Pyramids, Cones, and Cubes

Objectives To guide the identification of pyramids, cones, and cubes; and to facilitate the investigation of their characteristics.

Key Concepts and Skills
- Count the flat faces and corners on solid figures. [Number and Numeration Goal 2]
- Identify and describe solid figures. [Geometry Goal 1]
- Compare and contrast solid figures. [Geometry Goal 1]
- Compose solid shapes. [Geometry Goal 1]

Key Activities
Children learn the names of three more 3-dimensional shapes—pyramid, cone, and cube—and discuss their characteristics. They move some of the "other" items in the Shapes Museum to the appropriate categories and construct cubes and cones.

Ongoing Assessment: Informing Instruction See page 652.

Key Vocabulary
pyramid • cone • cube

Materials
- Math Journal 2, pp. 146 and 147
- Home Link 7-6
- Math Masters, p. 210 (optional); p. 212B
- slate • models of a pyramid, a cone, and a cube • 3" by 5" index cards • items for the Shapes Museum • scissors • tape • per small group: 20 twist-ties and 12 straws (each 4" in length)

Advance Preparation
For Part 1, write the words pyramid, cone, and cube on index cards. Display models of a pyramid and a cube, each with its name. Place a model of a cone with its name near the Math Message. Be prepared to add more objects to the Shapes Museum.

For the optional Extra Practice activity in Part 3, obtain a copy of Cubes, Cones, Cylinders, & Spheres by Tana Hoban (Greenwillow Books, 2000).
Getting Started

Mental Math and Reflexes
Children solve problems like the ones below, recording their answers on slates.

1. Write the number that comes before 30. Circle the digit in the tens place.
   29
2. Write the number that comes before 100. Circle the digit in the tens place.
   99
3. Write the number that comes after 149. Circle the digit in the tens place.
   150

NOTE You may wish to cut out some cone templates before the lesson (1 per small group) in case children have trouble cutting the templates.

Math Message
Name an object that is shaped like a cone.

Home Link 7-5 Follow-Up
Discuss which facts children think they know. They should be making progress on +1, +0, and doubles facts.

Teaching the Lesson

Math Message Follow-Up
Children might mention ice-cream cones, party hats, cone-shaped drinking cups, and traffic cones. Ask children how a cone is different from a circle or a triangle. Review the difference between 2- and 3-dimensional shapes. Tell children that they will learn about more 3-dimensional shapes today.

Discussing the Characteristics of Pyramids, Cones, and Cubes

Ask children to describe the pyramid, cone, and cube. Expect answers such as the following:

- The pyramid has all flat faces (or sides).
- The flat faces of the pyramid that come to a point are all triangles.
- The pyramid has the same number of flat faces as corners.
- The cone has one flat face shaped like a circle and one curved surface.
- The curved surface of the cone comes to a point.
- The cube has 6 flat square faces. It has 8 corners.

Mention that a cube is a special rectangular prism whose faces are all squares of the same size.

Help children move all objects shaped like pyramids, cones, and cubes out of the “other” category of the Shapes Museum and into the appropriate categories. Ask them to name objects in the classroom that approximate those shapes.

Social Studies Link Show children images of the pyramids in Egypt. Discuss the purposes of the pyramids and how they were built.
**Reviewing the Six 3-Dimensional Shapes**  
*(Math Journal 2, p. 146)*

Direct children's attention to the 3-Dimensional Shapes Poster on journal page 146. Ask questions such as the following:

- Which shapes come to a point? Cone and pyramid
- Which shapes have only flat surfaces? Pyramid, rectangular prism, and cube
- Which shape has no flat surfaces? Sphere
- Which shapes have both flat and curved surfaces? Cylinder and cone

**Adjusting the Activity**

Have geometric models available for children to hold up in response to the above questions. Continue with questions like the following:

- What do a cone and a pyramid have in common? They both have at least one flat face, and they both come to a point.
- How are a cone and a pyramid different? A cone has a curved surface and one flat face; a pyramid has several flat faces but no curved surface.

**Identifying the Shapes of Various Objects**  
*(Math Journal 2, pp. 146 and 147)*

Children refer to the 3-Dimensional Shapes Poster on journal page 146 as they identify the shapes of the objects shown on journal page 147 and record their names.

**Making Cubes and Cones**  
*(Math Masters, p. 212B)*

Tell children that they will be making cubes and cones. For the cones, give each group scissors, tape, and one copy of *Math Masters*, page 212B on construction paper. For the cubes, provide straws and twist-ties. Begin by modeling for children how to make a cone:

1. Cut out the cone template from *Math Masters*, page 212B. This consists of two pieces: the circle and the half-circle.
2. Fold the half-circle so that the tab on one edge of the half-circle can be taped to the inside of the other edge.
3. Fold the tabs on the circle. Tape the tabs to the outside of the folded half-circle to secure the circle at the base of the cone.

Next model for children how to make a cube:

1. Remind children how they used twist-ties and straws to make a rectangular prism in Lesson 7-5.
2. Illustrate the same directions (see page 647) used for the rectangular prism, using only 4” straws this time. First make two squares from 4” straws. Then connect them together with four 4” straws.

3. When you are finished constructing the cube, ask children how the cube you made and rectangular prism you made are different. Sample answer: The cube’s faces are all squares of the same size; the rectangular prism’s faces are all rectangles but not all squares.

Assistant children as they construct these shapes. When children are finished, have them add their shapes to the Shapes Museum.

**Ongoing Learning & Practice**

**Playing the Attribute Train Game**

Algebraic Thinking Children identify attributes of shapes by playing the Attribute Train Game. For instructions, see Lesson 7-2.

**Math Boxes 7•6**

(Math Journal 2, p. 148)

Mixed Practice Math Boxes in this lesson are linked to Math Boxes in Lessons 7-2 and 7-4. The skills in Problem 4 preview Unit 8 content.

Writing/Reasoning Have children write, draw, or verbalize an answer to the following question: What patterns do you see on the number grid? A reasonable answer should describe place-value patterns in rows and columns. Sample answer: Going across the ones place changes by one. Going down the tens place changes too.

**Home Link 7•6**

(Math Masters, p. 213)

Home Connection Children trace flat faces of 3-dimensional objects and identify the shapes they have drawn. A Word List containing the names of shapes is provided on the Home Link page.
The class has been working with 2-dimensional and 3-dimensional shapes. For today's Home Link, help your child find 3-dimensional objects and then trace around one face of each object. Some examples are the bottom of a box, the bottom of a can, and the bottom of a cup. Use the back of this sheet and other sheets if you want. For each tracing, help your child find the name for the shape in the Word List and write the name on the tracing.

Return this Home Link to school tomorrow.

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**Differentiation Options**

**Identifying Shapes Using Touch**

*Math Journal 2, p. 146*

To explore the attributes of solid figures, have children describe 3-dimensional shapes. Each group takes a paper bag containing a 3-dimensional shape. Without looking in the bag, each child takes a turn reaching into the bag and feeling the object. Once all of the children have described the object, they can remove it from the bag and compare it to the shapes pictured on journal page 146.

**Comparing Prisms and Pyramids**

*Math Masters, p. 214*

To compare and contrast the attributes of prisms and pyramids, have children construct a Venn diagram. Children take the pyramids and prisms from the Shapes Museum and sort them into the two groups. They list the common attributes in the overlapping section of the Venn diagram and the distinct attributes in the appropriate sections of the diagram. Have children discuss the similarities and differences they have listed in their diagrams.

**Reading About Geometry**

*Math Masters, p. 305*

**Literature Link** To provide practice with geometry skills, read *Cubes, Cones, Cylinders, & Spheres* by Tana Hoban (Greenwillow Books, 2000). On an Exit Slip (Math Masters, page 305), have children draw something shaped like a cube that is in their classroom.