

Curriculum topics:

- Spatial Reasoning
- Memory
- Problem-solving
- Logic
- Patterns and Sequences

Subjects:

**Physical Science,
Math, Art**

Grade range: Pre K-8

Who we are:

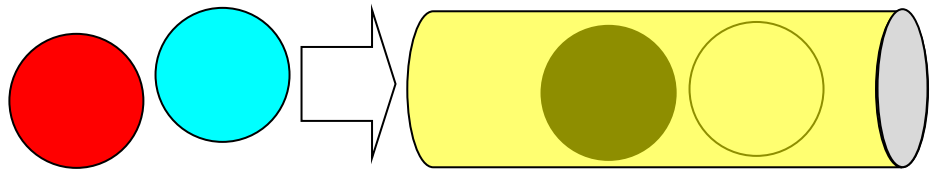
Resource Area for Teaching (RAFT) helps educators transform the learning experience through affordable “hands-on” activities that engage students and inspire the joy and discovery of learning.

For more ideas and to see RAFT Locations

www.raft.net/visit-raft-locations

SPATIAL REASONING TUBE

Improve memory and spatial reasoning skills



Develop memory and spatial reasoning skills using nothing more than a cardboard tube and a few simple objects. It's a great work-out for anyone who needs strong thinking skills - from pre-schoolers to advanced engineering students!

Materials required

Per team of 2-8 students:

- Cardboard Tube, ~ 5 cm (2") in diameter and 20 cm (8") long
- Age-appropriate objects of distinctly different colors (and similar in size and shape) that fit closely inside the tube, 4
- Optional: Bag or bin to hold the objects

A Note about Safety

Adult supervision required. This activity is intended for children 3 years and older. Always exercise care when handling small parts with children present.

Note: Make sure the objects slide through the tube easily, but are large enough [~3.8 cm (1.5") to 4.4 cm (1.75")] that they cannot pass one another or get wedged in the tube.

To do and notice

For young children, have an adult or older student facilitate this activity with a group of 2-8 participants. Older students can work in pairs or teams – taking turns leading the activity. The leader does the following:

1

Arrange 3 or 4 objects end to end in a row on a table.



“red”



“white”



“blue”



“black”

Curriculum Standards:

Science & Engineering Practices
(Next Generation Science Standards: Grades K – 8)

Problem solving, Memory & Knowledge, Curiosity & initiative (Early Education: Desired Results Dev. Profile (DRDP-R), Cognitive Development, 28 & 29, & 30)

Patterns (Common Core Math Standards: Measurement and Data, Grade 1, 4.1)

Problem Solving and Reasoning (Common Core Math Standards: Mathematical Practices Grades K -8)

Creativity and Innovative thinking are essential life skills that can be developed (National Visual Arts Standards: Creating – Generate and conceptualize artistic ideas and work, Grades Pre K-8)

To do and notice (continued):

- 2** Hold the **empty tube** still and level where everyone can see it. Hold up one **object** and the entire group states its color.
- 3** **Slide the object into one end of the tube** so that everyone can see what is happening. In a similar way, insert the rest of the objects into the same end of the tube. Ask *“If the tube is tipped, what color will come out of the other end of the tube first?”*
- 4** After the participants answer, **gently tip the tube until an object emerges**. Compare the result with the prediction and discuss. Repeat for the second, third, fourth objects.
- 5** Rearrange objects & repeat activity, but rotate tube before tipping tube.

Optional: Increase the difficulty - after the first piece slides out, carefully rotate the tube horizontally without “spilling” any of the pieces. Now which color will come out next? If the students have no difficulty with this, rotate the tube again!



The content behind the activity

Memory and spatial reasoning are important skills that can be improved with practice. This simple game requires players to remember four colors in sequence and “play them back” in reverse order as the tube is emptied. Mentally visualizing what is happening inside the tube is a powerful skill that can be used to solve science and engineering problems.

Learn more

- Use other attributes such as shape, texture, or materials in place of color.
- Use longer tubes, more objects, objects of varying shapes, or objects with more subtle color differences.

Re-purpose this activity for other subjects such as the following:

- Language: Spelling (use letter cubes or caps), vocabulary (compound-words, synonyms)
- Math: Patterns (Red-Blue-Red... what comes next?), sequences
- Science: Density (line up items up from least dense to most dense)

Related activities: See RAFT Idea Sheets:

Green Yellow Yellow -

<http://www.raft.net/ideas/Green Yellow Yellow.pdf>

No, the Other Blue One –

<http://www.raft.net/ideas/No The Other Blue One.pdf>

Resources

Visit www.raft.net/raft-idea?isid=733 for “how-to” video demos & more ideas! See these websites for more information on the following topics:

- **Spatial reasoning exercises and tests-**
<http://www.fibonacci.com/spatial-reasoning/>