

## Finding the Castle Keys Public Lesson Plan

### **Goal of public lesson:**

- a. Students will recognize rotations and flips of pentominoes and translations.  
Math Curriculum: describe, sort, classify, and compare two-dimensional shapes and three-dimensional figures, and describe the location and movement of objects through investigation;
- b. Students will verbalize similarities and differences between various 2D arrangements of 5 squares.  
Language: Use language to talk about their thinking, to reflect, and to solve problems  
Math: Demonstrate an understanding of basic spatial relationships and movements (e.g., use above/below, near/far, in/out).
- c. Children begin to develop and apply problem-solving strategies, and persevere when solving problems and conducting mathematical investigations.
- d. Apply developing reasoning skills (e.g., pattern recognition, classification) to make and investigate conjectures (e.g., through discussion with others).

### **Specific Learning Goal:**

By the end of this lesson, students will visualize and verbalize shapes as turns, flips, and movements.

### **Materials:**

- Smart board
- Centers
- Pentominoes
- 1 inch square tiles
- Pencils
- Scissors

### **Activation of student thinking –Whole group**

Begin lesson with whole group on carpet in front of SmartBoard. Introduction of narrative accompanied by images on SmartBoard.

Narrative: Picture of princess (Kate) and prince (William). Witch appears on screen and puts spell on prince and locks him in castle. (Teacher touches screen and prince disappears). Good fairy appears and says that the princess can help free the prince by meeting the following challenge: unlocking 12 of the castle doors by creating 12 special keys (which will be pentominoes).

Review the challenge with the students - for each of the 12 pentominoe shapes they create, they will receive a key (this is a plastic pentominoe form).

- Make a new design – does it follow the rules?
  - Squares must touch side to side.
- Have some 4 piece designs on side
- Is the new piece the same or different?
- How do you know? (Encourage vocabulary: if you turn/ flip it, is it the same? )
  - Shapes are the same if they can be flipped turned or moved to be the same
- Can you find all 12 different keys?
- How will you know if two keys are different or the same?

### **Development of ideas- 2-3 pairs working in each center**

1. Center One: Smart board file
  - a. Students will take turns building Pentominoes on SmartBoard.
  - b. Possible teacher prompts:
    - i. Is this key the same as one that was already built?
    - ii. How can you prove that?
  - c. Unique keys will be moved across the board to a “storage” area.
  
2. Center Two, Three, and Four
  - a. Each student or pair will have 5 square tiles to build a “key”
  - b. When a student thinks they have a new key, they will compare it to the keys in the center of the table.
  - c. Possible teacher prompts:
    - i. Is this key the same as one that was already built?
    - ii. How can you prove that?
  - d. Teacher will give the matching pentomino key to the student who will place it in the circular ring at center of the table.
  - e. Unique keys will be traced on 1” chart paper and cut out and placed in the center of the table (the key design storage area)

### **Consolidation of Student Thinking: whole group**

Students bring Pentominoes to circle around smart board.

- Class counts unique keys on SmartBoard,
- Ask groups to compare their keys to those on the board – ask for names for the shapes
- If they have any different keys, ask questions to pull language and gesture, (flip turn, move)
- The teacher congratulates the students on finding the keys
- Extensions: Teacher asks class to sort Pentominoes (? 1 straight five , 2 with 4 straight, 8 with a 3 block longest section, 1 with a 2 block longest section- the w often the last one found) or asks the kids to try at home with their families