

Brain Fitness Kit #4: LOGIC WITH SHAPES, COLOURS, AND NUMBERS

Smarti Bears make a Gift

Teaching guide for children between 4 and 8

Original story by George Ghanotakis, DC Canada Education Publishing; Ottawa, Ontario 2013

Lesson plan by: Francesse Kopczewski, OCT, Ottawa, Ontario 2013

TEACHING GUIDE FOR BRAIN FITNESS KIT #4 LOGIC WITH SHAPES, COLOURS, AND NUMBERS

This kit is designed for young children from age 4 to 8 and focuses on teaching numbers, colours, shapes, spatial orientation, classification, logical thinking, and creativity. It is suitable for most students from Junior Kindergarten to Grade 2, with varying levels of support. Students with Individual Education Plans (IEP) or students with language challenges, such as English Language Learners (ELL), will need additional supports or modifications to help them with learning the concepts below.

With this kit, children learn to:

- Read and represent whole numbers to 15



- Understand that text can convey meaning
- Use comprehension strategies to understand the meaning of text to solve a problem
- Use and understand visual cues of positive (+) or negative (-) to help solve the problem
- Understand and describe the relative locations of objects using positional language such as top, bottom, middle, left, and right
- Learn the geometric two-dimensional shapes of circle, square, triangle
- Sort geometric shapes and classify them by colour (red, yellow, blue) and by attributes (one dot, two dots or three dots)
- Understand and continue patterns with three attributes: colour, shape, number of dots
- Understand the use of a grid to organize information
- Apply oral instructions and visual clues to activate logical thinking about where to put the game pieces
- Make deductions and inferences to solve the problems

- Work cooperatively in large groups, small groups, pairs and independently

To encourage independent thinking and confidence in expressing their ideas, teachers frequently use strategies such as:

1. The **THINK-PAIR-SHARE** method: (Have students **think** about the problem, have them turn and **pair** with a partner to talk about the problem, then have the students **share** their ideas and thoughts with the class.). This allows all students to have something to contribute to the activity or discussion.
2. The **PEER** method: (**P**rompt the student to tell something about the story or challenge, **E**valuate the response, **E**xpand on the response by rephrasing and adding information for the student, **R**epeat the prompt to evaluate whether the student has learned from the expansion). Developed by the Stony Brook Reading and Language Project, this method of dialogic reading or play consists of a short interaction between a student and teacher where the teacher helps the student become the teller.

.....

CURRICULUM LINKS (CANADA) JUNIOR AND SENIOR KINDERGARTEN: LANGUAGE/MATHEMATICS:

(Reference: Ministry of Education for Ontario: THE ONTARIO CURRICULUM, The Kindergarten Program, 2016)

The four “frames” in The Kindergarten Program for Ontario are:

BC – Belonging and Contributing

SRWB – Self-Regulation and Well-Being

DLMB – Demonstrating Literacy and Mathematics Behaviours

PSI – Problem Solving and Innovating

- **1.2 BC, DLMB, PSI:** listen and respond to others
- **1.6 DLMB, PSI:** use language (verbal and non-verbal communication) to talk about their thinking, to reflect and to solve problems
- **1.7 DLMB, PSI:** use specialized vocabulary for a variety of purposes
- **3.2 SRWB:** demonstrate the ability to take turns in activities and discussions
- **4.1 BC, SRWB, PSI:** use a variety of simple strategies to solve problems



- **8.5 SRWB:** demonstrate spatial awareness by doing activities that require the use of small muscles
- **10.7 DLMB, PSI:** demonstrate an awareness that text can convey ideas or messages
- **11.8 DLMB:** demonstrate knowledge of most letters of the alphabet (e.g.,... identify a word that begins with the letter)
- **15.3 DLMB:** make use of one-to-one correspondence in counting objects
- **17.1 DLMB:** explore, sort, and compare the attributes
- **17.2 DLMB:** communicate an understanding of basic spatial relationships (e.g., use terms such as “above/below”...)
- **20.2 DLMB, PSI:** read and represent whole numbers to 10

CURRICULUM LINKS (CANADA) GRADE 1: LANGUAGE:

(Reference: Ministry of Education for Ontario; THE ONTARIO CURRICULUM, Grades 1-8: Language, 2006)

- **Oral Communication:** 1.3 Listening to Understand: identify a few comprehension strategies and use them before, during, and after listening in order to understand and clarify the meaning of oral texts (initially with support and direction...)
- **Oral Communication:** 1.4 Demonstrating Understanding: demonstrate an understanding of the information/ideas in oral texts by retelling the story or restating the information...
- **Reading:** 1.5 Making Inferences/Interpreting Texts: use stated and implied information and ideas in texts, initially with support and direction, to make simple inferences and reasonable predictions about them
- **Writing:** 2.3 Using Knowledge of Form and Style in Writing: use familiar words and phrases to convey a clear meaning

GRADE 1: MATHEMATICS:

(Reference: Ministry of Education for Ontario; THE ONTARIO CURRICULUM, Grades 1-8: Mathematics, 2005)

Number Sense and Numeration:

- Read and print in words whole numbers to ten
- Demonstrate using concrete materials, the concept of conservation of number
- Demonstrate, using concrete materials, the concept on one-to-one correspondence between number and objects when counting

.....



- Count forward by 1's, 2's,...
- Count backwards by 1's, from 20 and any number less than 20
- Solve a variety of problems involving the addition and subtraction of whole numbers

Geometry and Spatial Sense:

- Identify and describe common two-dimensional shapes (e.g., circles, triangles, rectangles, squares) and sort and classify them by their attributes
- Describe the relative locations of objects or people using positional language (e.g., over, under, above, below, ...)

Patterning and Algebra:

- Identify and extend, through investigation, geometric repeating patterns involving one attribute (e.g., colour, ... shape, etc.)

Data Management and Probability:

- Demonstrate an ability to organize objects into categories by sorting and classifying objects using one attribute (e.g., colour,...)

**CURRICULUM LINKS (CANADA)
GRADE 2: LANGUAGE:**

(Reference: Ministry of Education for Ontario; THE ONTARIO CURRICULUM, Grades 1-8: Language, 2006)

- **Oral Communication:** 1.2 Active Listening Strategies: demonstrate an understanding of appropriate listening behaviour by using active listening strategies...
- **Oral Communication:** 1.4 Demonstrating Understanding: demonstrate an

understanding of the information/ideas in oral texts by retelling the story or restating the information...

- **Oral Communication:** 1.6 Extending Understanding: extend understanding of oral texts by connecting the ideas in them to their own knowledge and experience...
- **Reading:** 1.3 Comprehension Strategies: identify several reading comprehension strategies and use them before, during and after reading to understand texts (e.g., ...ask questions to monitor understanding during reading; identify important ideas to remember
- **Reading:** 2.2 Text Patterns: recognize simple organizational patterns in texts of different types, and explain, initially with support and direction, how the patterns help readers understand the texts...
- **Reading:** 3.1 Reading Familiar Words: automatically read and understand many high-frequency words...of personal interest or significance...in shared-, guided-, and independent-reading texts...
- **Writing:** 2.3 Word Choice: use familiar words and phrases to communicate relevant details...

GRADE 2: MATHEMATICS:

(Reference: Ministry of Education for Ontario; THE ONTARIO CURRICULUM, Grades 1-8: Mathematics, 2005)

- **Number Sense and Numeration:** Quantity Relationships: read and print in words whole numbers to twenty, using meaningful contexts (e.g., ...signs)
- **Geometry and Spatial Sense:** Geometric properties: distinguish between the attributes of an object that are geometric properties (e.g., number of sides, number of faces) and the attributes that are not geometric properties (e.g., colour,...)
- **Geometry and Spatial Sense:** Location and Movement: describe the relative locations (e.g., beside...)
- **Data Management and Probability:** Collection and Organization of Data: demonstrate an ability to organize objects into categories, by sorting and classifying objects using two attributes simultaneously (e.g., sort attribute blocks by colour and shape at the same time)

CURRICULUM LINKS (USA)

LANGUAGE AND MATHEMATICS: Common Core State Standards – United States (CCSS):

KINDERGARTEN:

- **CCSS.ELA-LITERACY.RI.K.1:** With prompting and support ask and answer

questions about key details in a text

- **CCSS.ELA-LITERACY.RL.K.3.A:** Demonstrate the basic knowledge of one-to-one letter-sound correspondences
- **CCSS.ELA-LITERACY.RL.K.4:** Ask and answer questions about unknown words in a text
- **CCSS.ELA-LITERACY.RL.K.7:** With prompting and support, describe the relationship between illustrations and the text in which they appear
- **CCSS.ELA-LITERACY.SL.K.2:** Confirm understanding of a text, read aloud, or information presented orally by asking and answering questions about key details and requesting clarification if something is not understood
- **CCSS.ELA-LITERACY.SL.K.3:** Ask and answer questions in order to seek help, get information or clarify something that is not understood
- **CCSS.ELA-LITERACY.RI.K.10:** Actively engage in group reading activities with purpose and understanding
- **CCSS.MATH.CONTENT.K.MD.A2:** Directly compare two objects with a measurable attribute in common to see which object has "more of"/"less of" the attribute and describe the difference
- **CCSS.MATH.CONTENT.K.OA.A.1:** Represent addition and subtraction with objects, fingers, mental images, drawings, sounds, acting out situations, verbal explanations, expressions or equations



- **CCSS.MATH.CONTENT.K.CC.B.4:** Understand the relationship between numbers and quantities: connect counting to cardinality
- **CCSS.MATH.CONTENT.K.CC.B.4.A:** When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.
- **CCSS.MATH.CONTENT.K.CC.B.4.C:** Understand that each successive number name refers to a quantity that is one larger
- **CCSS.MATH.CONTENT.K.G.A.1:** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.
- **CCSS.MATH.CONTENT.K.G.A.2:** Correctly name shapes regardless of their orientations...

GRADE 1:

- **CCSS.ELA-LITERACY.RL.1.1:** Ask and answer questions about key details in a text
- **CCSS.ELA-LITERACY.RL.1.2:** Retell stories, including key details, and demonstrate understanding of their central message or lesson
- **CCSS.ELA-LITERACY.RI.1.6:** Distinguish between information provided by pictures or other illustrations and information provided by words in a text
- **CCSS.ELA-LITERACY.RF.1.3:** Know and apply grade-level phonics and word analysis skills in decoding words
- **CCSS.ELA-LITERACY.SL.1.2:** Ask and answer questions about key details in a text read-aloud or information presented orally...
- **CCSS.MATH.CONTENT.1.NBT.A.1:** Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral
- **CCSS.MATH.CONTENT.1.G.A.1:** Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color...); build and draw shapes to possess defining attributes

GRADE 2:

- **CCSS.ELA-LITERACY.RL.2.1:** Ask and answer such questions as *who*, *what*, *where*, *when*, *why* and *how* to demonstrate understanding of key details in a text
- **CCSS.ELA-LITERACY.RL.2.7:** Use information gained from the illustrations and words in a print or digital text to demonstrate understanding...
- **CCSS.ELA-LITERACY.SL.2.1:** Participate in collaborative conversations with diverse partners...
- **CCSS.ELA-LITERACY.SL.2.2:** Recount or describe key ideas from a text read aloud or information presented orally or through other media

- **CCSS.MATH.CONTENT.2.NBT.A.3:** Read and write numbers to 1000...
- **CCSS.MATH.CONTENT.2.G.A.1:** Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces...
- **CCSS.MATH.CONTENT.2.G.A.2:** Partition a rectangle into rows and columns of same-size squares and count to find the total number of them

PRIOR KNOWLEDGE AND PRE-ACTIVATION SKILLS TO TEACH

Before beginning the story and logic games, students will need to develop a basic knowledge in various areas so that they can fully participate successfully in these exercises. Students who are English Language Learners or students with specialized Individual Education Plans will need adaptations as required to the expectations or to the learning activities to help them access the information or clues. Furthermore, additional time or work with manipulatives may be necessary depending on the needs of the students.

LANGUAGE:

Prior to using the kit or reading the story, introduce various words in the story within the classroom to build a knowledge base with the students. Key words that may not be known by the students are: **celebrate, giggle, smirking, apron, winked, dumped, clues, decorated, present (as a "presentation" not as "at the current moment" or as a "gift")** and **grid**. Read other stories in which the characters are "celebrating" an event, giving or "presenting" someone with something, or "decorating" for an occasion. Write these words on your Word Wall and refer to them often. Have the students talk about a time when they "celebrated", "decorated", or "presented" something. Use the word "present" when choosing a student to show his or her work so the students



get used to hearing and understanding this particular meaning of the word. The word "apron" can be used during Visual Arts activities to demonstrate how it protects clothing. Bring in several aprons and show the students how they are worn and discuss the purpose for aprons. Ask the students when and where they have ever seen someone wearing an apron. Put the word "apron" above the hooks for aprons in the classroom. For the word "clue", use this word from time to time to generate interest in having the students guess where they are going (the "clue" might be on the class schedule on a bulletin board), or guess what they will be doing (have "clues" in the form of visuals, or labels). Emphasize that a "clue" is a tool to help you solve a mystery or a problem. The words "giggle", "smirking", "winked" and "dumped" are emotive words that can be introduced during circle time, or as a "Word of the Day", or during Read Aloud (demonstrating the meaning of the word by doing the action associated with it). For kindergarten students, these words are for auditory learning activities, whereas for Grade 1 and 2 students, these words could be put on the Word Wall, or on a "Special Words" bulletin board for students to use to augment their creative writing. The math and geography term of a "**grid**" could be used as an organizational tool in the classroom, starting with a smaller grid of 2 x 2 and expanding to a 2 x 3 grid which is used for the logic challenges.

MATHEMATICS:

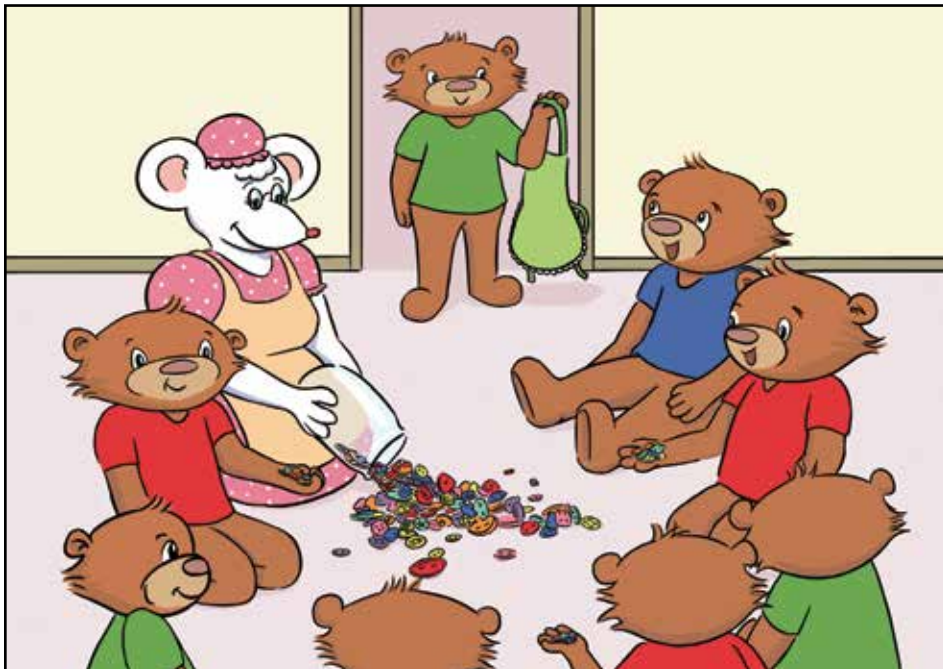
Students should be exposed to the following concepts throughout the day through visual and auditory prompts, instructions for play tables, lining up in the classroom, or other such opportunities:

1. *Primary colours: red, yellow, blue.* These colours could be used when directing younger students to a play area (e.g., Saying "Adam and Sahal will go to the Yellow Table today" while you hold up a yellow card which matches that play or work station). For older students, a simple colour method or organizing displays on bulletin boards, or classroom organizational methods (e.g., blue bin for finished work) is sufficient.
2. *One-to-one correspondence for the number of dots on each shape.* In early grades, frequently use counting with visual placement of materials, such as blocks. This concept is very important for further understanding of more complex math concepts so it is important to make sure students have a firm idea that 1 = one object. Presentation of the number and the written numerical words is also important for students to access the text within the games. This will require understanding of letter sounds and their correspondence to the beginning, middle or endings of number words, common sight words and directional words. Again, this could be built into Read Aloud, Shared Reading, Guided Reading or circle times.
3. *Two dimensional shapes: circle, square, triangle.* Depending on the level of the students, most will have this concept by the time they reach age 5, but there may be some students that need additional help. In addition,

it is important to have the names of the shapes in written word format so that students will be able to recognize them when they get to the activity challenges. In older grades, also focus on looking at the shapes themselves (e.g., number of “faces”, “sides”, “angles”).

4. *Orientation: left vs right, top vs middle vs bottom.* These concepts are best taught in context with a meaningful activity within the classroom. The concepts of left and right are critical for reading, writing, mathematics, social studies and directions. Use these concepts when asking students to organize their work, following a direction (e.g., “Hold up your right hand, now pass the marker to the person on your right.”), or during physical education activities. Fun activities for younger grades, such as wearing a stamp or sticker on their right or left hand will visually help students in understanding this. Singing songs with actions (such as the Hokey Pokey) are also fun ways to teach this concept. For top, middle and bottom, reinforce these concepts when reading (e.g., start at the top of the page, looking at pictures at the bottom of the page, etc.), alphabet letter formation, writing words, and grid concepts (see below). For each of these orientation concepts, the words should be available to students in the classroom and placed on the Word Wall.

5. *Grid concept for organizing information.* Grids can best be taught using interactive methods such as a whiteboard or a large class-size grid on a flip chart. Use a 2 x 3 grid that is used in the story Smart Bear: Logic with Colours, Shapes and Numbers Review concepts of *right and left and top middle and bottom* while pointing to the grid. Have students come up to demonstrate



the different parts of the grid placing different shapes or colours on the grid. Also introduce the ideas of positive (+) meaning that we must put that piece in that position on the grid and negative (-) meaning we don't put that piece in that location on the grid. Note: In the Activity Book 4, the grid is expanded into a data chart. This is especially valuable for late grade 1 and grade 2 for organizing data, but may need to be explicitly taught in a guided or shared math session.

READING THE STORY AND STARTING THE LOGIC GAMES

- In the Brain Fitness kit, there are 9 large-card challenges and an Activity Book 4 which also contains the 9 large-card challenges as well as two other activities for each of the 9 challenges. The 9 Large-Card Challenges should be done first as a class activity. Each card is leveled according to difficulty (one star is the easiest up to three stars which is the most difficult). In the Activity Book 4, the two other activities associated with each challenge may also be used as a class activity, especially when student reading levels are not able to easily decode the Riddle Rules or “clues” that are written in word format.
- Photocopies can be made of the game “clue” cards, the blank apron game card and the other activities for student use as the teacher sees fit.
- Using a Smart Board, other presentation technology or, if not available, a flip chart, reproduce Mother Bear's blank apron and nine game pieces (three of each colour with corresponding one, two and three dots).
- Read the story to the class. Use Shared Reading and Think Aloud methods to encourage student connections with the story. Record any questions, thoughts on anchor charts to be used later for Reading, Writing, Social Studies or Math assignments and play areas.
- Discuss the vocabulary in the text and make reference to your earlier discussions in the classroom. On an anchor chart, list special words used in the story such as: **celebrate, giggle, smirking, apron, winked, dumped, clues, decorated, present (as a “presentation” not as “at the current moment” or as a “gift”), and grid.** In grade 1 or 2, discuss with the class how they could figure out the meanings of some of the words using the context of the sentence, prefixes or suffixes, the base word, or other cues. Record the meanings of each of the words for student reference. This will especially important for English Language Learners or students with Individual Education Plans. Re-read the story to the class emphasizing the meanings of the words as you come to them in the story. During discussions of the story and during everyday dialogue, use these words in context (where possible) and refer to the recorded meanings as you use them. Encourage student use as well, both in their writing and throughout the day.
- Each kit also contains 24 smaller game cards on a ring. To introduce and reinforce logical thinking, the class will be working together on the large 9

game cards to start, with these smaller game cards used for small group, pairs or independent challenges.

- Re-read the story to the class. On page 11 and 12, discuss what clues Miss Mouse is showing the Smarti Bears and how they will have to decorate their mother's apron. By using the sample apron and game pieces that you have set up on the SMART board, other presentation technology or flip chart, have the class discuss what buttons (colour and number of dots) will go on the apron. Build the number of selected buttons to be added to the apron together, selecting the correct colours and number of dots and move these over to be used as you go through the clues.
- Now using the template of the blank-grid apron found on page 21 of the story, reinforce that Miss Mouse has put a grid on the apron. Have the students interactively place the buttons in the correct locations, looking and discussing each of the clues while using the orientation words of *right/left*, *top/middle/bottom* and *positive/negative*. This should be done as a class activity, using the PEER or THINK-PAIR-SHARE methods so that every student is clear about the "clues" and their meaning. Note: There are no negative clues given in the story itself, although Miss Mouse mentions it. This concept is introduced during Game 6 on the large cards and should be discussed and reviewed as a class at that time.
- At the end of working on the apron in the story, show the class that there is an answer key at the back. Go over each of the squares in class grid to see if it matches the answer grid, using the orientation vocabulary. This will help students check the answer key themselves when working independently in small groups, pairs or independently.

PLAYING THE LARGE-CARD GAMES

Now that the students have a good understanding of orientation vocabulary and logical thinking, the nine games on the large game cards can be played with the class. This can be done as part of a 15-20 minute opening or closing activity during the day, as a "fun break", or as a lesson in itself. Rolling the game die also increases the complexity, as the students must select the



correct piece from the 9 game shapes rather than doing this ahead of time. Game clues and completed game apron cards could be placed at a "Game Station" for further individual or partner exploration. Reviewing the Answer Key after playing each game card will also help students to check their own work.

Other activities in *Activity Book 4* could also be completed with the class or set up as individual or small group activities.

PLAYING THE SMALL-CARD GAMES

Once students have completed all 9 large game cards, they are ready to try the challenges in the 24 small game cards. Have students work individually, with partners or in small groups of three to solve some of these challenges. Games 21-24 have parts of the grid missing in the clues. Students must visualize the 2 x 6 grid in order to figure out what the clue means. This is a more complex challenge and may require a class-directed lesson to stimulate discussion about how this could be resolved.

The challenges can easily be monitored by the teacher who can check student understanding after students have finished the game. Students can also self-monitor their progress using the Smarti Bear Progress Chart. Students colour the Progress Chart green if they solve the puzzle correctly and red if they had an error. Any game can be played over until the correct solution is found and the chart coloured green.

USING TECHNOLOGY: SMARTI BEAR APPS

These logic challenges are also available to students online so that they can try different versions of the game. As the students work through the activities, the level of difficulty increases. Each game provides assistance and feedback for making corrections. The online version also gives students an opportunity to compete against other online players. Students can access this site by going to: <http://mediamaze.com/en/SB4>.

For more information on *Smarti Bear* and other educational book series, please contact us or visit our website.



DC Canada Education Publishing

613-565-8885 | 1-888-565-0262
info@dc-canada.ca

180, rue Metcalf, bureau 204
Ottawa, Ontario | K2P 1P5

www.dc-canada.ca