

SPARKing High Potential: Promoting Mathematics Achievement in Diverse Populations

Kelly Kearney, Ph.D., Rebecca O'Brien, Jennifer Sweeters, and
Catherine A. Little, Ph.D.

Leadership in Diversity Conference

March 25, 2017



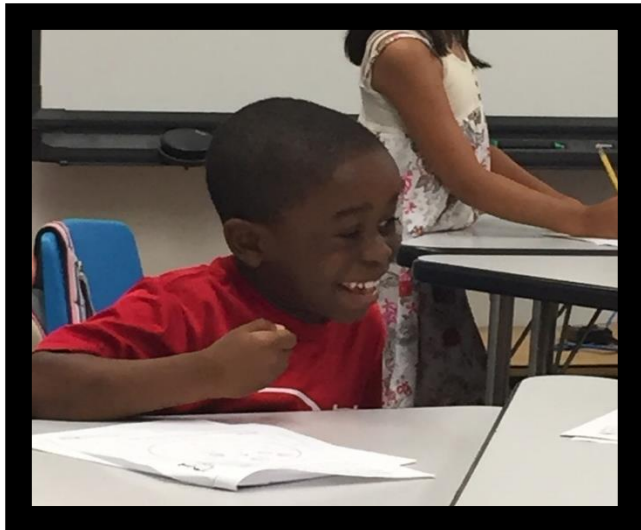
This project is supported under the Javits Gifted and Talented Students Education Grant Program, PR/Award Number S206A140017, as administered by the Office of Elementary and Secondary Education, U.S. Department of Education.

Project SPARK: Supporting and Promoting Advanced Readiness in Kids

- Focus on **early awareness/identification of high potential**
- **Intervention to promote achievement**
- Emphasis on students in grades K-2, particularly those students from sub-groups **traditionally underserved in gifted programs.**
 - students from culturally and linguistically diverse backgrounds
 - students from low-income backgrounds
- Application/scaling up of the Young Scholars Model in Connecticut schools



Focus on Recognizing High Potential and Supporting Access to Advanced Curriculum at K-2



SPARK Summer Program Outline

- Geometry unit from Project M²
- Professional development for teachers
- Three weeks, 3-4 hours per day
- Cross-age grouping
- 4 districts, 4 schools, 16 classrooms



Overview of Unit: Example of Lesson Plan:

UConn

Project M2



ABOUT PROJECT M2

GRADE TWO

GRADE ONE

KINDERGARTEN

Overview
Fun for Students
Teacher Resources
Family Resources

Grade One: Overview of the Units

Geometry Shape Games: Geometry with Imi and Zani



Geometry helps us make sense of the world about us. Shapes and their motions actually define the space we live in. Geometry also helps us learn more about other areas of mathematics such as number, algebra, and measurement.

In *Exploring Shape Games: Geometry with Imi and Zani* students explore two-dimensional shapes and in doing so discover properties of these shapes rather than memorize definitions given to them. The reasoning and spatial sense skills that they use help them develop an understanding of the properties of shapes, the relationships among shapes, symmetry, and congruence.

- Chapter 1 explores composing and decomposing two-dimensional shapes. The mathematically correct names of polygons are presented and students focus not only on the number of sides of shapes, but also the number of vertices.
- Chapter 2 focuses on describing, sorting, and classifying shapes by their attributes such as sides, angles, shape, color, and size.
- Chapter 3 investigates congruency and symmetry of two-dimensional shapes.

Throughout the unit students are involved in testing out geometry games for Imi and Zani, a macaw and Toucan from the Amazon Rain Forest. Students play games such as Grupo, MOVE It! REMOVE It!, The One-Loop Game, Carroll Diagram Puzzles, and Match It Up and then provide feedback to Imi and Zani.

- of four students, prepared ahead of time; optional)
- Transparencies (one per pair; optional)
- Overhead markers (one per pair; optional)

Lesson Development

Part 1. Tree Climbing

Setting: Whole class and individuals

Pacing Guide: 60 minutes

1. Read the fax from Imi and Zani.

Begin the lesson at a common meeting place in the classroom. Read the fax from Imi and Zani thanking students for their help with the puzzles that they developed using Venn diagrams. Notice that the students will continue to play and design games and puzzles as they learn about tree and Carroll diagrams in this lesson.

2. Present the concept of a tree diagram.

Tell students that Imi and Zani love to play games by hanging shapes in trees in the Amazon Rainforest with their friend Ooboo (rhymes with "booboo"), who is a monkey. In this game, only certain shapes are allowed to hang from certain branches. Ooboo loves to climb the trees and hang the shapes.

3. Brainstorm a list of ways to sort shapes.

Ask students what attributes could be used to sort shapes. Make a list on a chart or IWB. Some responses might be color, size, shape, size of angles, etc. It may be helpful for students to have the Attribute Shapes in front of them. This will help students further realize that shapes have many different attributes.

4. Using a tree diagram, sort shapes according to a single attribute.

Make a large four-branch tree with a ladder on the board or poster board, and title it "Shape-Sorting Tree." Place one of the following label cards on each branch: square, circle, hexagon, and triangle as shown on p. 194. Pretend to have Ooboo work his way up the tree with an Attribute Shape Card in hand. When Ooboo reaches a place where the branches separate, students have to make a decision about which branch matches the shape. Ask students which way Ooboo should go if he had, for example, a circle. Have a few students demonstrate with other shapes.



Throughout the lesson use the "What to Look for in Responses" and "Possible Difficulties" to help focus discussions.



Teacher Tip

As students place shapes on the tree branches, encourage them to ask each other "why" questions.

Student Focus:

- Building students' discourse skills
- Strengthening conceptual understanding
- Hands-on activities that promote critical thinking
- Real world problem solving skills
- Scaffolded levels of application
- Encourage math talk skills to promote and expand their thinking and rationale

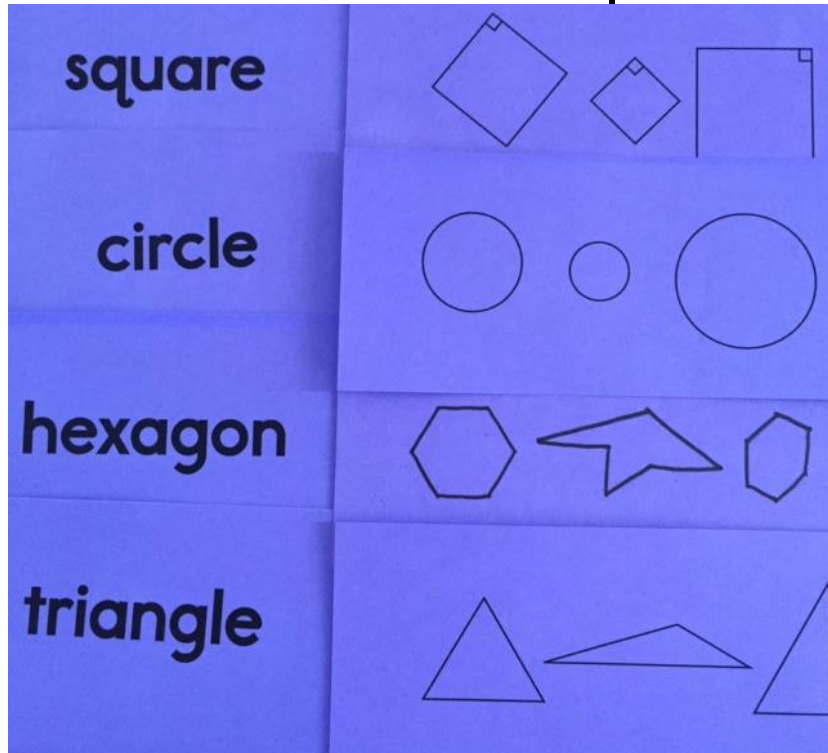


Extension of the regular classroom-

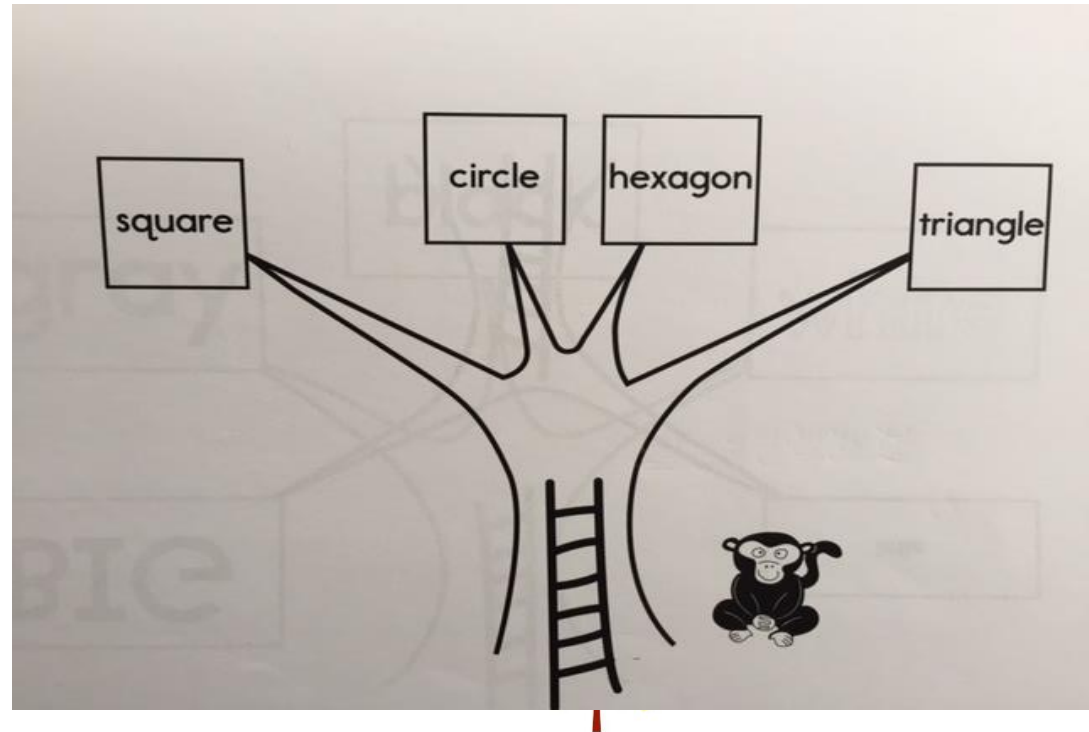
Let's walk through an actual activity from the first grade curriculum:

Introduction:

-Introduce basic shape vocabulary

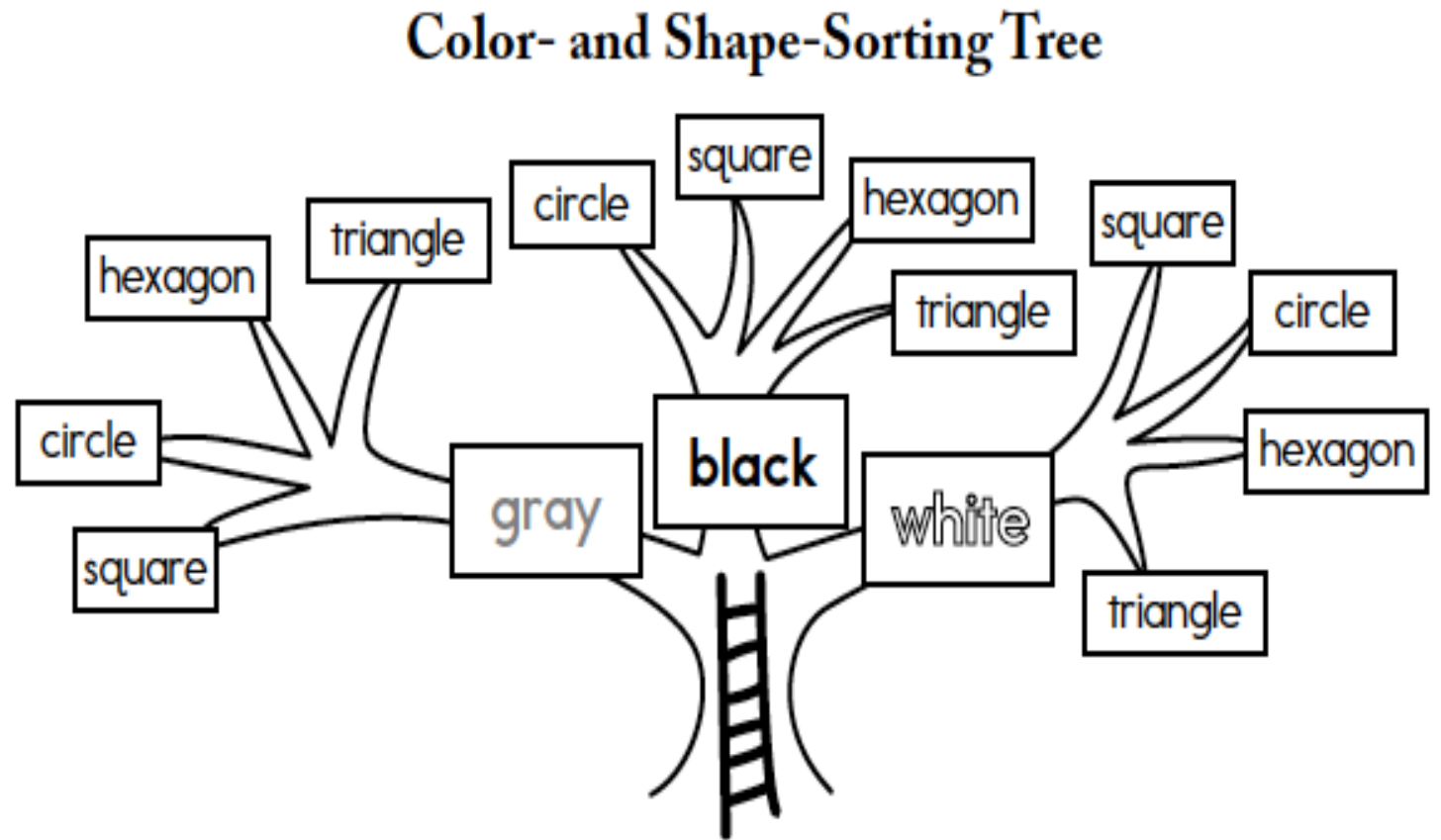


-Introductory sorting tree



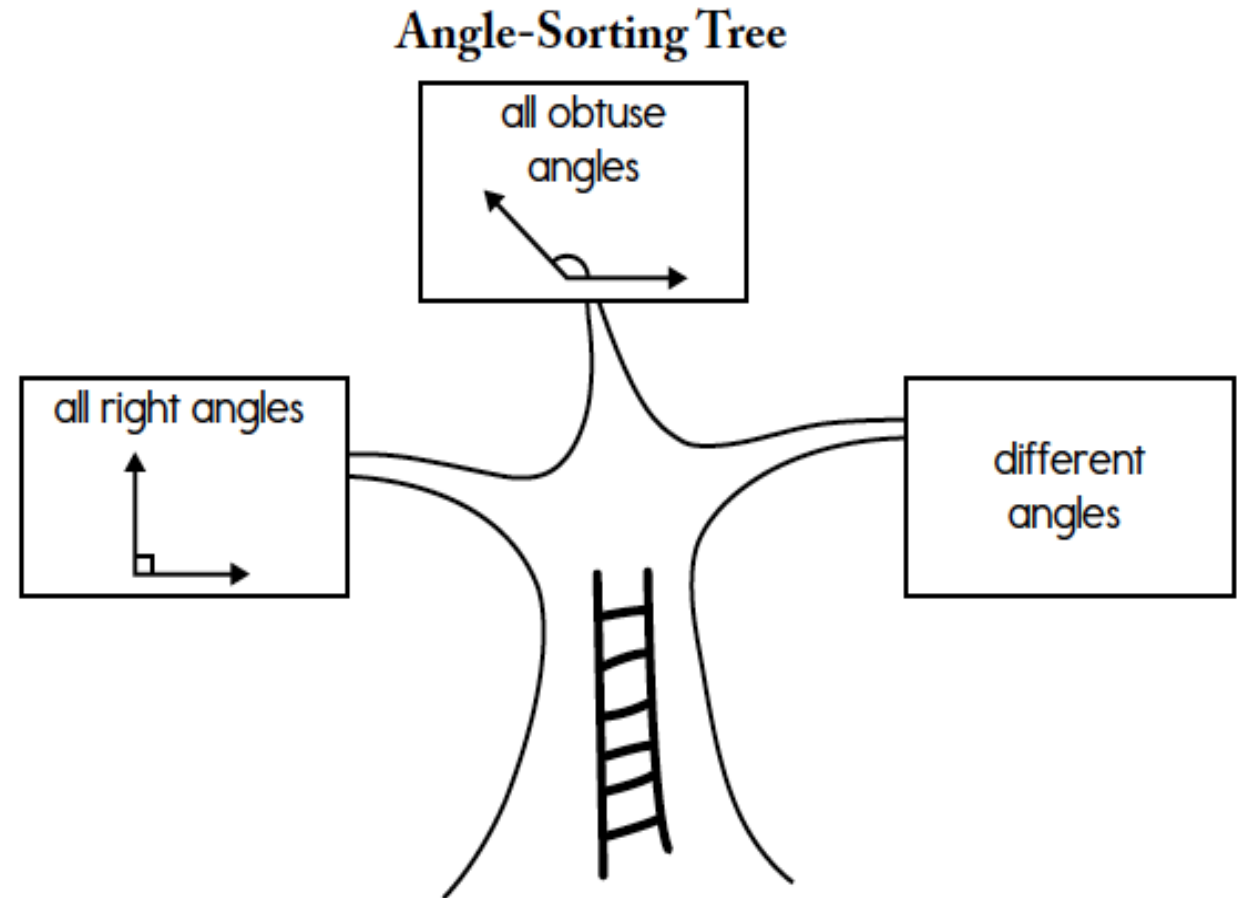
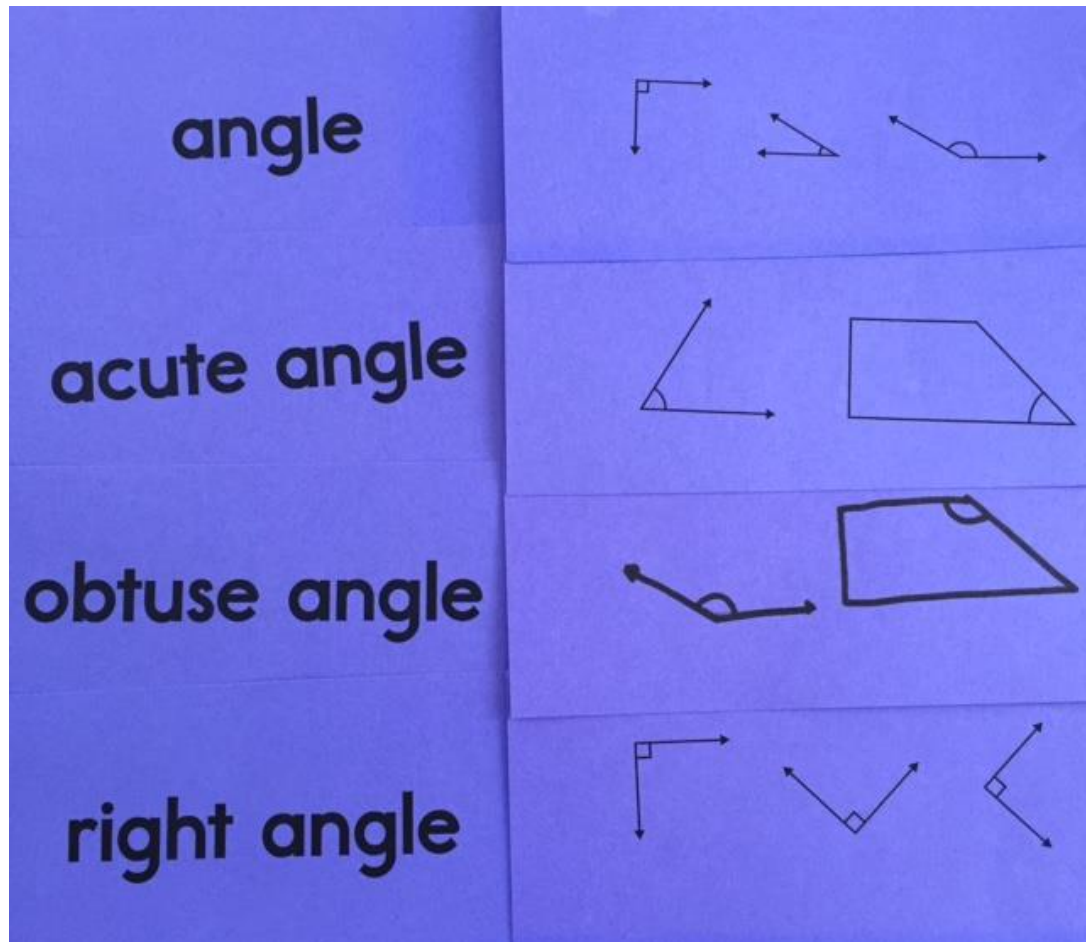
Example of a Multi-Attribute Sorting Tree

- Provides scaffolded instruction
- Encourages higher order thinking skills
- Practice multi-step problem solving skills

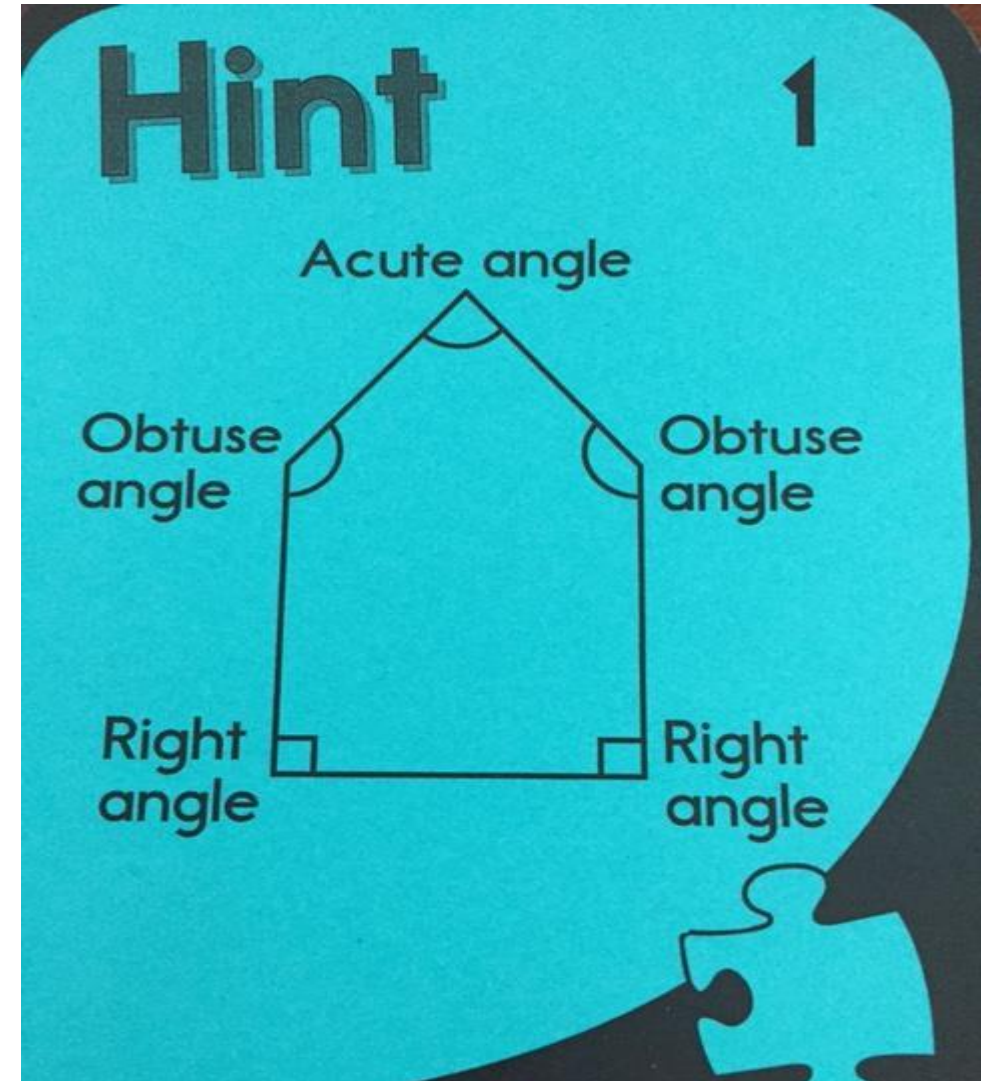
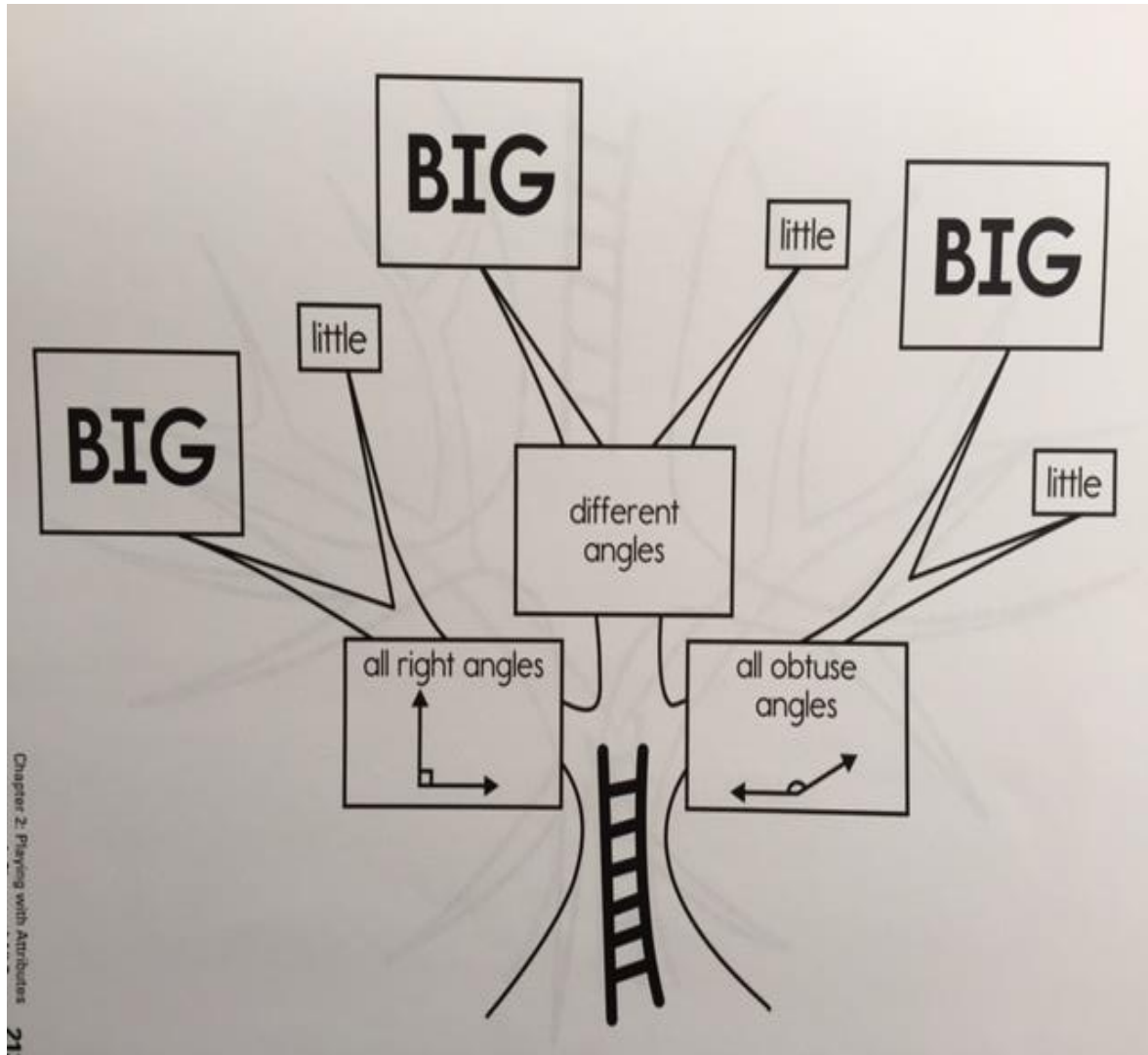


Continuing Rigorous Instruction:

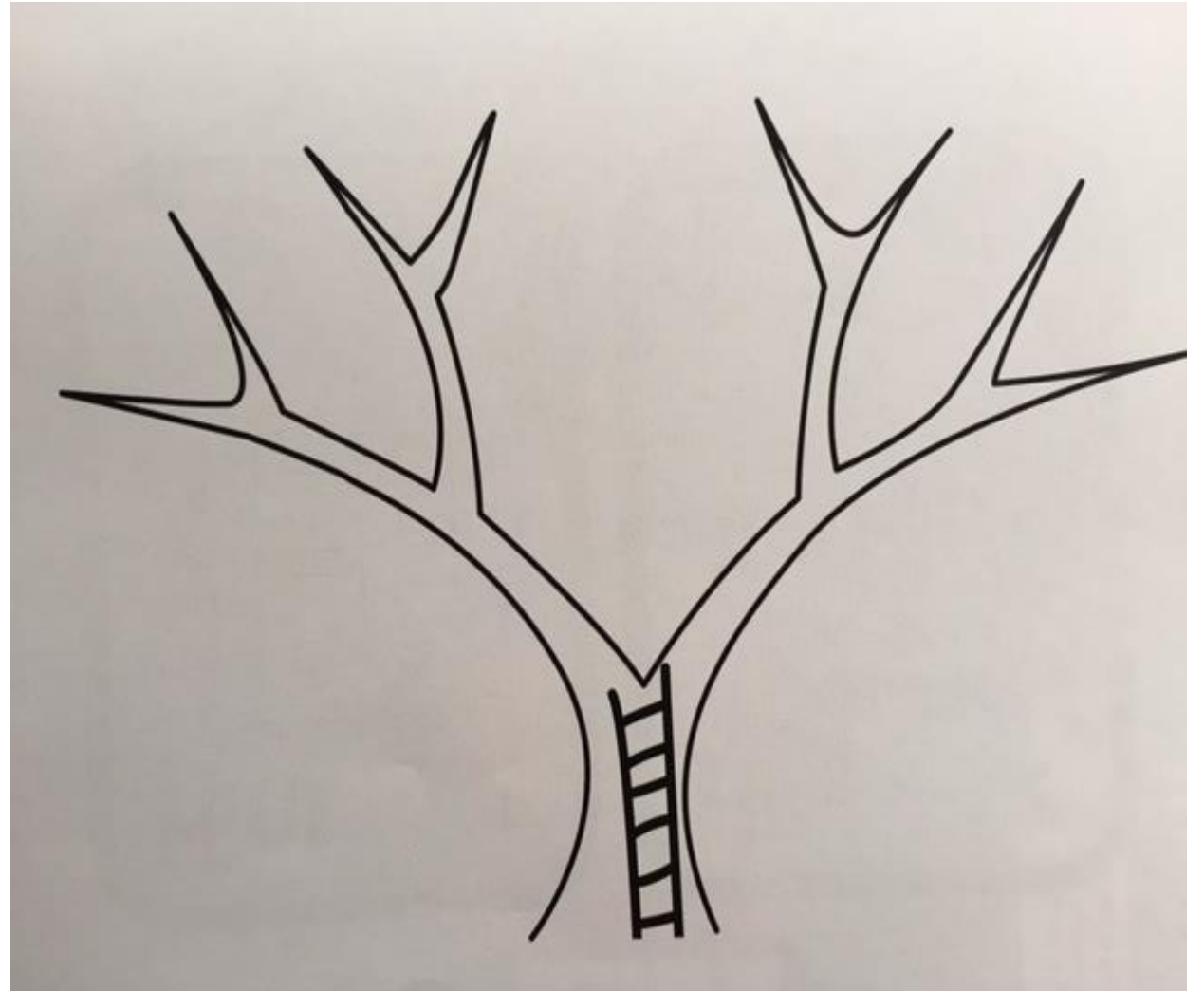
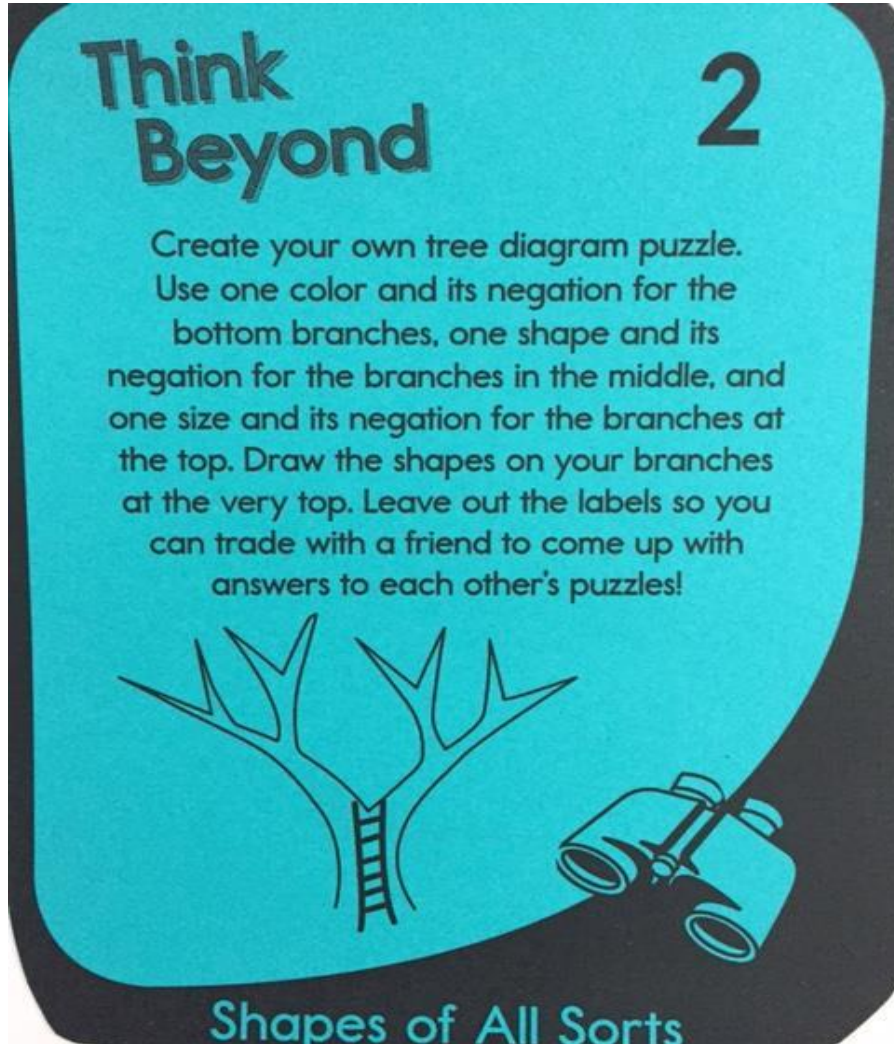
Introduce new rigorous vocabulary
to further enhance skill



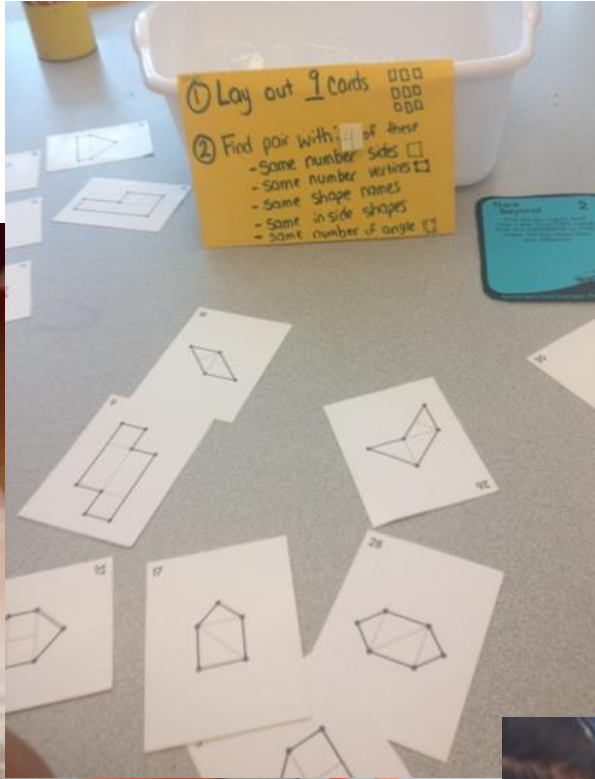
Continuing Higher Order Thinking



Application of Knowledge- Highest Level of Thinking



Students in Action



Differentiated Instruction: Every Lesson has ways to promote higher level thinking with the 'Think Beyond' activities, as well as 'Hint Cards' for students who need extra support.

Think Beyond

2

Take a piece of paper and fold it in half. Fold it in half again. Now punch one hole in the paper. Where will the holes be when you open the paper up? Do the same with two holes.

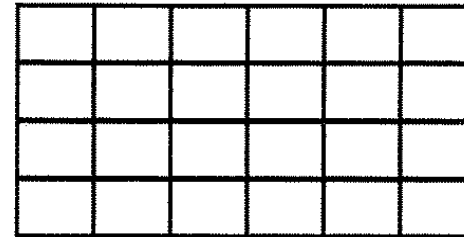
Try this many times.



Symmetrical Shapes

Think Beyond

Design your own 4 × 6 "What's Missing?" puzzle.



Create a pattern for shape, color, and size.
Trade puzzles with a friend. What is the same about your puzzles? What is different?

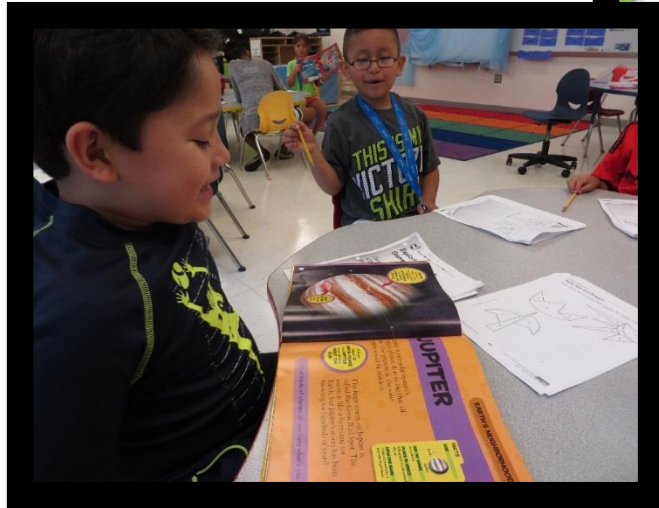
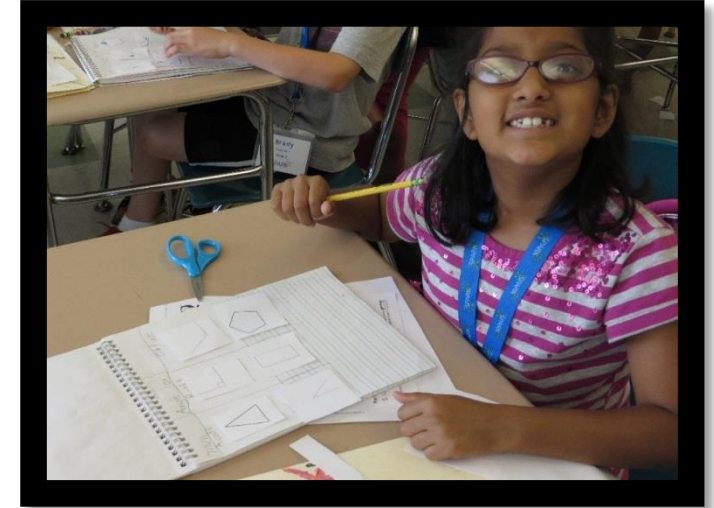


Shapes of All Sorts

Example:

	□	■	■		■
●	○	●		○	
▲			▲	△	△
⬢	⬢		⬢		⬢

SPARKing student and teacher learning



Questions?

