Mathematics: Geometry

3.G.1	**Cluster Heading:** Reason with shapes and their attributes. **Content Standard:** Understand that shapes in different categories may share attributes, and that the shared attributes can define a larger category. Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. **Practice Standards: MP 5** Use appropriate tools strategically, **MP8** Look for and express regularity in repeated reasoning.

Problem/Task Suggestions	Formative Assessment Suggestions
Quadrilateral Questions Create a single design on a geoboard using only 1 rubber band. Say "I have a category or characteristic in mind. Guess the category based on the two groups of geoboards I display". (*The teacher will use 8-10 of the shapes created by the students and will separate these geoboards into 2 groups -- quadrilaterals and non-quadrilaterals. If a student or group thinks they know the category the teacher has in mind, rather than stating what the category is, they would place another geoboard into the existing groups to check their theory. This will allow more students to keep engaged in thinking about the problem. After it is clear most students have predicted the category, spend time in whole group processing the vocabulary of quadrilateral and sub-categories of quadrilaterals. Allow students to create their own definition of quadrilateral and provide counterexamples of shapes that fit their definition to show the need to refine their definition. For instance, draw an open shape with 4 sides or one that has curved sides. Now that the students have seen the process modeled, they will work in their groups to create geoboard categories for others to guess)* If you wish to do these activities in a written format, say "The geoboards on the left have the characteristic, the geoboards on the right do not. Describe this characteristic in writing. In your description, include a drawing of one example that has the characteristic and one example that does not." **Differentiation** **Support** • Give the student a word bank of possible characteristics or categories. **Extension** • Create examples and non-examples on geo-board dot paper and ask another group member to guess the characteristic.	**Observation of Students** Is the student able to • Generalize a property by looking at specific designs? • Verbalize an appropriate definition for a geometric property? **MP6** • Create an appropriate drawing(s) for the property? • Represent a generalization from specific drawings? **MP8** • Organize general shapes by attributes? **Questions to Guide Student Thinking** • In non-math terms, describe the shapes on the left and on the right. • What characteristics have we talked about in class? Describe to me. • Could you put a geoboard in both the right and the left categories? **Misconceptions** Students may • Not represent a common characteristic • Not know the properties or attributes of shapes well enough to distinguish among them. • List a characteristic that works for some, but not all. **Vocabulary** • Categories: quadrilateral, squares, rectangles, parallelogram, triangles, etc. • Characteristics: containing a right angle, parallel lines or a line of symmetry

Adapted from: Math Solutions. Burns, Marilyn. Mathematics: For Middle School. New Rochelle, N.Y.: Cuisenaire Co. of America, 1989.