

RAFT IDEAS

Topics: Problem Solving, Innovation, Puzzles

Materials List

- ✓ Cube, die cuts for cubes are available at RAFT, or cubical box
- ✓ Permanent marker
- ✓ Optional: blank labels
- ✓ Box Puzzle Patterns (See page 2)

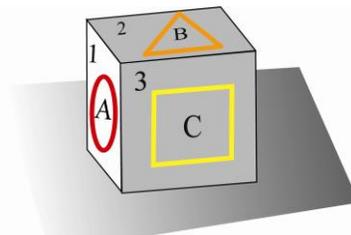
This activity can be used to support the teaching of:

- Problem Solving and Reasoning (Common Core Math Standards: Mathematical Practices Grades 1-12)
- Science & Engineering Practices (Next Generation Science Standards: Grades 1-12)



Thinking on the Outside of the Box

Discover the Unknown Using Logical Problem Solving Skills



Use logic to figure out what is on the “unseen” side of the cube. The flexible format allows innovative puzzles to be created for a wide range of subjects and abilities.

Assembly

1. Choose a sample pattern from page 2 or create a suitable pattern (see below).
2. Use a permanent marker to copy the pattern onto the sides of a cube or box.
Optional: write pattern on blank labels and place labels on the sides of the cube.

Playing the Game (for any number of players)

1. Place the cube on a table, keeping the bottom hidden. Have students silently move around the table, observing the top and 4 sides of the cube.
2. Once all students have observed each of the 5 visible sides, they discuss any patterns they have observed.
3. Students analyze the patterns seen on the 5 visible faces of the cube, speculate on the patterns, and propose answers to hypothesize what is written on the “hidden” 6th face. Questions to ask include:
 - a. Is there a series of numbers or letters; if yes - is there an element of the series that is missing?
 - b. How are the numbers and words on a side related (e.g., number of letters)?
 - c. What patterns are there in the words, shapes, or colors, (e.g., first letters, number of syllables), what might the missing piece(s) be?

Guidelines for Creating a Box Puzzle Pattern

1. Create patterns based on students’ abilities and the subjects being studied. Patterns may include numbers, letters, shapes, words, pictures, and stickers.
2. The elements of the pattern on the different sides are interrelated, with the opposite sides being particularly linked together. The pattern “works” when the “hidden” face, whichever side that happens to be can be, determined uniquely from the available data (i.e., there is only one answer).

The Content Behind the Activity

Solving puzzles of any type enhances logical thinking and problem solving skills, needed for both mathematical and scientific thought processes. In order to solve this puzzle, students must repeatedly evaluate the patterns and relationships between all the elements of the puzzle patterns. While puzzles may cause frustration, figuring out solutions is extremely empowering. Encourage students to use perseverance and brainstorming skills, and to work together to solve the puzzles.

Taking it Further

Working individually, in pairs, or in small groups, have students create additional box puzzles, and test the puzzles on classmates or younger students.

Web Resources (Visit www.raft.net/raft-idea?isid=517 for more resources!)

Copy samples onto larger cube patterns, or large cubical boxes. Cube patterns vary, adjust the location of the lowest box to match pattern used.

				2 B
1 A	3 C	4 D		
			5 E	

Patterns include:

- Matching shapes on opposite sides
- Letters in order
- Numbers in order

				4 Sheep
0 Eel	2 Eagle	0 Snake		
			4 Elk	

Patterns include:

- Types of animals
- Number of syllables
- Number of legs
- First letter of word

				8 Francene
4				
3 Rob 3	4 Alma 2	7 Roberta 3	6 Albert 2	
			5 Frank 4	

Patterns include:

- Men's and women's names
- Number of letters
- Number of shared letters

				9 Wisconsin
			1	
7 Alabama 3	11 Mississippi 4	6 Alaska 3	8 Missouri 4	
			10 Washington 1	

Patterns include:

- Names of states
- Number of letters
- Number of shared letters

