

# *I've Seen That Shape Before*

## Lesson Plan

- I) Overview
- II) Conducting the Lesson
- III) Teacher to Teacher
- IV) Handouts

### I. OVERVIEW

#### Lesson Summary

Students learn the names and explore properties of solid geometric shapes. They identify these shapes in the real-world and in pictures found on websites. In the pre-activities and the extensions, students use physical models of simple solid shapes.

**Grade Level** Pre-K – 2

**Estimated Time** Two 45-minute sessions for the [Internet Activity](#), and 45 minutes for each [Pre-Activity](#) and [Extension](#).

**Objectives**

- To learn the names and explore the characteristics of simple solid shapes.
- To recognize 3-dimensional geometric shapes in the real world.
- To see that a real object may have a recognizable geometric shape even though it's not a perfect representation of that shape.
- To recognize shapes when they are combined with other shapes.

**Web sites** The following sites are either referenced throughout the lesson or can serve as additional resources for this lesson.

<http://www.nps.gov/nama>

The end of this web page contains links to photos of the Lincoln Memorial, Jefferson Memorial, Washington Monument, Capitol Building, White House, and other buildings in Washington, D.C., which will be used in the lesson.

<http://www.greatbuildings.com/gbc.html>

On this site you enter the name of a building to view an illustration or photo of it.

<http://illuminations.nctm.org/3-5/FacesCornersEdges/index.html>

This i-Math investigation on the Illuminations web site allows students to spin virtual solids and then mark and count the corners, edges, and faces.

<http://illuminations.netm.org/across/connections/tour/index.html>

This i-Math investigation on the Illuminations web site lets students take an online virtual tour of the San Francisco Museum of Modern Art.

<http://putwest.boces.org/Standards.html>

To verify or modify the teaching of this lesson so that it is in alignment with local, state, or national standards or frameworks, visit this web site.

<http://www.learner.org/teacherslab/math/geometry/>

This web site provides a teachers' geometry lab. This lab divides activities into two broad categories. Activities about shape center on identifying properties of various shapes and measuring their dimensions. Activities about space focus on moving objects for yourself around in your imagination, and visualizing how the resulting "picture" will look.

## Materials

Materials needed for Pre-Activity 1:

- Physical models of a cube, cone, sphere, cylinder, rectangular prism, and triangular prism (one set per group).

Materials needed for Pre-Activity 2:

- Physical models of a cube, cone, sphere, cylinder, rectangular prism, and triangular prism (one set per group).
- [Shape Cards Sheet](#) cut into shape cards with pictures of geometric solids.
- [Name Cards Sheet](#) cut into name cards with the names of geometric solids.
- (Optional) Chart made in Pre-activity 1 (characteristics of each solid).

Materials needed for Pre-Activity 3:

- Physical models of a cube, cone, sphere, cylinder, rectangular prism, and triangular prism (one set per group). You can use commercially available models or cut your own from Styrofoam trays, craft foam, or cardboard.
- Physical models of a triangle, square, rectangle, and circle. You can use commercially available models or cut your own from Styrofoam trays, craft foam, or cardboard.
- Name cards and shape cards from pre-activity 2. You can make more by cutting them from Shape Cards Sheet and Name Cards Sheet.
- [Face Cards Sheet](#) cut up into cards with illustrations and names of plane, 2-dimensional figures.
- (Optional) [Number Cards Sheet](#) cut up into number cards.

Materials needed for Pre-Activity 4:

- Physical models of a triangle, square, rectangle, and circle. You can use commercially available models or cut your own from Styrofoam trays, craft foam, or cardboard.
- Name cards and shape cards from pre-activity 2. You can make more by cutting them from the Shape Cards Sheet and the Name Cards Sheet.
- Camera(s), if available.

Materials needed for Extension Activities

- Cubes
- Shape Cards Sheet

**NCTM Standards**

[Geometry](#), [Number](#), [Algebra](#) (patterns and relationships), [Problem Solving](#), [Reasoning](#), [Connections](#), [Communication](#), [Representations](#)

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## II. CONDUCTING THE LESSON

### OUTLINE

#### A. Pre-Activities

1. [Exploring Physical Models](#)
2. [Representing Space Figures](#)
3. [Faces, Corners, and Edges](#)
4. [Shape Spotting - Classroom and Beyond](#)
5. [Pulling It All Together](#)

#### B. [Doing the Internet Activity](#)

#### C. [Reflecting on the Activity](#)

#### D. [Extensions](#)

### A. PRE-ACTIVITIES

#### Pre-Activity 1: [Exploring Physical Models](#)

**Objective:** To examine, recognize, name, and explore the properties of simple geometric solids.

**Materials:** Physical models of a cube, cone, sphere, cylinder, rectangular prism, and triangular prism (one set per group).

### Activity:

Let students handle, examine, and talk about physical models of geometric solids.

Lead the class in generating a list of characteristics for each shape. Record the information in a chart and post it in the room for reference during extension activities, other pre-activities, and the main activity of the lesson.

As students list characteristics, guide them with questions like the ones below.

*[Teaching Notes: Teaching notes, answers, and sample student responses are shown indented and in italics.]*

### **Guiding Questions**

(Responses shown are samples only. Student responses will vary.)

- Which of the shapes roll?  
*[sphere, cylinder, cone]*
- Which ones don't roll?  
*[cube, rectangular prism, triangular prism]*
- How would you describe this triangular prism?  
*[It has two triangles that look the same and they are connected by 3 rectangles.]*
- How are the cube and rectangular prism alike?  
*[They each have 6 faces, 8 corners, and 12 edges. Neither one has any round parts. etc.]*
- How are they different?  
*[The cube has square faces, while the rectangular prism has rectangular faces. The cube is a type of rectangular prism, but the rectangular prism we're referring to is not a cube.]*
- Can you point to the corners, sides, and faces of each solid figure?
- What can you tell me about this shape? What else do you notice?  
*[Sample response for cone: It's round at one end and comes to a point at the other. It has only one corner and one edge.]*

### **Pre-Activity 2: Representing Space Figures**

Objective: To match physical models of 3-dimensional shapes with their names and illustrations.

- Materials:
- Physical models of a cube, cone, sphere, cylinder, rectangular prism, and triangular prism (one set per group).
  - Shape Cards Sheet cut into shape cards with pictures of geometric solids.
  - Name Cards Sheet cut into name cards with the names of geometric solids.
  - (Optional) Chart made in Pre-activity 1 (characteristics of each solid).

## Activity:

### 1. Matching Illustrations and Solids

Give each group of students a set of physical models of the geometric solids and a set of pictures of geometric solids cut from Shape Cards Sheet.

Have the students match each solid with its illustration.

As you circulate, observe students' actions and listen to their conversation for ongoing assessment.

### **Guiding Questions**

As you move among the students ask helpful questions, such as:

- What do you notice about the shape shown on this card?
- Which of the solids is like that?
- What shape are the faces of the figure in the picture?
- Which of the solids has faces in that shape?

### 2. Matching Names and Solids

Work with the class to pronounce the names of the 6 solids and match them to the physical models and to the illustrations on the shape cards. Explain that having names for shapes makes it easier to talk about them and makes it easier to describe objects. For example, you can describe a soup can just by saying it has the shape of a cylinder.

Save the name cards and shape cards for Pre-activity 3.

### **Pre-Activity 3: Faces, Corners, And Edges**

Objectives: To recognize and name the shapes of the faces of space figures.  
To count faces on space figures.  
To count corners and edges on plane and space figures.

Materials:



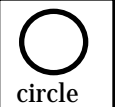

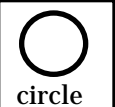

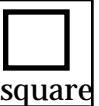


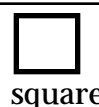



- Physical models of a cube, cone, sphere, cylinder, rectangular prism, and triangular prism (one set per group).
- Physical models of a triangle, square, rectangle, and circle. You can use commercially available models or cut your own from Styrofoam trays, craft foam, or cardboard.
- Name cards and shape cards from pre-activity 2. You can make more by cutting them from the Shape Cards Sheet and the Name Cards Sheet.
- Face Cards Sheet cut up into cards with illustrations and names of plane, 2-dimensional figures.
- (Optional) Number Cards Sheet cut up into number cards.

Activity:

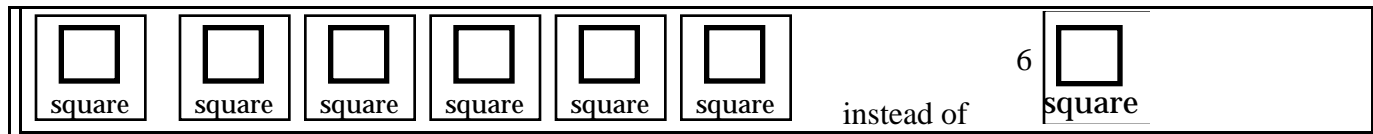
Have students work in pairs to match each plane figure with the solids that have faces in that shape.

*[Note that students will need to match some plane figures with more than one solid.]*

Have students create a chart like the one below to show the number and type of faces, as well as the number of corners and edges, on each solid. They can fill in their the chart by gluing shape, name, and face cards to the chart, and also by either gluing number cards or writing numerals.

PICTURE	NAME	FACES	CORNERS [ART - corner]	EDGES [ART - edge]
	sphere			
	cone	1  circle		
	cylinder	2  circle		
	cube	6  square	8	12
	rectangular prism	4  rectangle  2  square	8	12
	triangular prism	2  triangle  3  rectangle	6	9

In addition, instead of writing numbers in the middle column, children can use multiple shape cards. For example:



Keep the children's charts in their portfolios. Encourage them to write or draw any additional ideas they have about the shapes.

### Guiding Questions

As you move among the students, ask questions and give suggestions. For example:

- This is one corner (or edge or face); can you show me another?
- What can you do so you don't count a face (or corner or edge) more than one time?  
*[Mark it with a piece of tape, keep a finger on it.]*
- To see the shape of a face, try holding the solid directly in front of your eyes.  
*[Demonstrate this for the students.]*
- Why do you think these two shapes are both called prisms?

### Pre-Activity 4: Shape Spotting - Classroom and Beyond

Objective: To recognize 3-dimensional shapes in the real world.

- Materials:
- Physical models of a triangle, square, rectangle, and circle. You can use commercially available models or cut your own from Styrofoam trays, craft foam, or cardboard.
  - Name cards and shape cards from pre-activity 3. You can make more by cutting them from the Shape Cards Sheet and the Name Cards Sheet.
  - Camera(s), if available.

#### Activity:

##### 1. Solid Shapes in the Classroom

Ask students to look around the classroom to find examples of the 3-dimensional shapes they have been studying. Have the students label each object to show its geometric shape. They can make labels on index cards by drawing a simple outline of the shape, writing the name of the solid on the card, or pasting the matching name and shape cards from Shape Cards Sheet and Name Cards Sheet.

##### 2. Solid Shapes Outside the Classroom

Take the class on a walk around the school to identify space figures in the environment. For each one they find, have them say whether it's man-made or natural. If they have a camera, students

can take photographs to record the location of each figure and later use these photos to make a bulletin board display or a book for the class library.

### **Guiding Questions**

During the walk and after, ask questions such as the following:

- Is this figure exactly like the model in the classroom?
- How is it alike? How is it different?  
*[Help students understand that they can recognize shapes even when the objects they see are not exactly like the shapes they can imagine.]*

### **Pre-Activity 5: Pulling It All Together**

Have individual students or pairs of students display models of each shape: cube, cone, sphere, cylinder, rectangular prism, and triangular prism. As they do so, ask them to identify the shape, talk about it, and give examples of objects they have seen that have that shape.

*[If the students have photographs from pre-activity 4, have them include photos in their presentations.]*

### **Guiding Questions**

As students display and talk about each shape, ask questions like these:

- Does this figure have any flat, smooth sides?
- The flat smooth sides of solid figures are called faces. What is the shape of this figure's faces?
- Does it have any corners?
- What else can you tell me about this solid?  
*[Sample response for a cone: The solid is also smooth and curvy.]*
- Have you ever seen anything that looks like this shape? Where? How was it being used?  
*[Follow-up questions for a cone: Have you seen this shape in PE class? Have you seen it where people are fixing a road?]*

You can tailor this activity for Pre-K students, as follows.

Put one of each solid in a pillow case or bag. One student is blind-folded and picks a solid from the pillow case. The child holds the solid with both hands while the teacher holds the pillow case so the rest of the class can't see the solid. Prompted by your questions like the ones above, the blind-folded child describes how the solid feels. As the other children listen, challenge them to choose from the set of solids in front of them the solid being described. This activity helps children build their vocabulary of words associated with solid figures, such as pointy, flat, rounded, smooth, edges, and corners.

## B. DOING THE INTERNET ACTIVITY

Have students examine photos of landmarks and buildings on the following web sites:

<http://www.nps.gov/nama>

*[The end of this web page has links to photos of the Lincoln Memorial, Jefferson Memorial, Washington Monument, Capitol Building, White House, and other buildings in Washington, D.C..]*

<http://www.greatbuildings.com/gbc.html>

*[On this site you enter the name of a building to view an illustration or photo of it.]*

At each site, have students do the following:

1. Identify the name of each solid figure they find and tell where it is located in the picture and how it is used.

*[For example: I found part of a sphere in the Jefferson Memorial. It's used as a roof.]*

2. Keep a record of the shape they found and a picture of the whole structure to show the shape in context.

*[Students can record in several possible ways:*

*-- Use the copy image feature of their web browser to save pictures.*

*-- Print pictures directly from web pages.*

*-- Make rough sketches, which can be simple outlines, as long as they help students recall what they've seen.]*

### Guiding Questions

Provide help as needed by asking guiding questions, such as:

- What does the shape of that building remind you of?
- What shape does the top of that monument look like?
- Do you see part of one of the space figures in that building?
- How would you describe the shape of that roof?

### Assessment Tips

- Answers to questions like the Guiding Questions can help you assess and improve students' level of understanding, make instructional plans, and report student progress to parents and administrators.
- Keep the record of shapes and structures from Activity 2, above, to help you assess the student's ability to recognize, name, replicate, or sketch 3-dimensional shapes in the environment.
- When you circulate among students as they work, observe them as part of an ongoing assessment of their expanding knowledge and understanding.

- Make notes of what the student does and doesn't understand, what the student can do, and special things the student says or does. Use these notes later to help you determine the level and type of help, if any, the student needs or the type of extra challenge that would be appropriate.

### **Guiding Assessment Questions**

To help you assess students' knowledge and understanding, ask yourself questions like:

- What level of assistance, either from another student or from you, did students require in naming, locating, and drawing space figures?
- What properties of the shapes did the student identify correctly?
- What information about shapes was the student able to record?
- What characteristics or properties do students notice first? Why?
- What strategies do students use to keep track of the faces, corners, and edges as they count them?
- What schemes do students use to match names with figures?
- What strategies did students use to match plane shapes with faces of solid figures?
- Did they focus first on the plane figure or on the solid?
- What are students able to visualize? What do they have difficulty visualizing?
- Can students distinguish different shapes? What did students do or say to indicate that?
- What strategies did students most frequently use in identifying space figures?

### **C. REFLECTING ON THE ACTIVITY**

It is important for students to look back at what they have done and summarize what they have learned. This is also an opportunity to assess student progress.


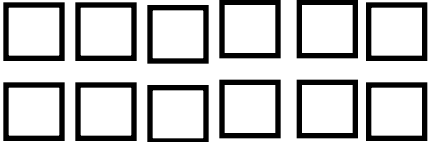
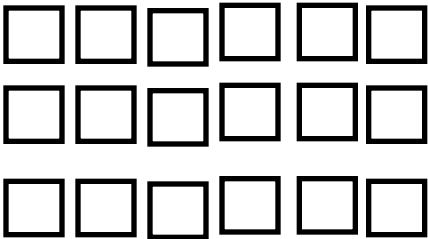
Pose questions like the ones below to encourage students to think about and use what they've learned, as well as and to assess their progress. (Students' responses will vary. Responses shown are samples only.)

- How would you describe the shape of that roof?  
*[It looks like half of a ball, or half a sphere.]*
- How is a cone shape and a cylinder shape alike?  
*[They both have a round side. They both have a face in the shape of a circle.]*
- How are they different?  
*[The cone comes to a point; the cylinder just goes straight up and makes another circle.]*
- Can you point to the corners, sides, and faces of the solid figures?
- What can you tell me about the shape of that building? What else do you notice about it?  
*[All the faces are rectangles. The sides are not perfectly smooth.]*
- What things in your home have you seen that have the shape of a cylinder?  
*[cans of food, rolls of paper towels]*
- What cylinders have you seen outside your home?  
*[trash barrels, smokestacks]*
- Which solid figure have you found most often? Why?  
*[rectangular prism, because it's easy to build]*

## D. EXTENSIONS

### 1. Face Patterns

Have students explore patterns by counting faces on a group of cubes. First help them develop a chart like this:

Number of Cubes	Number of Faces	Sketch
1	6	
2	12	
3	18	

### 2. Shape Hunt Game

Students pick cards from a collection of shape cards from Shape Cards Sheet and try to find an example of each shape. The hunt can take place within the classroom, throughout the school, at home, etc. Players can try to be the first to find all their shapes. Or they can try to find the most shapes in a given time.

### 3. Shapes on the Web

Have students identify shapes they find as they explore web pages that contain photos of items for sale, sports activities, works of art, etc.

### 4. $(\text{Corners}) - (\text{Edges}) + (\text{Faces}) = 2$

Students can connect to the Illuminations i-Math Investigation [<http://illuminations.nctm.org/3-5/FacesCornersEdges/index.html>] that allows them to spin virtual solids and mark and count the corners, edges, and faces. They can build a table and look for patterns. With some possible hints, they can discover that:

$$(\# \text{ of Corners}) - (\# \text{ of Edges}) + (\# \text{ of Faces}) = 2.$$

## 5. Online Virtual Tour of the San Francisco Museum of Modern Art

Students can connect to the Illuminations i-Math activity that lets them take a virtual tour of the San Francisco Museum of Modern Art (<http://illuminations.nctm.org/across/connections/tour/index.html>). Have the students take the "Unstructured Tour" of the Yerba Buena Gardens, the First Floor, and the Second Floor. As they take this virtual stroll through the museum, ask them to find, name, and describe as many two- and three-dimensional shapes as they can.

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### III. TEACHER TO TEACHER

#### A. TEACHER REFLECTIONS

Here are a few questions to ask yourself during and after the lesson.

- Did students achieve the objectives for this lesson? If yes, how can I tell? If not, how should I change the lesson so that it is more effective?
- What additional experiences do students need to be successful with this activity?
- What additional experiences do students need before moving to the next activity?
- Are students able to explain their reasoning? Are their reasons logical?
- What are the indicators that students are able to work together?
- How do students decide upon shared responsibilities?
- Are students able to quantify, organize and/or record information?
- Were directions clear and usable by students? If not what adjustments would be appropriate for me to make?
- What new vocabulary did students use that might need to be reinforced in the next lesson?
- What additional extensions would be appropriate?

#### B. MORE ABOUT GEOMETRY

<http://www.learner.org/teacherslab/math/geometry/>

Geometry is not abstract. Rather, it's fun and colorful, instructive and practical. Geometry is about real things: how big they are, whether they fit, how to find them, what they look like in a mirror. This lab divides activities into two broad categories. Activities about shape center on identifying properties of various shapes and measuring their dimensions. Activities about space focus on moving objects, or yourself, around in your imagination, and visualizing how things will look.

## **C. ASSESSMENT ISSUES**

### Performance Assessment Idea

Have students communicate to their parents, friends, or others what they have done and learned in this lesson. Their report might include:

- Written descriptions (scripted by an adult) of each part of this lesson
- Drawn pictures
- Illustrations and photos from books and magazines, from other web sites, or from computer-based encyclopedias
- Audio recordings
- Photos (in print or electronic form) that the students have taken

Keep a copy of this product in the student's portfolio.

## **D. RELATED RESOURCES**

### Correlation To State Standards

To find out about your local or state standards requirements, in order to verify or modify the teaching of this lesson so that it is in alignment with those standards, visit this website:

<http://putwest.boces.org/Standards.html>

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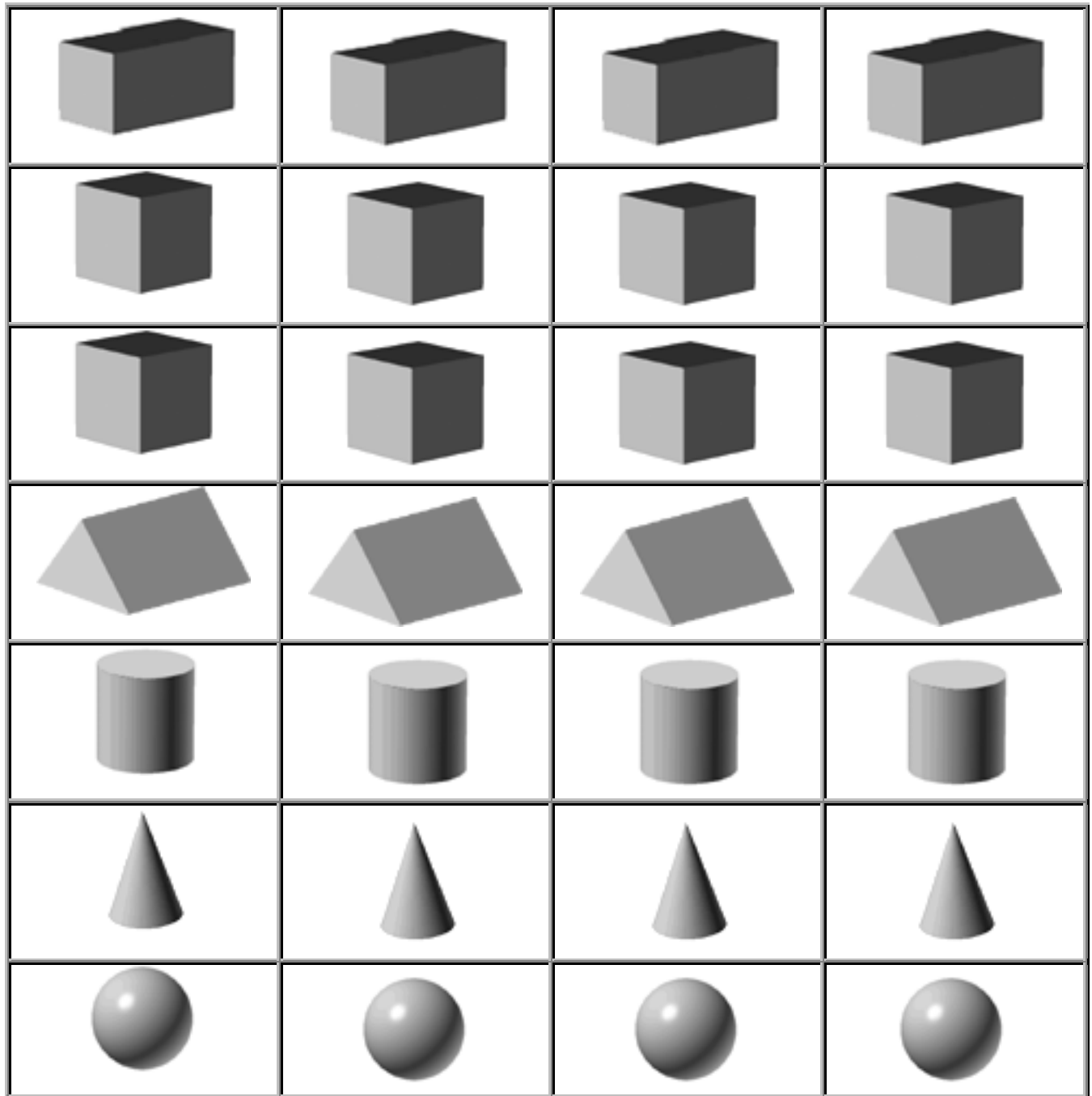
## **IV. HANDOUTS**

There are four reproducible handouts for this lesson:

Shape Cards Sheet  
Name Cards Sheet  
Face Cards Sheet  
Number Cards Sheet

These four handouts can be copied from the following pages.



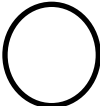



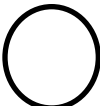



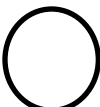
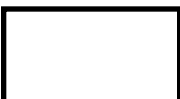


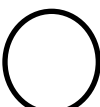



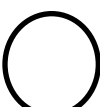
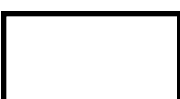


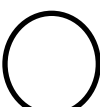
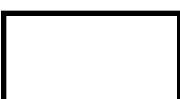


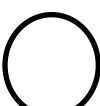
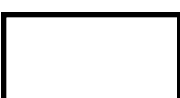
**Shape Cards Sheet**  
*for I've Seen That Shape Before*



**Name Cards Sheet**  
*for I've Seen That Shape Before*

Triangular Prism	Triangular Prism	Triangular Prism	Triangular Prism
Cube	Cube	Cube	Cube
Rectangular Prism	Rectangular Prism	Rectangular Prism	Rectangular Prism
Cylinder	Cylinder	Cylinder	Cylinder
Cone	Cone	Cone	Cone
Sphere	Sphere	Sphere	Sphere
Triangular Prism	Triangular Prism	Triangular Prism	Triangular Prism
Cube	Cube	Cube	Cube
Rectangular Prism	Rectangular Prism	Rectangular Prism	Rectangular Prism
Cylinder	Cylinder	Cylinder	Cylinder
Cone	Cone	Cone	Cone
Sphere	Sphere	Sphere	Sphere

**Face Cards Sheet**  
*for I've Seen That Shape Before*

 Triangle	 Square	 Circle	 Rectangle
 Triangle	 Square	 Circle	 Rectangle
 Triangle	 Square	 Circle	 Rectangle
 Triangle	 Square	 Circle	 Rectangle
 Triangle	 Square	 Circle	 Rectangle
 Triangle	 Square	 Circle	 Rectangle
 Triangle	 Square	 Circle	 Rectangle

*for I've Seen That Shape Before*

1	2	3	4	5	6
1	2	3	4	5	6
1	2	3	4	5	6
1	2	3	4	5	6
1	2	3	4	5	6
1	2	3	4	5	6
1	2	3	4	5	6
1	2	3	4	5	6
1	2	3	4	5	6
1	2	3	4	5	6