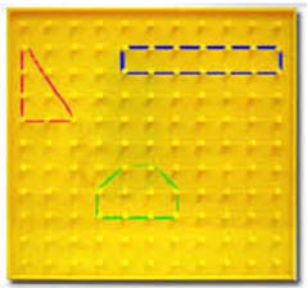
Geoboards! Hands-On Geometry Part 1

for 2nd Grade



Math Learning Goals:

- Recognize and name shapes with a given number of angles and a given number of equal faces.
- Draw and name shapes with given attributes.
- Identify and define triangles, quadrilaterals, polygons, right angles, and parallel faces.

Materials Needed:

- Geoboard (1 per student)
- Rubber bands
- Characteristics of Figures Worksheet
- Alternative to Geoboards: dot paper, ruler, pencils

Geoboards can be found for purchase on Amazon.com (Learning Resources: 6 for $11).

The Activity:

Distribute a geoboard and a rubber band to each student. If you do not have geoboards, distribute dot paper to each student as a substitute-students can draw shapes using a ruler on dot paper instead. Ask the students to use the rubber bands to make a shape on the geoboard. Introduce and define the shape as a polygon. Write the new vocabulary word on the board for spelling and reference. As students finish, have them bring their geoboards to a part of the classroom suitable for displaying all of the geoboards together, such as a large table or floor space.

After all of the geoboards are displayed, have students watch as you group all of the quadrilaterals to one side of the table, and the non-quadrilaterals to the other side. As you do this, ask students why you are grouping the shapes as you are. There is a chance that no student made a quadrilateral. You might need to change some of the shapes as you move them. Let the students see how you are changing them. It is helpful for students to see how you are changing the shapes to fit the category. Alternatively, you may have some examples ready to share with students. Guide students to recognize that all of the shapes on one side of the group have 4 sides. Introduce and define the term *quadrilateral*. Write the new vocabulary word on the board for spelling and reference. Students should conclude that a quadrilateral is any four-sided polygon.

From the quadrilaterals, select shapes with parallel sides and group them together. As you do this, ask students to determine why you are grouping the shapes as you are. Again, there is a chance that no student made a quadrilateral with parallel sides, so change some of the shapes as you move them or have examples ready to display. Students should notice that at least one set of sides is parallel. Introduce and define the term *parallel*. Students should notice that parallel lines are lines that do not

intersect and remain the same distance apart.

Now take any polygons with right angles, including non-quadrilaterals that include at least one right angle, and group them separately. As before, ask students to point out similarities on the shapes as you are moving them. This time, they should notice that there is a right angle in each shape by using descriptions such as "square corner." Introduce and define the term *right angle*. Students should notice that a right angle is formed by two lines that intersect at 90°, or in the shape of an "L." Make sure to go over the definition of a triangle before the students start the activity.

After you have worked with students to sort the shapes and define attributes with appropriate vocabulary, students take back their geoboards. Organize students in groups of three or four, and distribute the Characteristics of Figures Activity Sheet. Each student in the group should draw their own geoboard shape and that of the other members of the group and complete the activity as directed on the sheet. Then have students determine which shapes made by their group members are quadrilaterals, which have parallel lines, and which have a right angle. When all groups have completed the activity sheet, ask the students to share with the class any shapes that have a combination of two or three of the attributes. Students should show their geoboards and be able to point to the parallel lines and/or the right angle(s).

The following lists of questions for informal assessment while students are finishing the activity sheet.

1. What's the maximum number of right angles a triangle can have? Why?

    [One, because you wouldn't be able to close it with three line segments if there were two.]

2. What's the maximum number of right angles a quadrilateral can have? How do you know?

    [Four, because you can make a closed figure with four sides and four right angles.]

3. If a quadrilateral has two sets of parallel sides, does it have to have right angles? How do you know?

    [No, because the figure can be slanted and still be parallel.]

4. Is it ever possible for a triangle to have parallel sides? Why or why not?

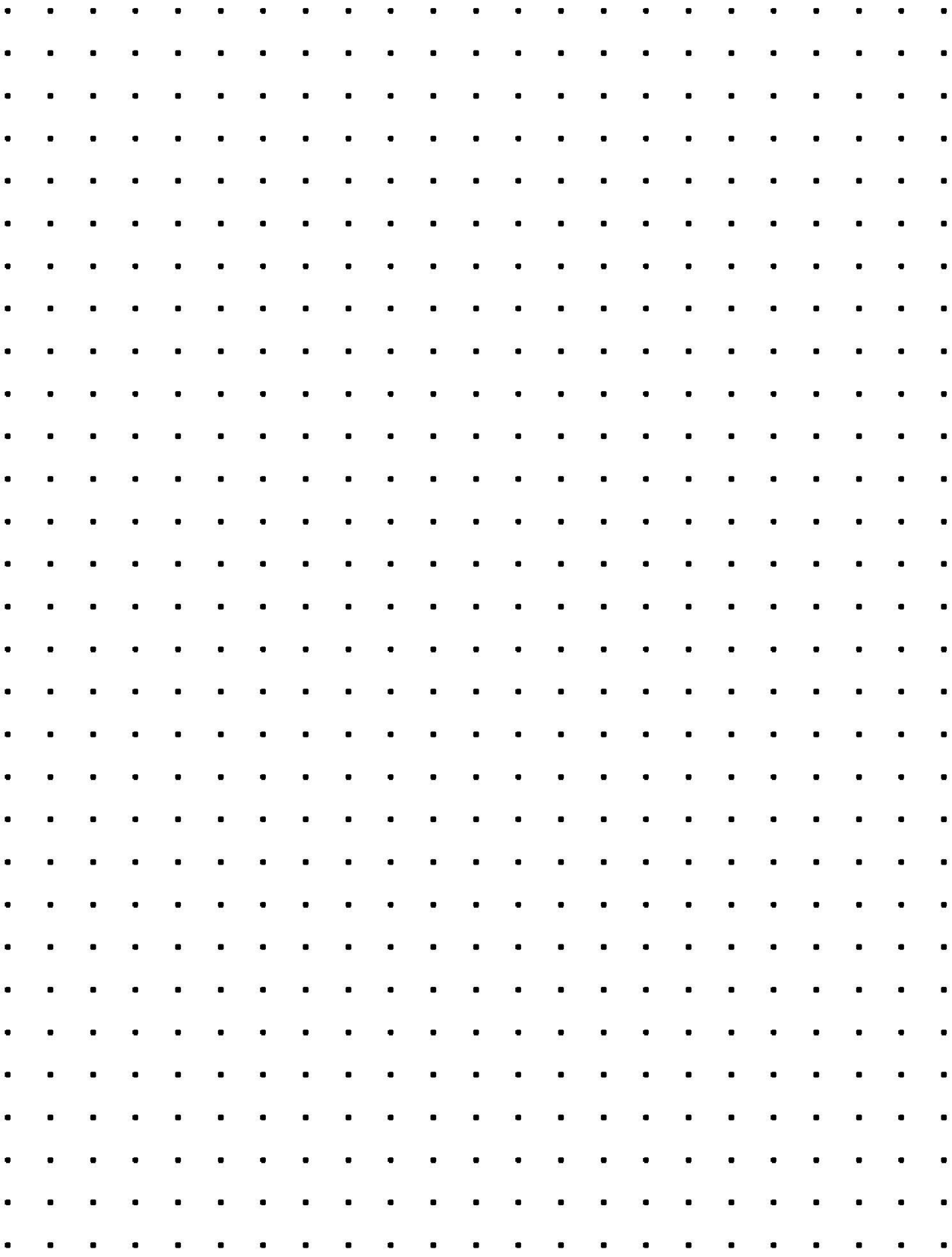
    [No, a shape must have at least four sides to be able to have parallel sides.]

TN Math Standards 2nd grade

Geometry: Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

Source: National Council of Teachers of Mathematics. Trying Out Tangrams: Applying Knowledge of Geometry Vocabulary. Access at www.nctm.org/classroom-resources/lessons

Adapted for 2nd grade by Virginia Parkman and Suzanne Lenhart



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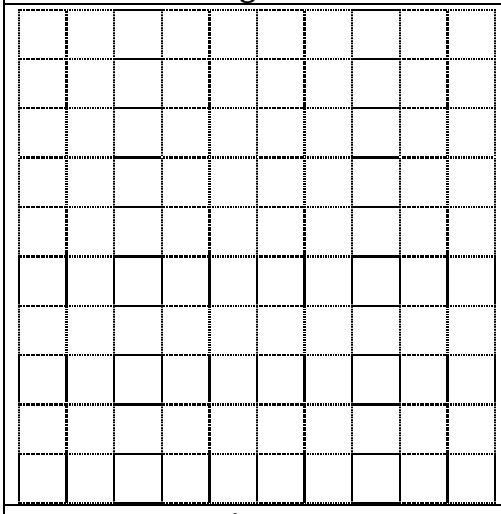
Characteristics of Figures

NAME_____

Draw each team member's geoboard. Then, under the Attributes column, state whether or not the figure is a quadrilateral. Also, state whether or not the figure has at least one pair of parallel lines and/or one right angle.

Figure	Attributes
	
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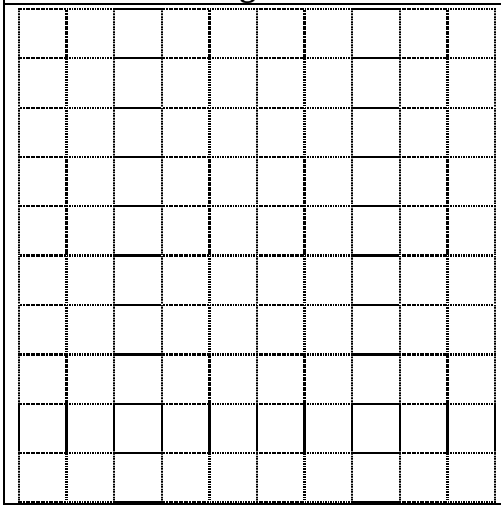	

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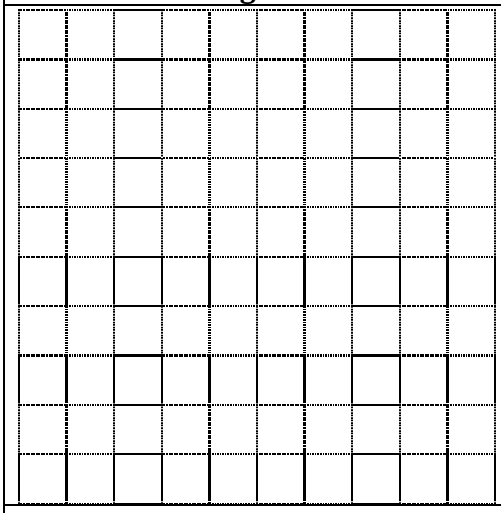	
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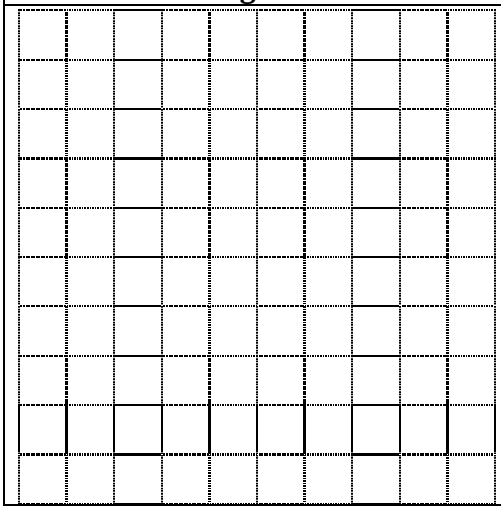	

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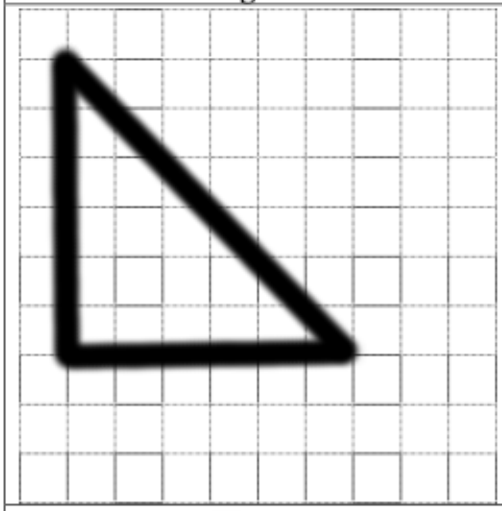
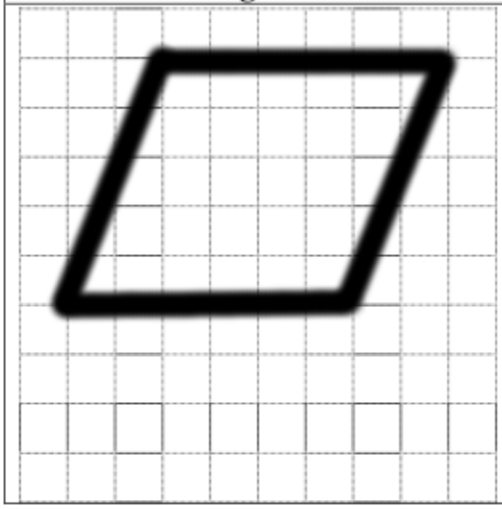
Student Examples

Characteristics of Figures

NAME_____

Draw each team member's geoboard. Then, under the Attributes column, state whether or not the figure is a quadrilateral. Also, state whether or not the figure has at least one pair of parallel lines and/or one right angle.

Figure	Attributes
	There is at least one right angle.
Figure	**Attributes**
	There is at least one pair of parralel lines. It is a quadrilateral.

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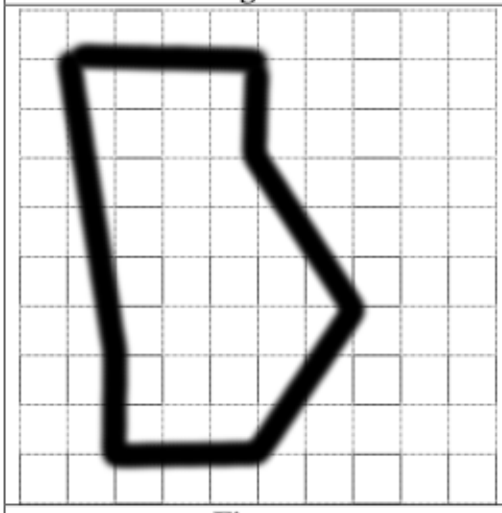
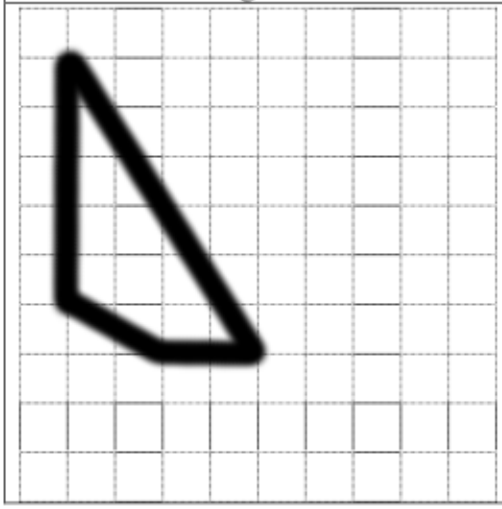
	There is at least one right angle. There is at least one pair of parallel lines.
Figure	**Attributes**
	It is a quadrilateral.

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