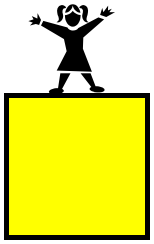
CONTRUCTION TASK: WHAT MAKES A SHAPE?



STANDARDS FOR MATHEMATICAL CONTENT

MCC3.G.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

STANDARDS FOR MATHEMATICAL PRACTICES

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should have had experiences with common plane figures and the identification of their sides and angles. Students should also be familiar with grouping and ways to express their findings using common graphic organizers.

ESSENTIAL QUESTIONS

- How can I use attributes to compare and contrast shapes?
- Why are the properties of shapes important?
- How it is possible to have a shape that has fits into more than one category?

MATERIALS

- Small bag with a set of paper quadrilaterals for each student or pair of students
- Glue
- *The Greedy Triangle* by Marilyn Burns or other book about shape attributes
- "What Makes a Shape? Shapes for Sorting" student sheet, copied on colored paper
- "What Makes a Shape? Venn Diagram" student recording sheet, copied on white paper

GROUPING

Whole Group/Partner Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students begin the process of exploring shapes for their many attributes and use critical vocabulary to describe and compare those shapes through higher-level thinking skills.

Part I

Teachers may want to begin this task by reading a book about shape attributes such as *The Greedy Triangle*. While reading, questions should be posed to the students that lead to the discovery of shape attributes – their similarities and differences. A list of attributes may be generated on the board throughout the reading or each student may be asked to keep a list of attributes. These words may already be on an anchor chart from the previous task.

Students may sort shapes by such attributes as number of vertices, or size of angles. Responses should clearly indicate how the shapes were grouped. Exemplary responses would include the use of a graphic organizer, explanations or labels that are clear, and appropriate mathematical vocabulary.

When students are working in pairs, the teacher should monitor the questioning and discussion between the students, and if necessary, model a discussion prior to or during the work time.

Once students have completed their Venn diagrams, encourage them to share their work. A few students can be selected during the work time to share their work and explain their thinking. Or if students have had experience sharing their work, they can be placed in small groups and each student can share their work with their group.

Part II

Students will follow the directions below from the "What Makes a Shape?" student recording sheet.

1. Cut out the shapes below.
2. Sort the shapes in different ways. (Use the list of attributes to help you think of different ways to sort the shapes.)
3. Choose two attributes and label the Venn diagram.
4. Sort your shapes in the Venn diagram leaving any shapes that don't fit outside of the Venn diagram.
5. Once you have checked your work, glue the shapes on the Venn diagram.
6. Write to explain your thinking and to describe any observations you made.

FORMATIVE ASSESSMENT QUESTIONS

- How could you describe this figure in relationship to another figure?
- Why did you place the figure here? (Indicate a section of the Venn diagram.)
- How do you know this shape is in the correct place?

- Choose one plane figure and tell me how it is used in the world and why its attributes are important in that use.
- Can you choose a shape not in the bag and tell me where it would fit on your paper and why?

DIFFERENTIATION

Extension

- Have students select different ways to compare/contrast the shapes, then compare their way of sorting with another student.
- Use solid figures instead of plane figures.
- Incorporate a writing opportunity by having students write a compare/contrast paragraph using 2 shapes.

Intervention

- Select a smaller sample of shapes. Provide the labels and a graphic organizer for students or do the reverse in a discovery model and set out some of the shapes in the organizer and let students determine the correct labels, then sort the remaining shapes.
- If students are having difficulty participating in productive conversations, the teacher should model using think-alouds or self-questioning strategies.

TECHNOLOGY CONNECTION

- http://nlvm.usu.edu/en/nav/frames_asid_172_g_2_t_3.html?open=activities&from=category_g_2_t_3.html Interactive geoboard from the National Library of Virtual Manipulatives
- http://nlvm.usu.edu/
- http://www.mathcats.com/explore/polygons.html - Explore Polygons
- http://www.math-play.com/Polygon-Game.html - Name the Shape
- http://nlvm.usu.edu/en/nav/frames_asid_170_g_2_t_3.html?open=activities&from=category_g_2_t_3.html – Compose Shapes
- http://www.learner.org/courses/learningmath/video/geometry/wmp/geo_10_k5_ch1.html - Video of teacher using Venn Diagram to sort polygons with whole class

Name _____ Date _____

What Makes a Shape?

Shapes for Sorting

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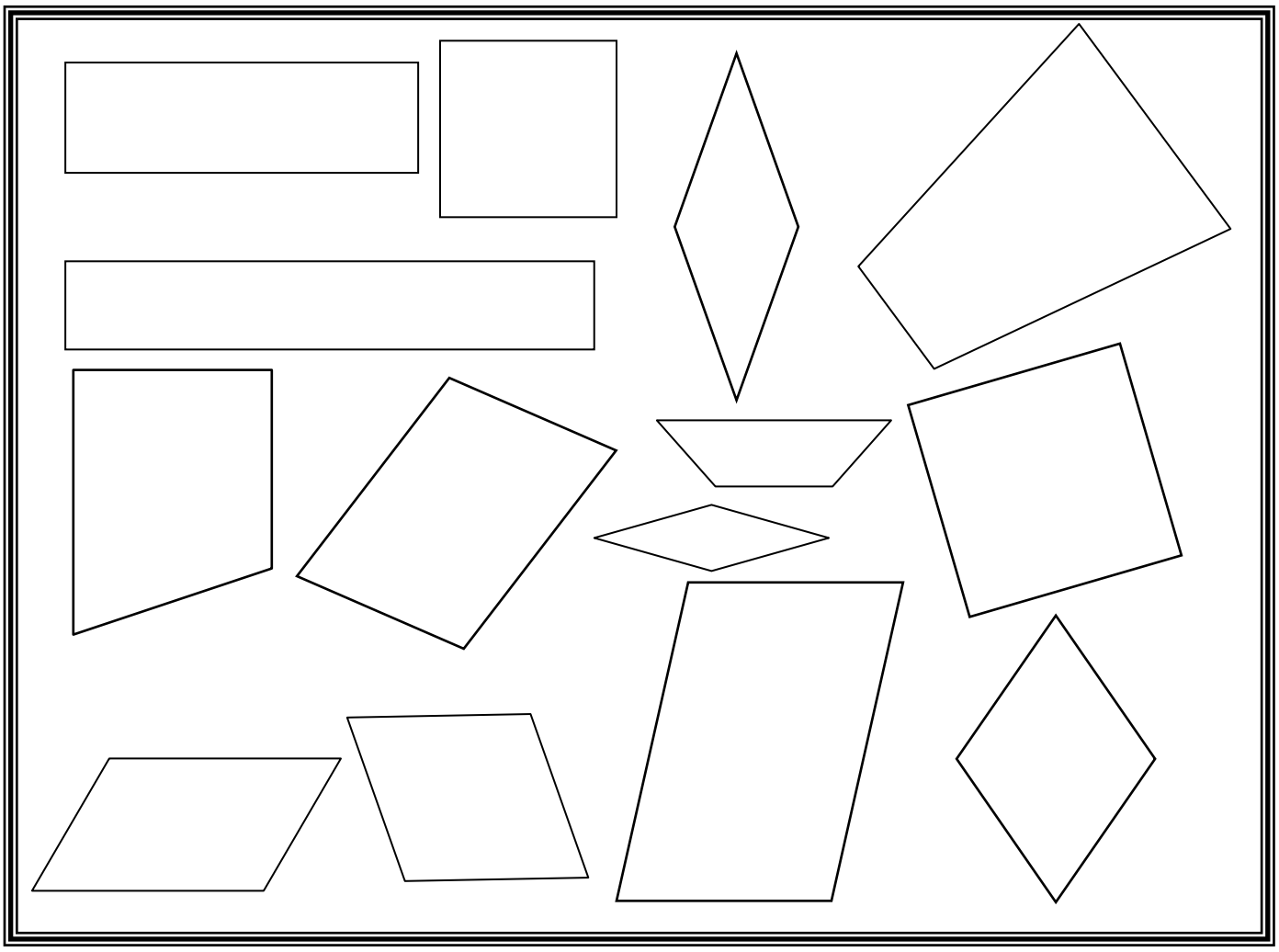

Name _____ Date _____

What Makes a Shape?

Venn Diagram