

LESSON 8

What Shape Is It In?

Geometry and Spatial Sense

Objectives . . . Students will be able to:

- ◆ Identify 2-D geometric shapes.
- ◆ Describe 2-D geometric shapes.
- ◆ Model 2-D geometric shapes.
- ◆ Draw 2-D geometric shapes.
- ◆ Classify 2-D geometric shapes.

NCTM Standards and NAEP Strand

Concepts learned and applied in Lesson 8 correlate to NCTM Standards 1, 2, 3, 4, and 9; and NAEP Strand 3 (Geometry and Spatial Sense).

Materials List

The Class

- paper and pencils

Each Pair of Students

- A copy of BLM 8-C—cookie cutter shapes students will cut out and trace.
- BLM 8-D

Each Student

- A copy of BLMs 8-A and 8-B for the "You Try It at Home" activities.

To Prepare Your Students

Introduce today's video topic and ask questions designed to ascertain if the students are familiar with the Student Prerequisites and Key Words and Terms. Present some simple examples of the type of problem

Student Prerequisites

- ◆ Knowledge of two-dimensional geometric language, e.g., triangle, square, rectangle, diamond, point, line, angle, straight, curved, horizontal, vertical, diagonal, parallel.
- ◆ Ability to draw two-dimensional geometric shapes, e.g., triangle, square, rectangle, rhombus/diamond.
- ◆ Ability to use geometric language, as listed above, to describe 2-D shapes.

Key Words and Terms

square	rectangle	rhombus
diamond	pentagon	hexagon
octagon	point	line
angle	straight	curved
horizontal	vertical	diagonal
triangle	trapezoid	right triangle
isosceles triangle	equilateral triangle	

we will be exploring—e.g., what shapes do they see on the way to school, in school, or in the classroom? Be sure your students know and can correctly use geometric terminology to describe 2-D shapes. For example: corners, right angles, 90 degree angles, parallel lines, etc.



Video Overview

The show begins by taking the viewer on a “visual geometry walk,” showing 2-D shapes in all kinds of settings—traffic signs, globes, etc.

Video Lesson

The Alien Game

Judy Fadness of the Locust Lane Elementary School pretends she is an alien and asks her class to describe a square to her. She follows their directions and makes a square out of pencils on the overhead projector. Then she tells them that they will be practicing this activity with one another: one student will be the “Describer” and the other will be the “Drawer.” The describer will have a picture of a secret shape and give the drawer directions for making the shape (e.g., “draw a straight line up to near the top of the paper”).



YOUR CLASS MAY WANT TO TRY THIS NOW.

For the following activity, teachers should begin by repeating the video-teacher example. You should DRAW the shape on an overhead, rather than using objects. Model the role of the DRAWER using a rectangle. Have your students play the role of the DESCRIBERS. The first ground rule is that they cannot name the shape. Encourage



correct and precise use of geometric vocabulary—this can be done by misinterpreting imprecise or incorrect directions. For example, if students say, “Draw a line” then you should draw a line that extends as far as possible OR draw a line that is not horizontal or vertical—perhaps a diagonal line.

Next, separate your students into groups of two and explain the roles they will be taking as Describers and Drawers. Make sure that each pair has paper and pencil and provide them with a shape from BLM 8-D—equilateral triangle, trapezoid, parallelogram, octagon, hexagon, etc. Make sure that only the Describer can see the shape and knows that it must be kept secret. Then set them all to work playing the “alien game.”

After they have worked out the problem, but before they present their solutions, play the video showing how other kids solved the problem.

Play

Watch the ways the children on the video solve the problem. The video then asks:

WERE THESE SOLUTIONS LIKE YOURS?

Note: Question is on-screen but there is no stop sign. Teachers should pause at this point and ask each group to present its solution. Encourage your class to think about all the solutions and remind them that there are many possible solutions. These reports should identify the shape the pair used, the process the pair used in drawing the shape, the geometric language they used, and any troubles they had to work through to complete the drawing.

Play

Cookie Cutter

Next, the video shows two sisters using cookie cutters to see how many shapes they can cut from a pan of jello with as little waste as possible.



YOUR CLASS MAY WANT TO TRY THIS NOW.

A blackline master is provided with several “cookie cutter” shapes. Give each pair of students a copy of this master and have them cut out the shapes. Next, have them trace on a sheet of paper the outlines of the cookie cutters. How many shapes can they get on one sheet of paper, without overlapping, using every shape?

Have selected students discuss their solution to the problem and the processes they used to solve the problem with the rest of the class. Student solutions and their written description of their solution processes could be displayed in the room.



Play

In the final segment, students are encouraged to travel around the school neighborhood to draw the shapes they find there. This could be a group activity. The video suggests . . .

You Try It!

EXTENDED ACTIVITIES

These activities are designed to extend the mathematics learning introduced in this lesson.

1. Repeat the 2-D Alien Game with geoboards/geoboard grid paper.
2. On the blackboard draw several shapes—square, circle, diamond, right triangle, equilateral triangle, pentagon, etc.—and label them A, B, C, etc. Then list at random the terms for the shapes in a separate column and number them 1, 2, 3, etc. Ask the students to match the shapes to the numbered terms.

Cross-curricular Activity

"Shape hunt" around school with a camera: Using disposable or Polaroid cameras, have groups of students locate and photograph examples of shapes. Construct books/bulletin boards with the resulting pictures. OR, ask students to construct pictures of animals using one triangle, one square, and four rectangles, or one triangle, two diamonds, and three rectangles, etc. Display the pictures for the class and ask them to discuss using shapes to make other familiar objects.

Writing Activity

Use geoboards/geoboard grid sheets and have your students explore the following questions:

- What polygons can be made?
- What different types of triangles can be shown?
- What different types of quadrilaterals can be shown?
- What makes each of them different?

They should write out their answers and illustrate them.

You Try It At Home

Two handout masters, numbered 8-A and 8-B, are provided in a booklet accompanying the Teacher's Guide; reproduce as many of these as you need. Reduced examples are also provided at the end of this lesson. These activities are designed to extend and reinforce concepts taught in the lesson, and to enable parents or other caregivers to become more involved with students' mathematics learning.



Assessment and Criteria for Scoring

The following proficiency categories may be used to evaluate student performance in response to Lesson 8. You may use these evaluation categories to assess student classroom performance and extended activity performance.

The problem: Students are asked to draw mystery shapes as their partner communicates to them how to draw the shape using only geometric language.

Advanced Performance: Student is able to communicate and follow directions to draw the mystery figure and explains the process using mathematical terms.

Proficient Performance: Student is able to communicate and follow directions to draw the mystery figure.

Partially Proficient Performance: Student is not able to communicate or follow directions to draw the mystery figure.

References and Resources

National Council of Teachers of Mathematics (1989) Curriculum and Evaluation Standards for School Mathematics. Reston, VA: The Council.

Standard 1 : Mathematics as Problem Solving.

Standard 2 : Mathematics as Communication.

Standard 3 : Mathematics as Reasoning.

Standard 4 : Mathematical Connections.

Standard 9 : Geometry and Spatial Sense.

NCTM Addenda Series Grades 2, 3, 4—Geometry section.

NAEP Strand 3 (Geometry and Spatial Sense).



Suggested Children's Literature

Tana Hoban: *Circles, Triangles, and Squares*

Round and Round and Round

Shapes and Things

Shapes, Shapes, Shapes

Juliet and Charles Snape, *The Boy with Square Eyes*

Marcia Brown, *Listen to a Shape*

Ed Emberley, *The Wing of a Flea: A Book about Shapes*

Lydia Sharman, *The Amazing Book of Shapes*

You Try It At Home 1 and 2

Shape Hunt

Geometry is all around us. Show a parent or other adult care-giver the following list of shapes. Ask them which of these shapes are part of objects they use every day. For instance, "I see the circle on my telephone . . ." See if they can give you examples for all of the shapes and write in the space below what you found out.

Right Triangle

Square

Rectangle

Trapezoid

Circle

Pentagon

Author, Author!

Tana Hoban is an author/photographer who knows that geometric shapes are a part of our world. Go to the library and find one of the following books by Tana Hoban:

Circles, Triangles, and Squares

Round and Round and Round

Shapes and Things

Shapes, Shapes, Shapes

Or use one of these books:

Juliet and Charles Snape, *The Boy with Square Eyes*

Marcia Brown, *Listen to a Shape*

Ed Emberley, *The Wing of a Flea: A Book about Shapes*

Lydia Sharman, *The Amazing Book of Shapes*

Find the shapes that are pictured in the book in different places outside. Then write your own book about shapes. Illustrate your book with drawings or photographs. Ask an adult at home or other care-giver to help you with this project.