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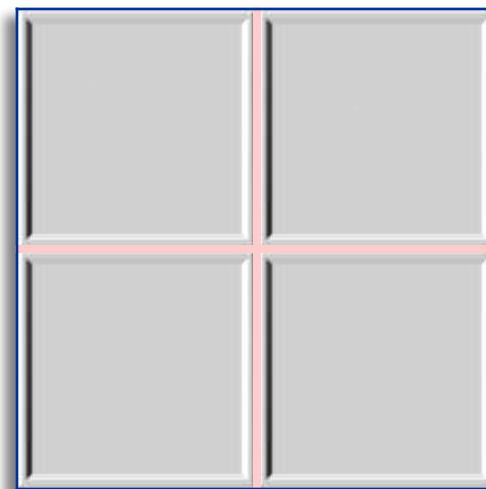
... a little more:

Put the shapes below in each of the grids.
Follow the clues carefully.



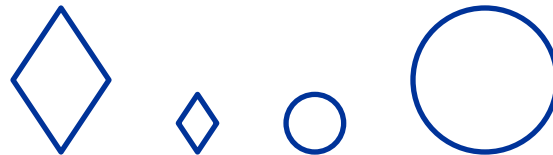
Clues:

- A. The small circle is in the top row.
- B. The large shapes are on the right.



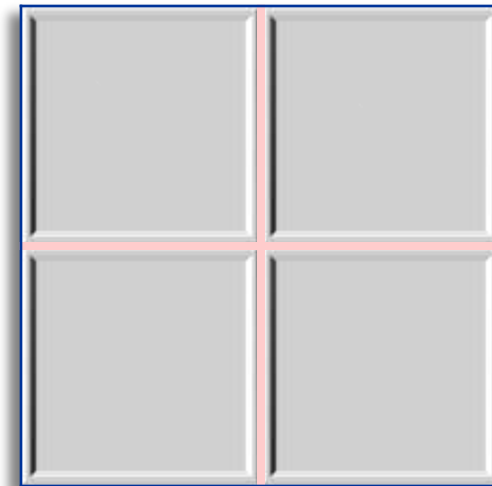
Last one:

Placez les pièces dans the cadre ci-dessous .
Suivez les indices.



Indices:

- A. Les carreaux ne sont pas en bas.
- B. Le petit carreau est à gauche.



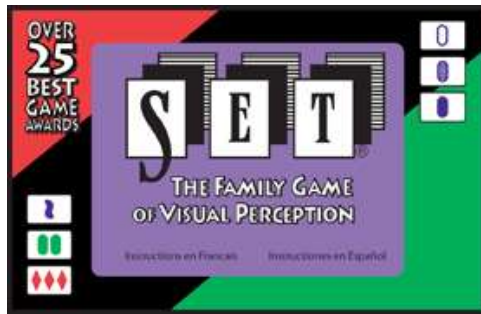
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Today's Play List

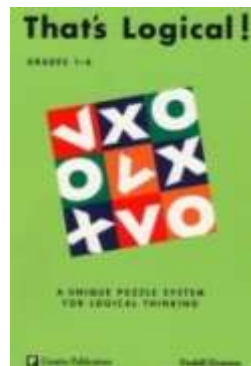
- SET Game



- MetaForms Logic Builder

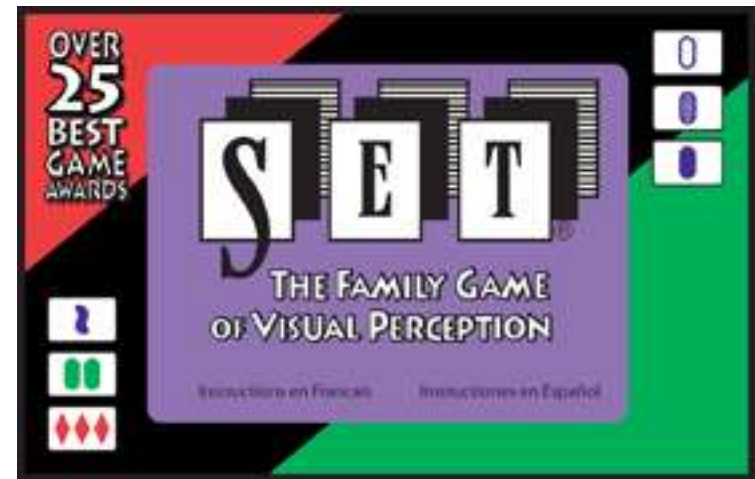


- That's Logical!

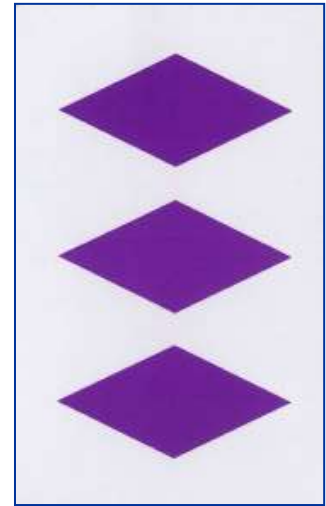
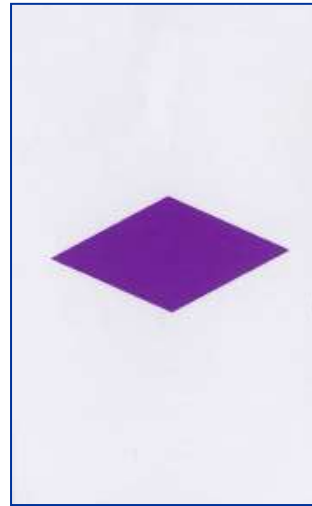
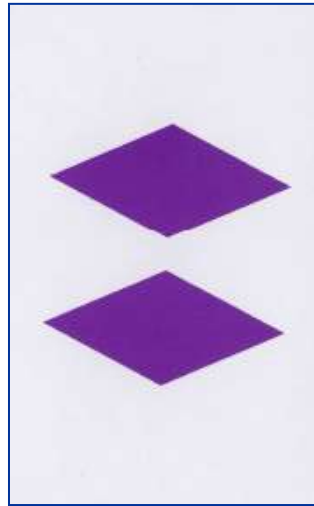


SET Game – the logic game

- Designed by Marsha Jean Falco in 1974
- Published independently in 1991

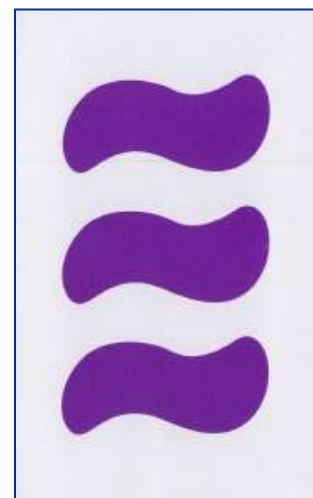
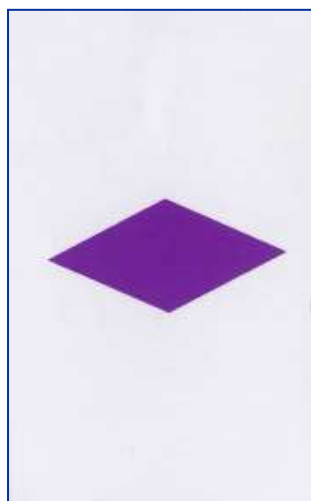
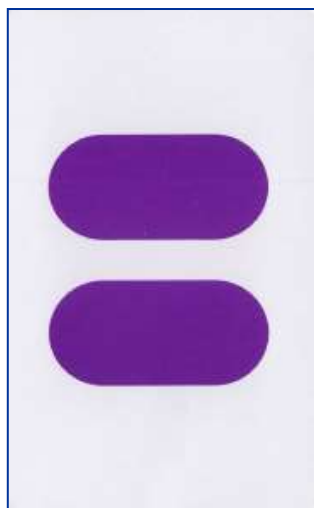





Learning the SET Game – Question 1



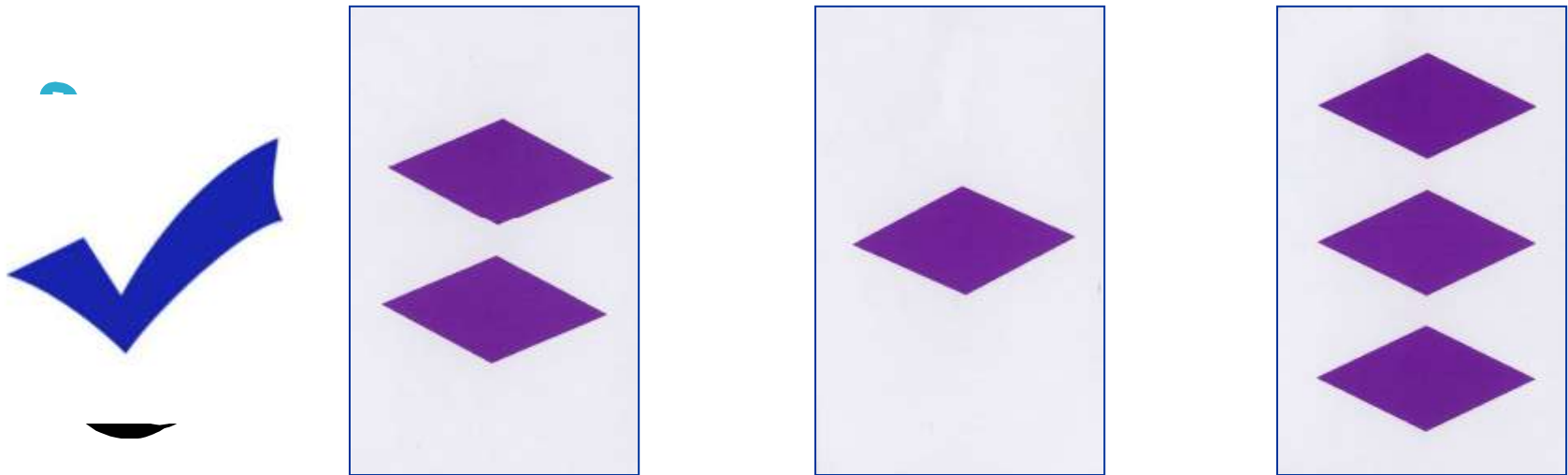
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Learning the SET Game – Question 1



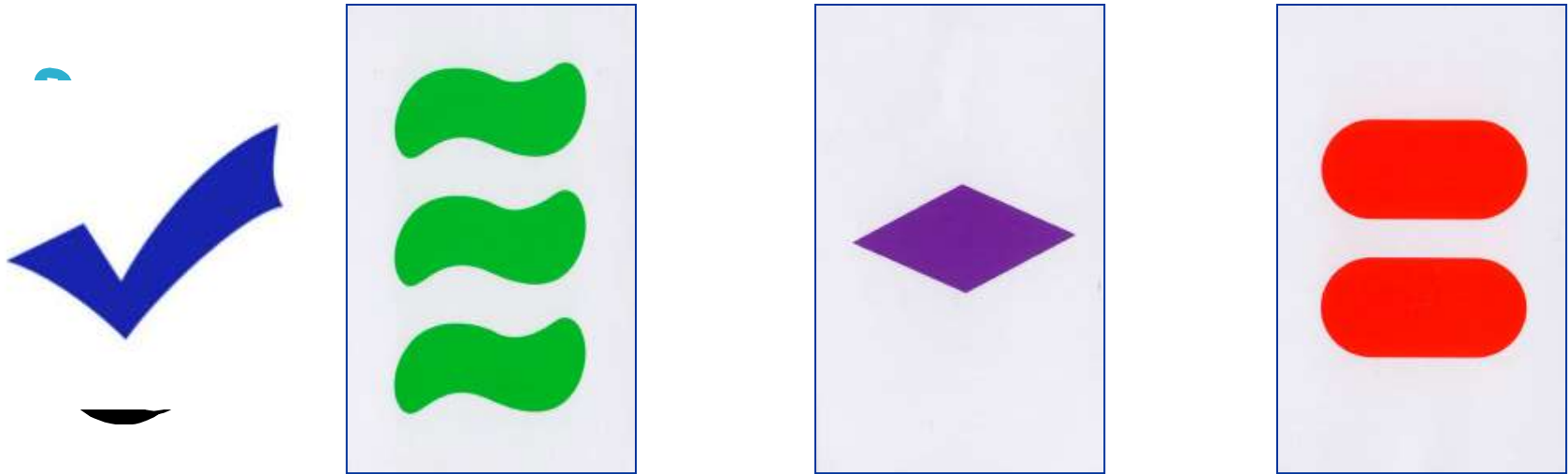
Number	2	1	3
Shape			




Wait a second – back to Question 1



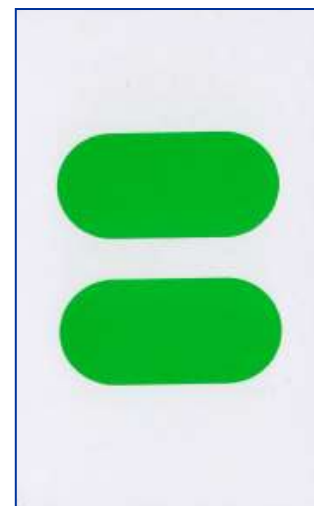
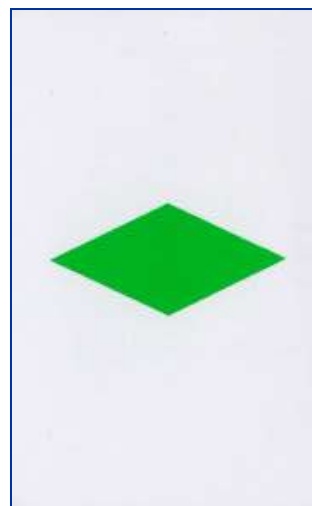
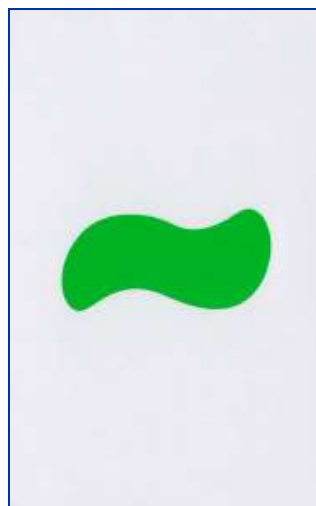
Number	2	1	3
Shape			


Ok ... Question 3



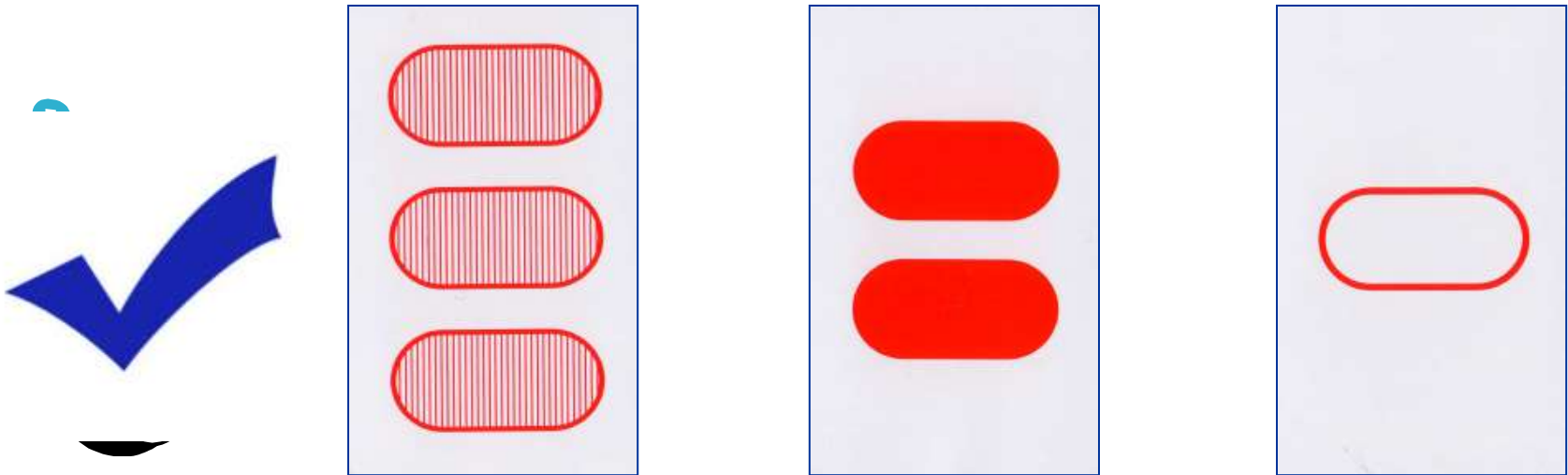
Number	3	1	2
Shape			
Color	Green	Purple	Red

Question 4



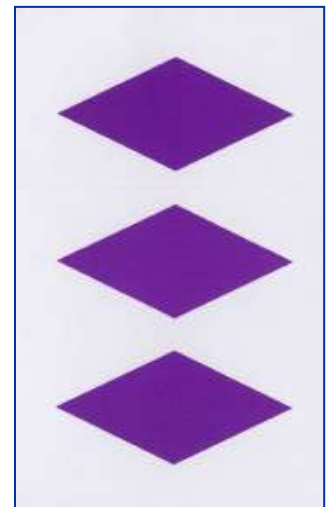
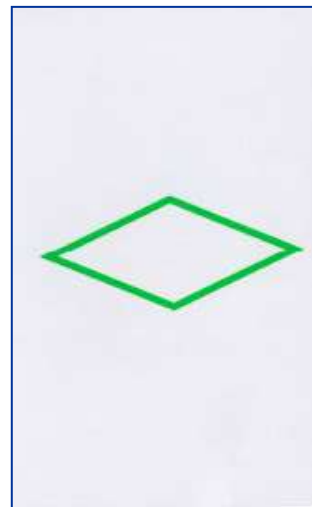
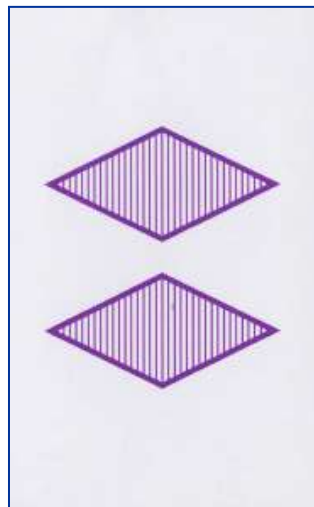
Number	1	1	2
Shape			
Color	Green	Green	Green






Question 5



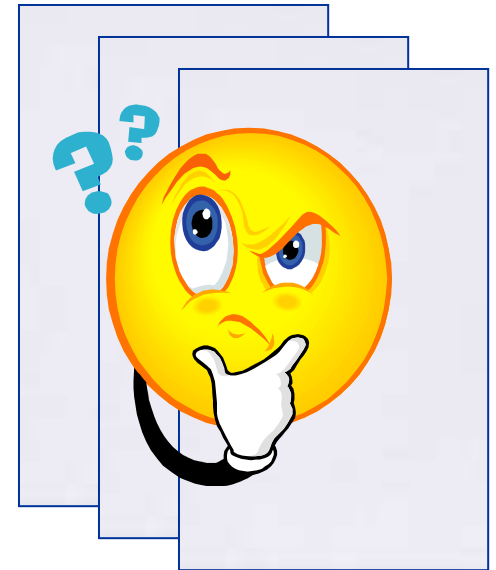
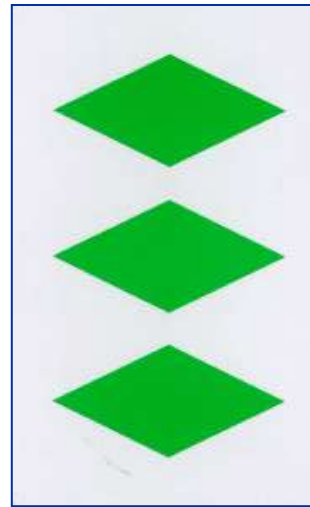
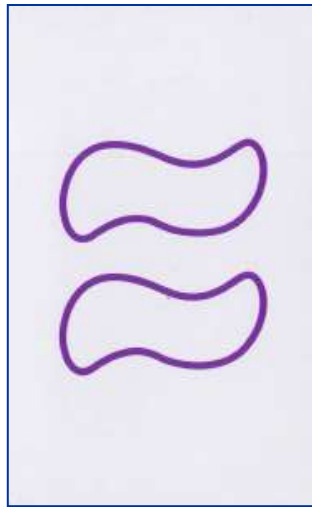
Number	3	2	1
Shape			
Color	Red	Red	Red
Shading			




Question 6



Number	2	1	3
Shape			
Color	Purple	Green	Purple
Shading			

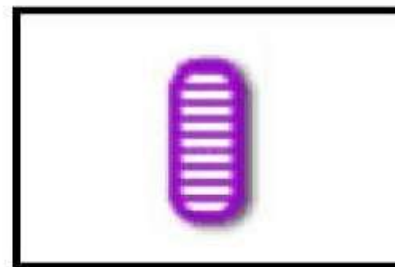
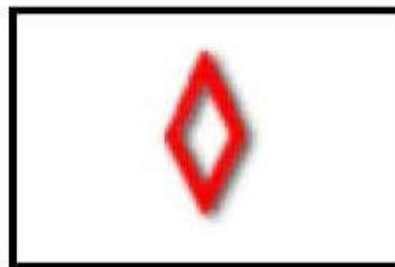
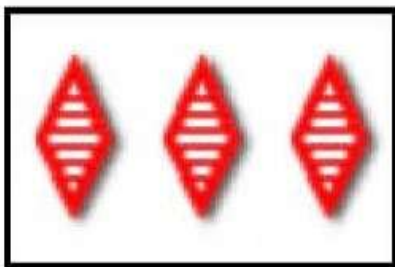
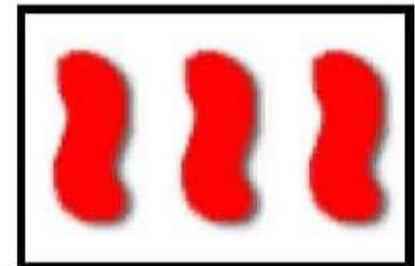
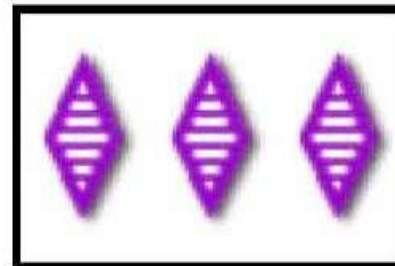
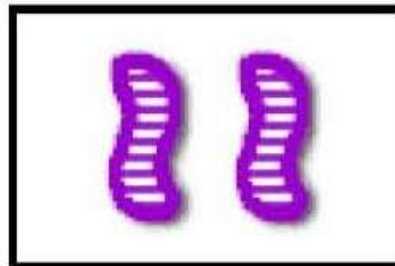
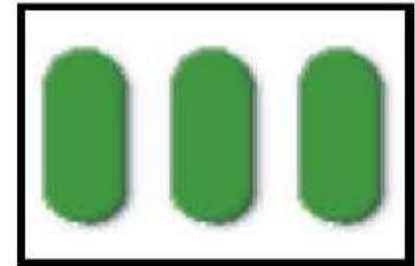
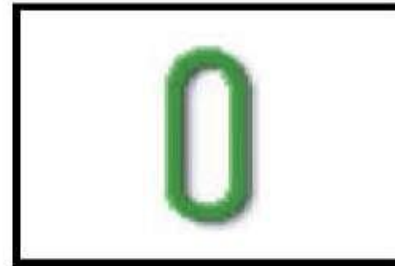
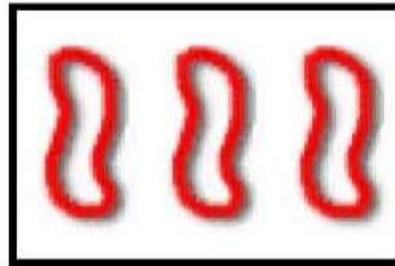
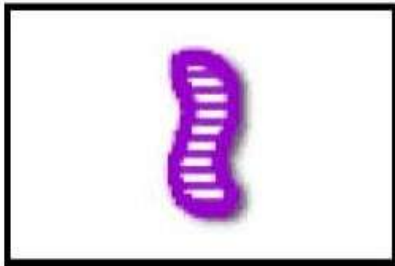
Question 7



Number	2	3	?
Shape			?
Color	Purple	Green	?
Shading			?

Find all 6 sets

www.SETGAME.com daily puzzle April 19, 2009



Connections ...

- How many cards are in the :
 - Deck with only solid purple shapes?
 - Deck with all color solid shapes?
 - Full deck?
- How many cards will I have to add if I wanted to make the deck bigger by adding shapes with dotted and squiggly outlines?
- How many sets are there
 - With 2 attributes that are the same and 2 that are different?
 - With 1 attribute that is the same and 3 that are different?
- What is the probability of not having any sets in 9 cards?

Meta-Forms Logic Builder

- Designed by Robert & Michel Lyons
- Part of *Defi Mathematique* (Challenging Mathematics) curriculum
 - French speaking Canada
 - Grades 1 – 6
- Published by FoxMind Games



Meta-Forms Set-up



Quick Reminder of Logic

- Start with

- Axioms – rules of the game
- Givens – clues in the puzzle
- Propositions – combinations of clues

- Goal

- Valid conclusion – solution to the puzzle
 - ▲ does not contradict any of the propositions

Remember the Goals

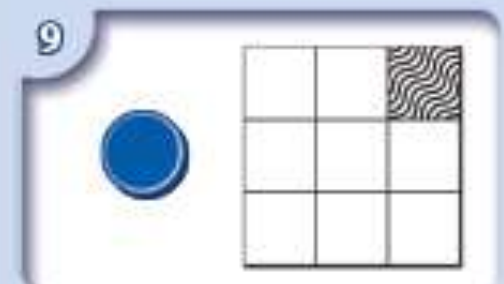
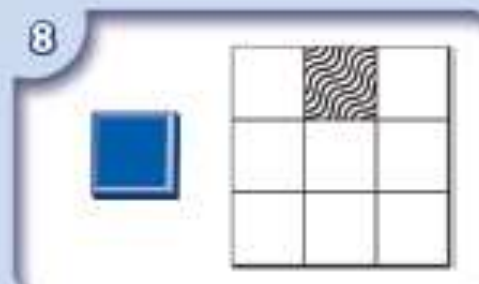
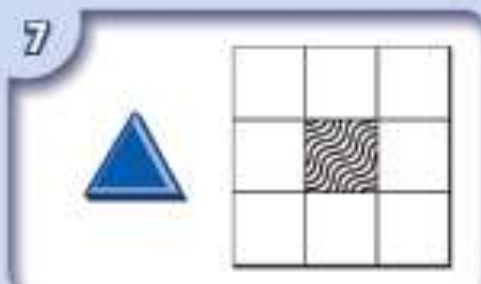
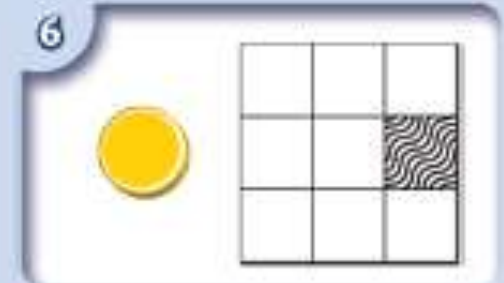
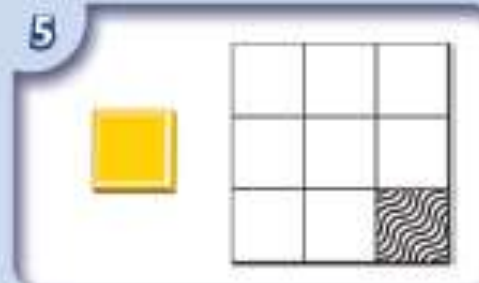
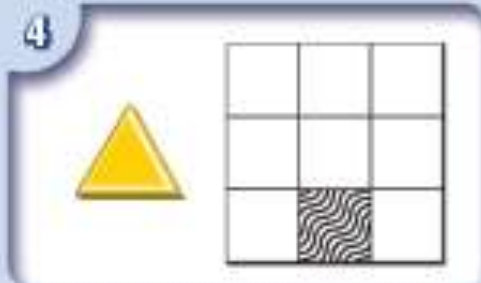
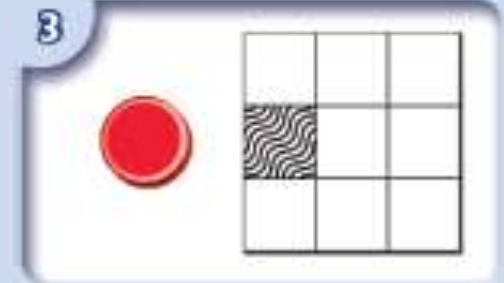
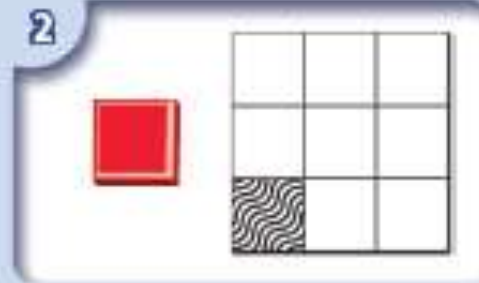
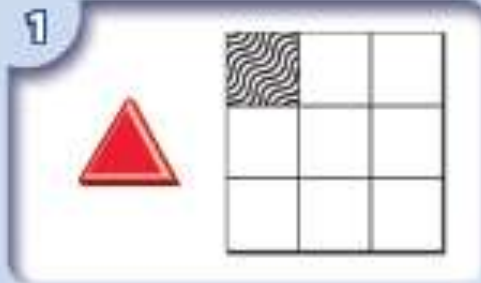
- Goals

- Children reasoning **logically**

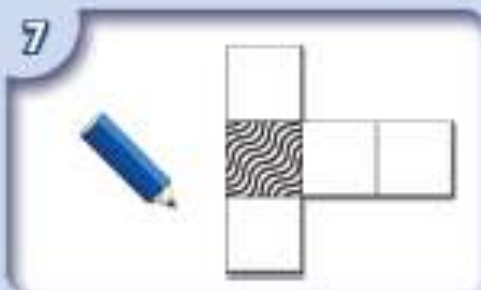
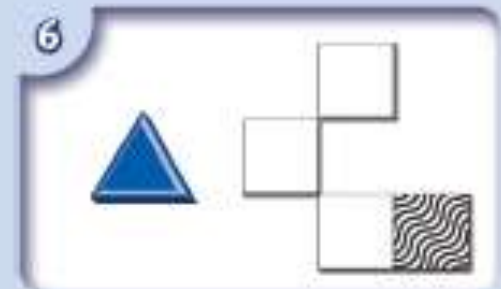
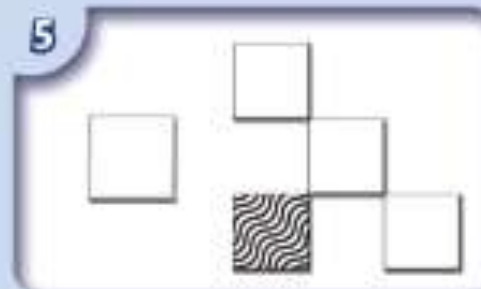
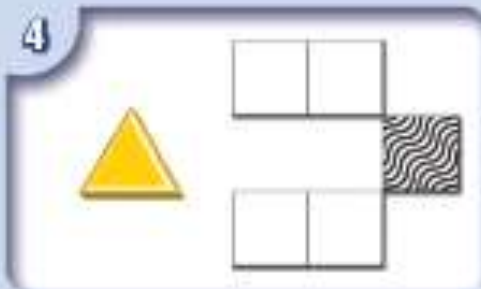
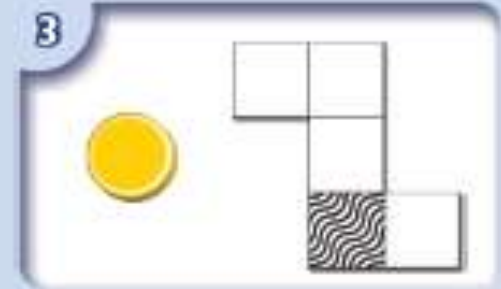
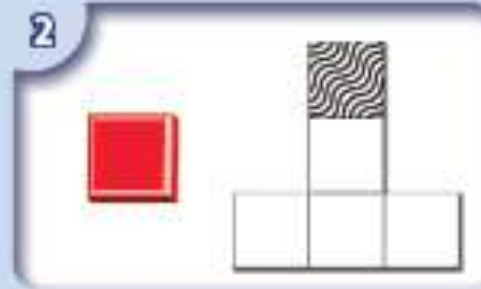
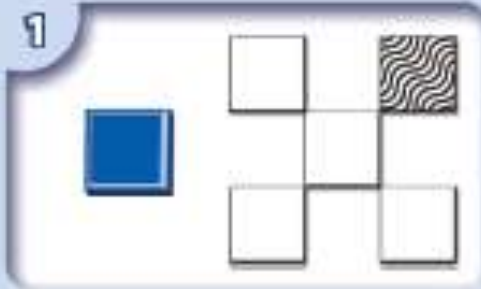
- Children reasoning **independently**

- Children **communicating** their reasoning

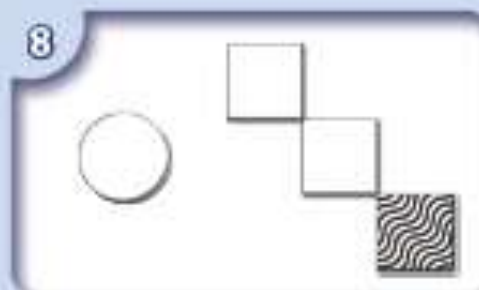
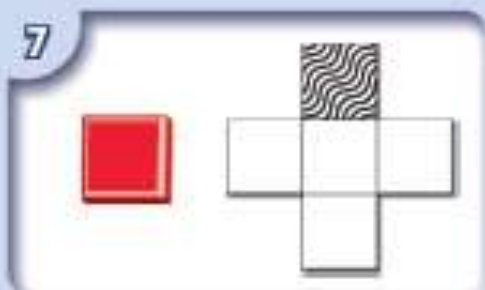
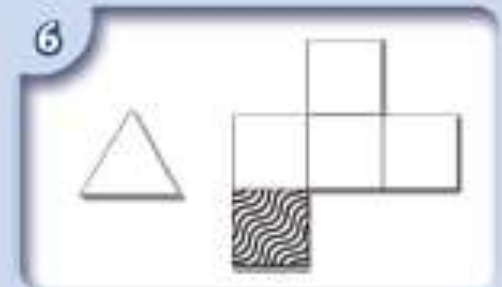
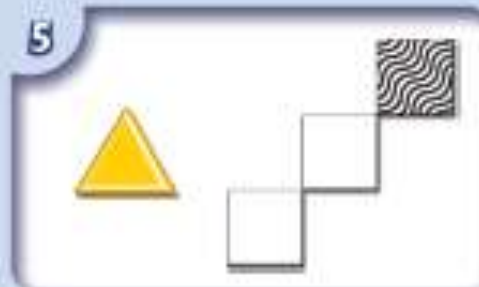
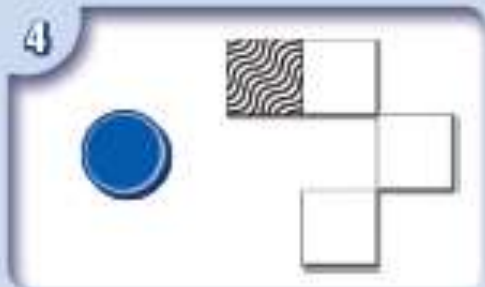
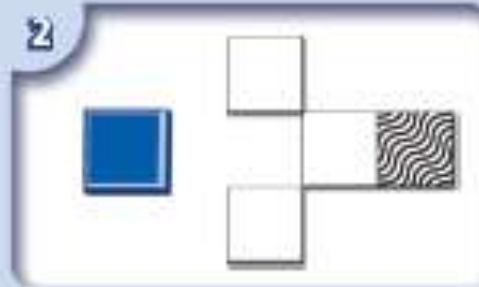
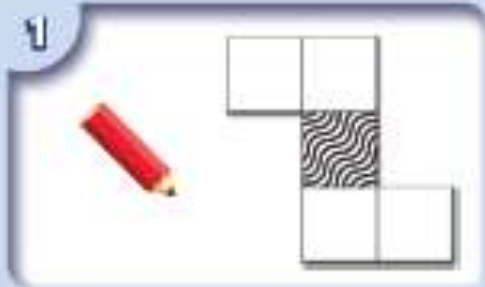
Section 1



Section 1



Section 1



Check your solution ...

- **Dependent:**

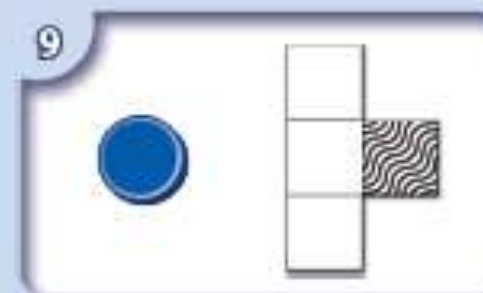
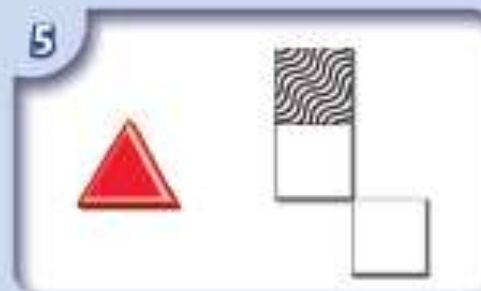
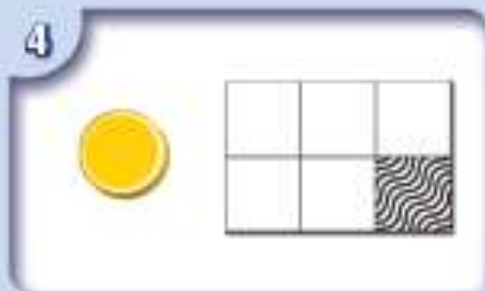
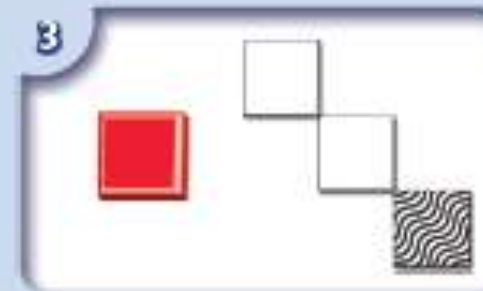
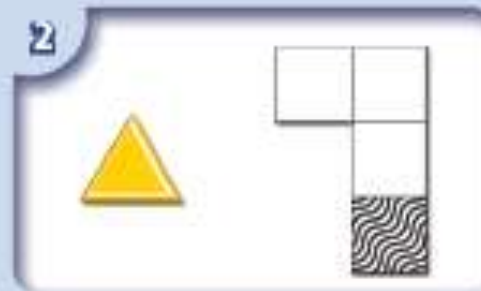
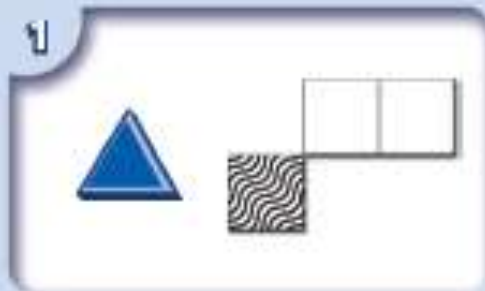
- **Compare** solutions with your neighbor

- Ask the teacher if you are correct

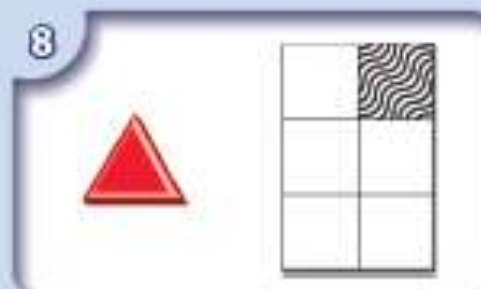
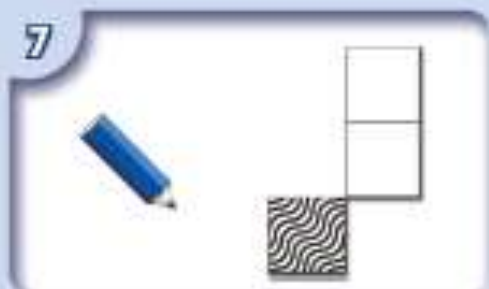
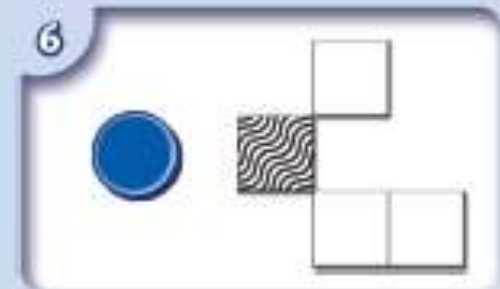
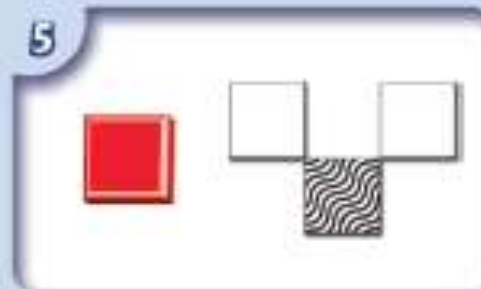
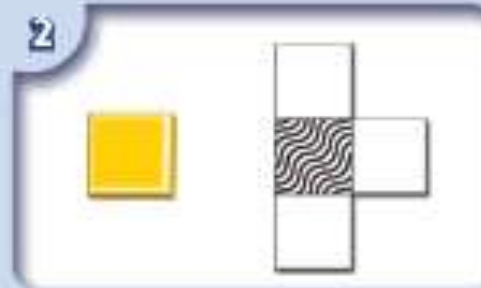
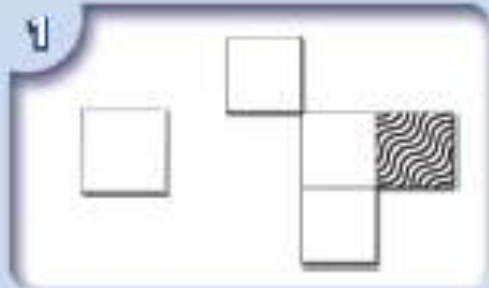
- **Independent:**


- Check for **contradictions** within the puzzle clues

Section 2



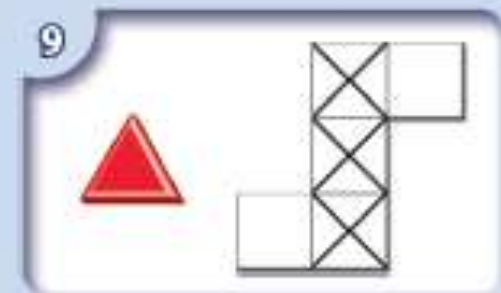
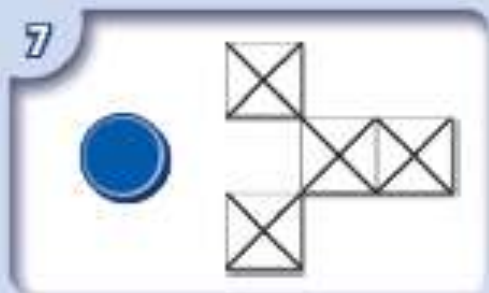
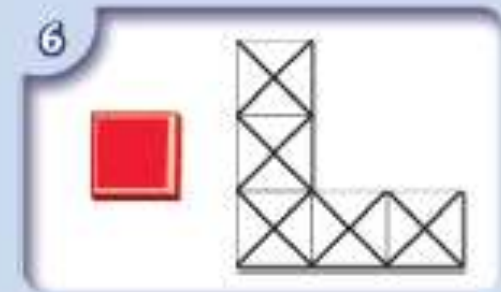
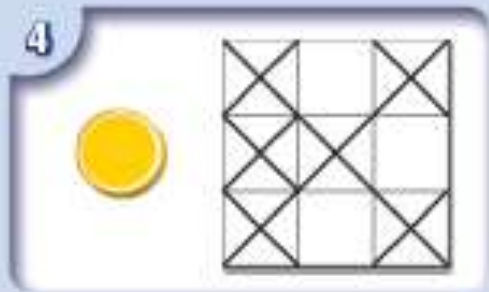
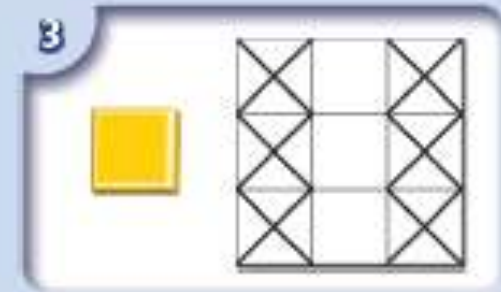
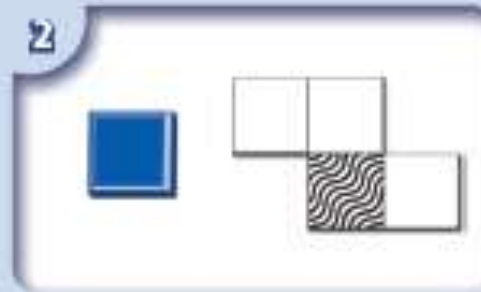
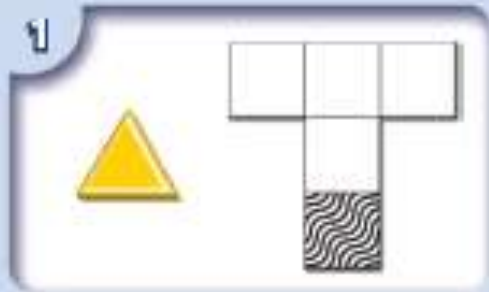
Section 2



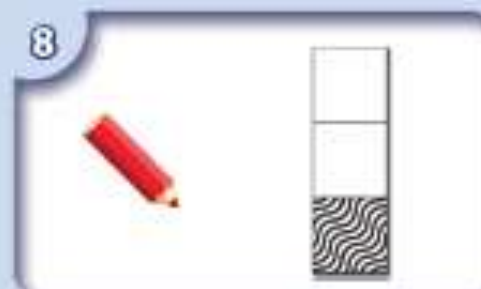
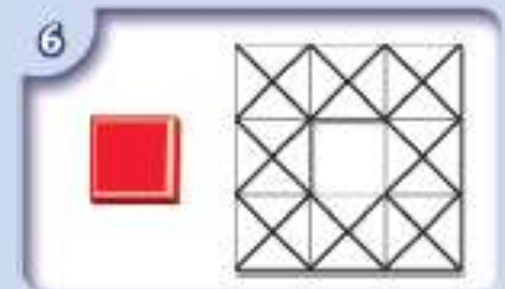
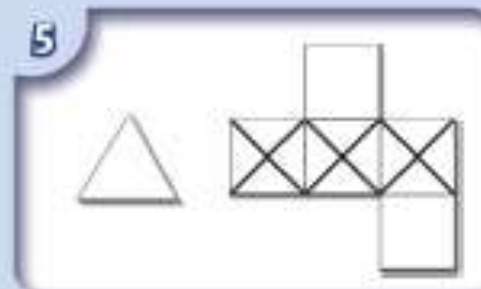
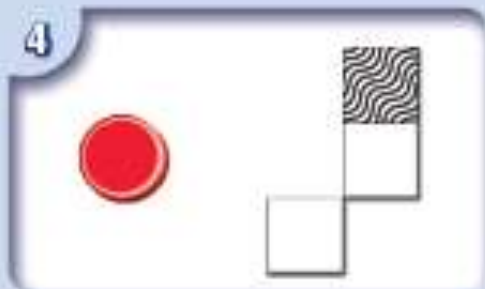
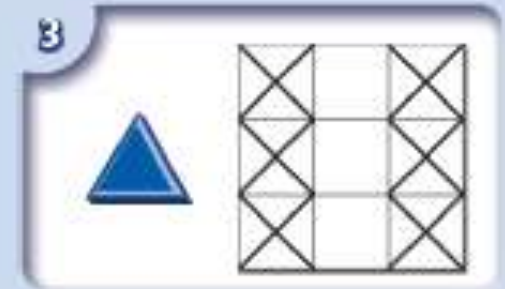
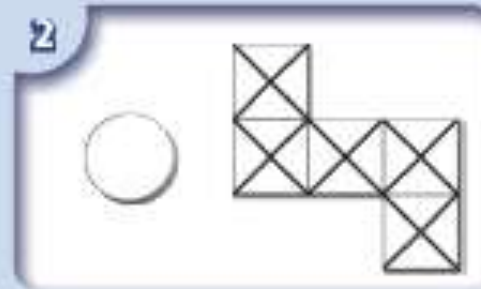
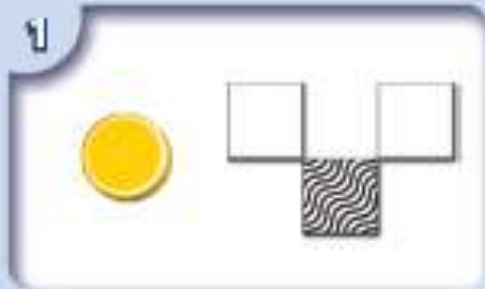


But ... what if we use
the clues in order?

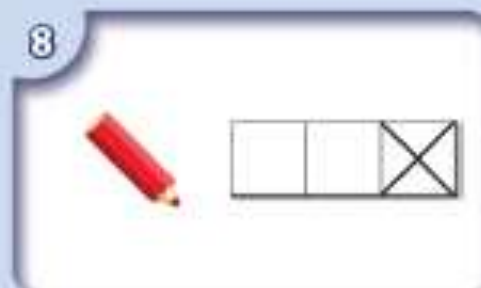
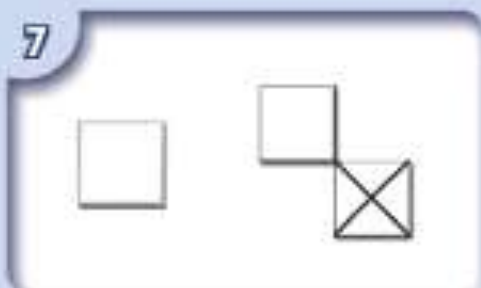
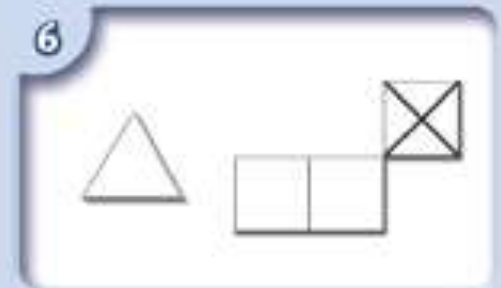
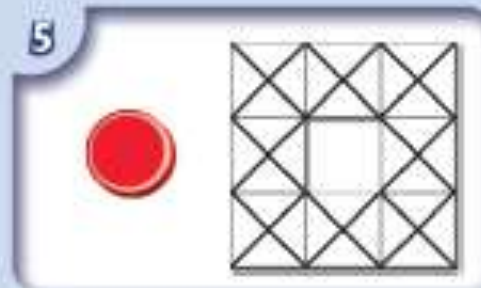
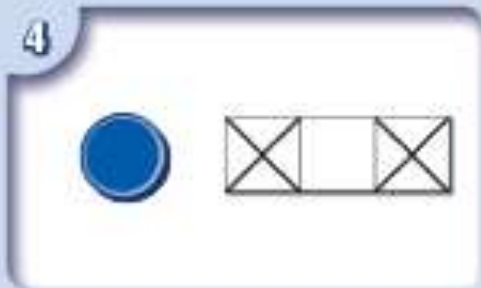
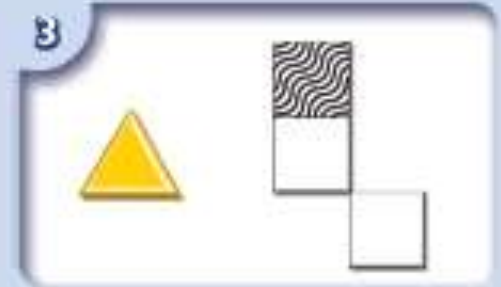
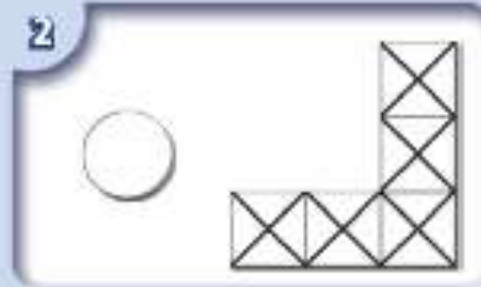
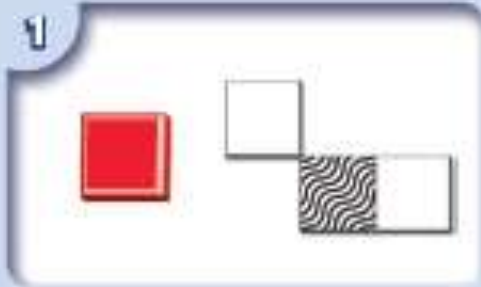
Section 3



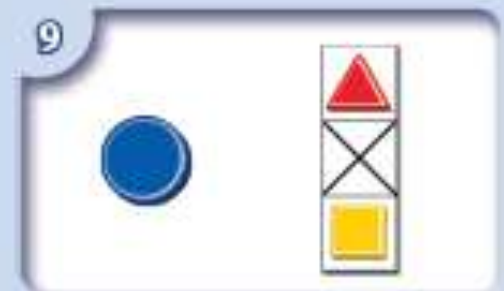
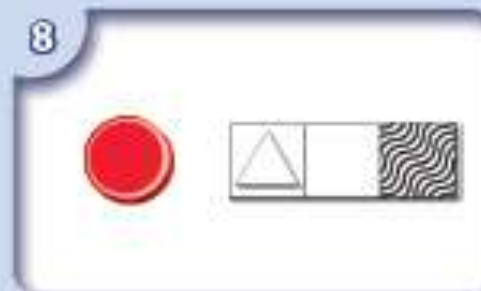
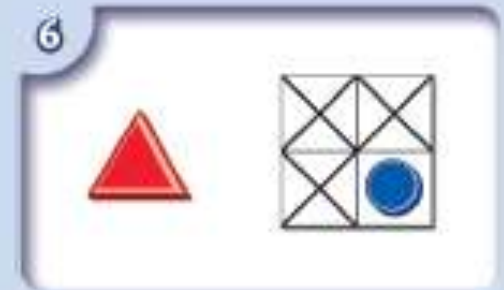
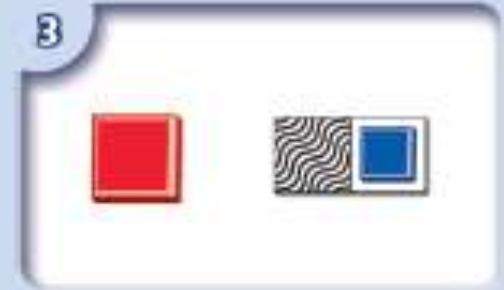
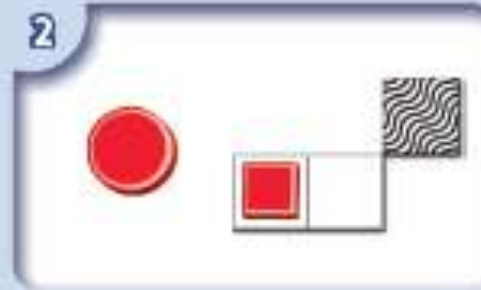
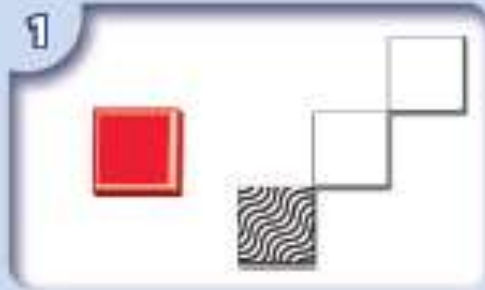
Section 3



Section 4



Section 6



Types of questions we can ask

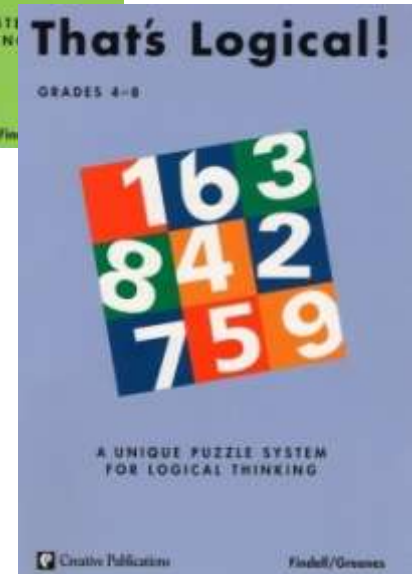
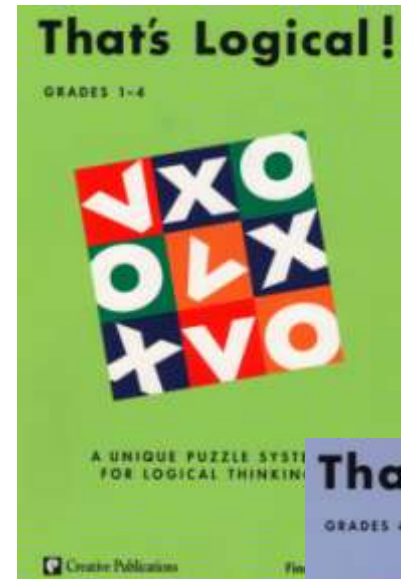
- What do you see?
- What do the clues tell us?
- Where could you start?
- What does a clue mean? How do you say it in words?
- Are there other solutions? How many solutions are there?
- Is there another way to solve the puzzle?
- How is this puzzle different from another?
- How do you know that you are right?
- How could you check your reasoning?

And many, many more ...

That's Logical!

a.k.a. Sigmund

- Developed by
Drs. Carole Greenes &
Carol Findell
 - Book 1: Grades 1 - 4
 - Book 2: Grades 4 - 8
- Inspired by MetaForms
- Published by
Creative Publications

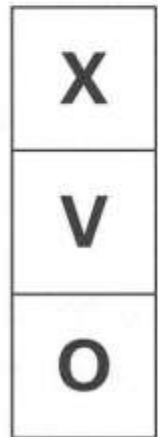
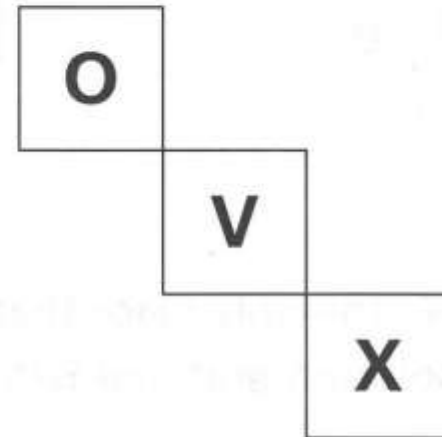
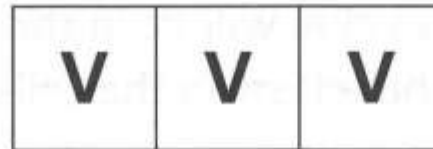
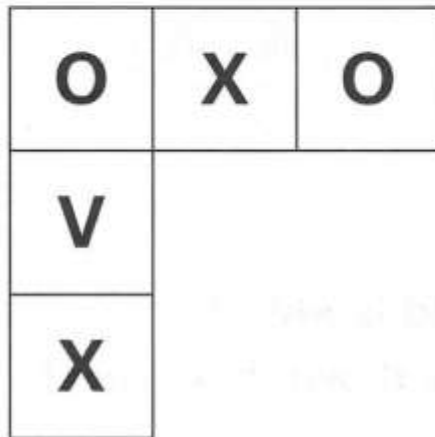


That's Logical! (1-4) *1

Use the clues to figure out where to put the 9 letters.

X X X V V V O O O

Clues

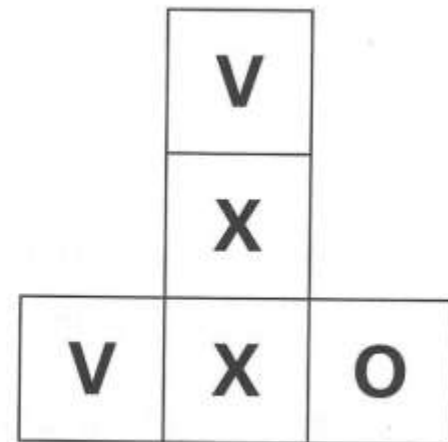
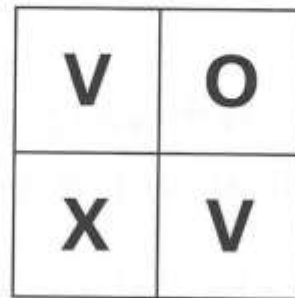
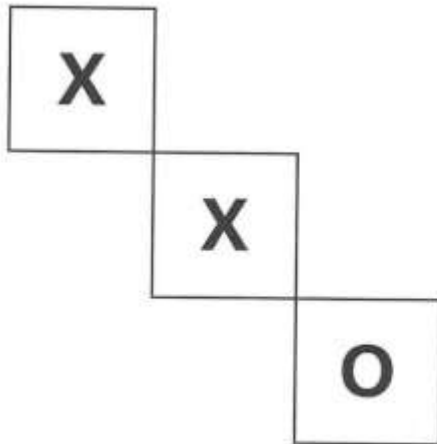


That's Logical! (1-4) *12

Use the clues to figure out where to put the 9 letters.

X X X V V V O O O

Clues

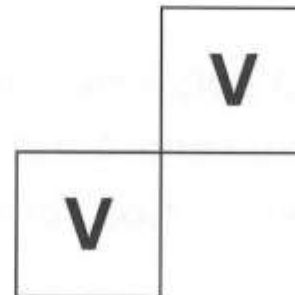
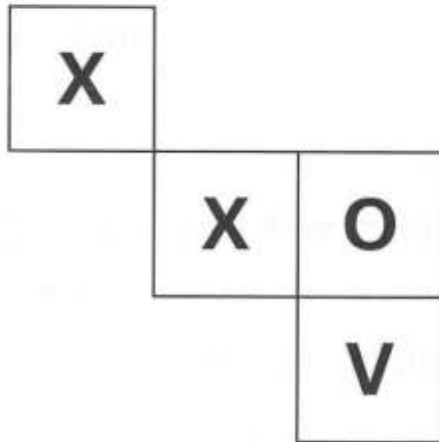


That's Logical! (1-4) **12

Use the clues to figure out where to put the 9 letters.

X X X V V V O O O

Clues

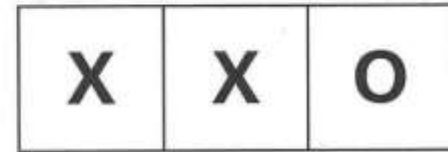
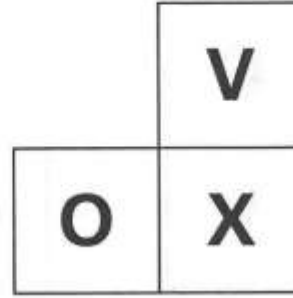
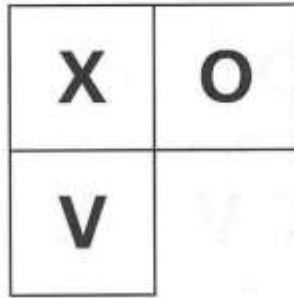
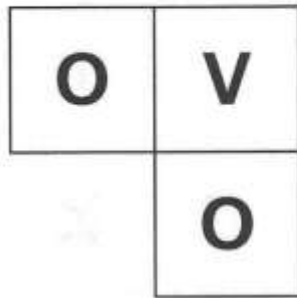


That's Logical! (1-4) ***11

Use the clues to figure out where to put the 9 letters.

X X X V V V O O O

Clues

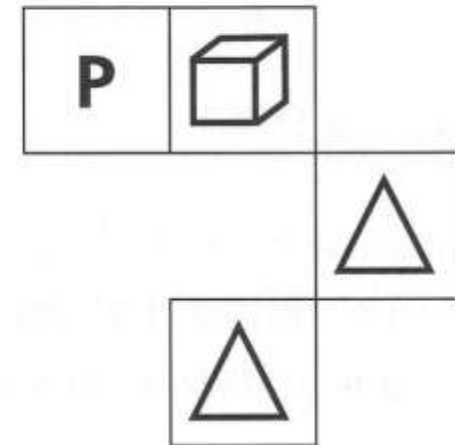
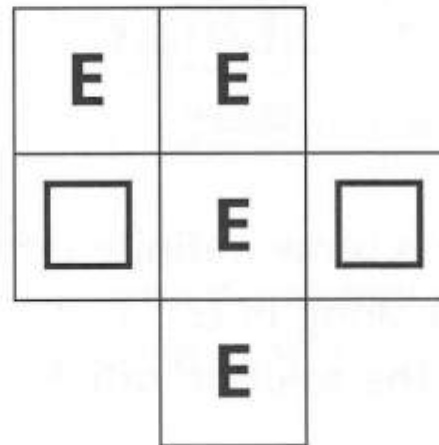
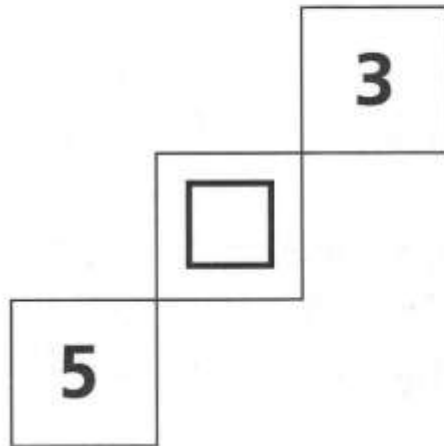


That's Logical! (4-8) *1

Use the clues to figure out where to write the 9 digits.

1 2 3 4 5 6 7 8 9

Clues

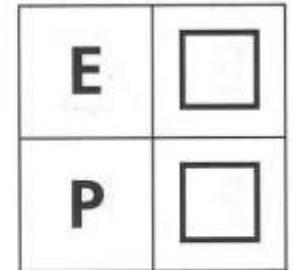
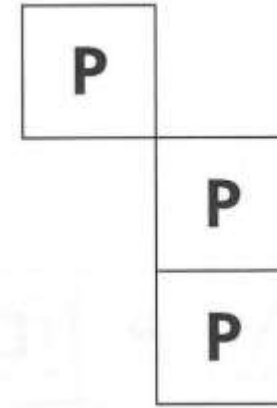
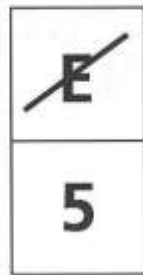
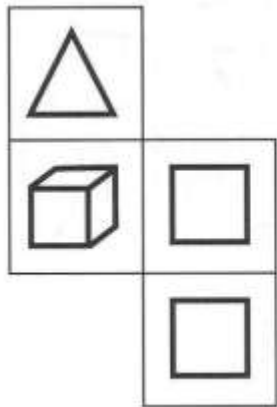


That's Logical! (4-8) ***11

Use the clues to figure out where to write the 9 digits.

1 2 3 4 5 6 7 8 9

Clues



Consumer information

- *That's Logical!*
 - Grades 1-4 & Grades 4-8
 - *Creative Publications @ www.wrightgroup.com*
 - *Booth #1211*
- *Set*
 - *Set Enterprises @ www.setgame.com*
- *MetaForms Logic Builder*
 - *FoxMind Games @ www.foxmind.com*
 - *Booth #1718*

If you have questions as you start to play and work with your students, please contact me at:

E-mail: Polina@Sabinin.info

Phone: 978-263-6040.

Thank you for playing along!

Please repack the game pieces into their bags to before you leave.

Thanks!