

TWO AND THREE DIMENSIONAL RIDDLES

- Pre-Activities:** Students should know the names and attributes of pattern block shapes. Students should explore the properties of geometric solids.
- Materials:** Pattern Blocks, Geometric Solids, mirrors, software (*to be determined*), cut-out shapes (*Ellison*), templates or tracers, overhead projector
- Resources:** Mathland Grade 2 Guidebook, Unit 9, Shaping Questions, Pattern Block Riddles
- Technology:** Tenth Planet, Geometry

CT Performance Standards: (revised)

1. Describe, model, draw and classify shapes.
2. Investigate, *describe* and predict the results of combining, subdividing and changing shapes.
3. Identify and use geometric shapes in various orientations, including rotations, reflections and translations.
4. Use real-life experiences, concrete objects and technology to explore and understand properties of 2- and 3-dimensional geometric shapes.
5. *Investigate and describe* relationships among and properties of shapes, such as congruence, similarity and symmetry.
6. *Create mental images of geometric shapes using spatial memory and spatial visualization.*

Grade Level Expectations: (objectives)

1. Build models, draw and classify polygons and describe similarities and differences using characteristics such as number of sides and angles, symmetry and congruence.
2. Use a variety of manipulative materials to build and identify shapes that have one or more lines of symmetry and construct the reflection of simple polygons.
3. Describe and predict the results of combining, subdividing and moving shapes and solids.
4. Reconstruct figures from visual memory.

[Created by Maria Bulson, Clinton School District]

Activity 1: Build a Model

Using 3-4 pattern blocks and overhead, teacher has a student build a shape. Students describe how the shape is made by describing the shape and giving “riddle clues”. Record clues such as number and properties of blocks, placement of blocks, similarities. Remove the model and ask students to reconstruct the model using the clues and visualization.

Activity 2: Developing Riddles

Students work in pairs to build a shape and make up, record and revise a riddle about their shape. Write riddle on separate paper to share with classmates. Students record their solution (final shape) by tracing, pasting cut outs or using templates.

Students exchange their riddles with other pairs who will build the shape and record their solution. There may be more than one solution possible. Pairs discuss and justify solutions.

Extension: Use the same shapes to make a new solution. Predict how the clues will change and write the new riddle.

Activity 3: Sorting Solutions

After students have recorded solutions to riddles and had the opportunity to solve others’ riddles, they will sort and classify the solutions. Teacher will give each small group a set of class solutions to sort. The solution set size can be varied using at least 12. Students will justify their sorting rules.

In order to develop students’ ability to think critically, ask students to sort solutions a different way using characteristics such as number of sides and angles, symmetry and congruence.

Activity 4: Symmetry-Reflection

Students cut out class set of solutions, fold to determine symmetry (balance). As a class students will sort solutions into symmetrical and non-symmetrical groups. Working in small groups, students will find, draw in and discuss lines of symmetry in the set of symmetrical solutions. Share findings as a whole class to look for different solutions.

Students will use software, geoboards, and mirrors to explore reflections of riddle solutions.

Activity 5: Geometric Solid Riddles

During the pre-activity have students describe solids using terms faces, edges and vertices (corners).

Pairs of students write a riddle describing one solid shape. (cube, cylinder, cone, rectangular prism, pyramid, etc.) Exchange with other groups to solve.

Activity 6: Visual Memory

Have students look at a shape made with 4 pattern blocks on the overhead. Give them one minute to discuss the shape with a partner. Cover shape. Have students reconstruct visualized shape from memory.

Assessment:

Give students 3 shapes. Have them build and record a symmetrical shape and write a riddle for their shape. Draw the line of symmetry on their shape.

Give students a riddle to build and record a solution.