Geometric Solids

Summary

This activity will expose students to a variety of three-dimensional objects.

Main Core Tie

Mathematics Kindergarten
Strand: GEOMETRY (K.G) Standard K.G.2

Additional Core Ties

Mathematics Kindergarten
Strand: COUNTING AND CARDINALITY (K.CC) Standard K.CC.4.
Mathematics Kindergarten
Strand: COUNTING AND CARDINALITY (K.CC) Standard K.CC.5.
Mathematics Kindergarten
Strand: GEOMETRY (K.G) Standard K.G.3
Mathematics Kindergarten
Strand: GEOMETRY (K.G) Standard K.G.4
Mathematics Kindergarten
Strand: GEOMETRY (K.G) Standard K.G.6

Materials

- Geometric Solids Parent Letter pdf
  Collected geometric solids
  Floor Graphing Mat
  Geometric Solids
    Cylinder
    Sphere
    Cone
    Cube
    Rectangular prism
  Paper
  Marker

Additional Resources
Books

- *20 Instant Math Learning Centers Kids Will Love!*
  , by Traci Ferguson Geiser and Krista Pettit; ISBN 0439227291 (Scholastic)
- *Block City*
  , by Robert Louis Stevenson; ISBN 0689869649
- *The Busy Building Book*
  , by Sue Tarsky; ISBN 0698118200
- *Captain Invincible and the Space Shapes*
  , by Stuart J. Murphy; ISBN 0064467317
- *Changes, Changes*
  , by Pat Hutchins; ISBN 0689711379
- *Cubes, Cones, Cylinders and Spheres*
  , by Tana Hoban; ISBN 0688153259

- *Geometric Shapes*
  , by Mary J. Kurth; ISBN 3055402625
- *Hands-On Math: K-1*
  , by Virginia Johnson (Edited by Janet Bruno); ISBN 3055402600 (CTP 2600)
- *Instant Math Centers: K-1*
  , by Creative Teaching Press; ISBN 1574716891 (CTP 2597)
- *Math Tub Topics: K-2*
  , by Creative Teaching Press; ISBN 1574719548 (CTP 2812)
- *Pattern Animals: Puzzles for Pattern Blocks*
  , by Sandra Mogensen; ISBN 1569110867
- *Pattern Block City*
  , by Planet Dexter; ISBN 0201483610
- *Pattern Blocks Problems for Primary People*
  , by Linda Harvey and Ann Roper; ISBN 0884881237
- *Take it to Your Seat Math Centers K-1*
  , by Jill Norris; ISBN 1557999317

Media

- *Can A Jumbo Jet Sing the Alphabet?*
  , by Hap Palmer; ASIN: B00000I6UA
- *Getting to Know Myself*
  , by Hap Palmer; ASIN: B00004TVSF
- *Learning Basic Skills Through Music Vol. 2*
  , by Hap Palmer (http://www.happalmer.com)
- *Math All Around Me*
  , by Jack Hartmann (http://jackhartmann.com); Item #CD-08
- *Musical Math*
  , by Heidi Butkus (http://www.heidisongs.net);

Organizations

- *National Association for the Education of Young Children*
  , 1509 16th St. N.W., Washington, DC 20036 (202) 232-8777 or (800) 424-2460, http://naeyc.org
- *National Council of Teachers of Mathematics*
  , 1906 Association Drive, Reston, VA 20191- 1502 (703) 620-9840, http://www.nctm.org

Background for Teachers

Geometry is the study of the property and relationships of points, lines, angles, surfaces and solids. Geometric shapes can be dated back 15,000 years. Geometric shapes were drawn on ancient artifacts and cave walls. Geometry is divided into two categories: plane geometry and solid geometry. Plane geometry is the study of two-dimensional objects in one plane. Two-dimensional objects have length, width and area but no volume. Solid geometry is the study of three-dimensional shapes. Three-dimensional objects have length, width, height, area and volume. The most common three-dimensional shapes are prisms, cubes, cylinders, cones, spheres and pyramids.
We need to use the correct terminology when teaching solid shapes. Kindergartners do not need to be able to name the objects yet, but exposure to the correct names for three-dimensional objects will help them in the future.

Intended Learning Outcomes

1. Demonstrate a positive learning attitude.
2. Understand and use basic concepts and skills.

3. Communicate clearly in oral, artistic, written and nonverbal form.

Instructional Procedures

Invitation to Learn

Have students gather the geometric solids they brought from home. Encourage students to examine their object and find a student who has a similar object to the one they brought. Have students discuss the similarities and/or differences while bringing them to the whole group area.

Instructional Procedures

Several days before this lesson, send home the *Geometric Solids Parent Letter* with each student.

Before beginning the lesson, have the Floor Graphing Mat in the whole group area. As the students bring their geometric solids, encourage them to sit on the perimeter of the Floor Graphing Mat.

Show the students the cylinder. Have all the students who brought a cylinder place their cylinders, one in each square, of the Floor Graphing Mat. As a class, count the total number of cylinders. Record the total number of cylinders on a sheet of paper to be placed on the graph. Continue with the remaining solids, graphing, counting and recording as you go.

As a class, discuss the findings of your graph. Which has the most, the least, etc.

Gather the items collected from the students and place in an area of the room where students can investigate the geometric shapes further.

After cleaning up the graph, you could set up a variety of centers focusing on Geometric Shapes they could choose during math time. Suggestions for centers are found in the Curriculum Extensions/Adaptations/Integration section of this lesson.

Extensions

Provide several centers focusing on shapes.

Geometric Solid Investigation--Provide the center with a set of Geometric Solids, magnifying glasses, paper, and pencils. Encourage students to explore the geometric solids. Students could sort the solids in a variety of different ways. Students could also stack the solids and build different things. Have students record what they learned about the solids or draw a picture of what they did with the solids.

Pattern Block Template--Provide the center with a set of pattern blocks, and pattern block templates (like those available on-line at Kelly's Kindergarten). Encourage students to recreate the pictures using the pattern blocks.

Pattern Block Creations--Provide the center with a set of pattern blocks, paper, die-cut pattern blocks, and glue--or pattern blocks stamps and stamp pads. Students will create their own pictures using the pattern blocks. Students can then use paper to recreate their picture with the die-cuts or stamps to take home.

Block Play--Provide the center with blocks of all different shapes and sizes, paper, pencils, and crayons. Encourage students to build structures with the geometric solid blocks. Have students draw a picture of their structure to take home.

Geometric Solid Graph--Provide the center with the Floor Graphing Mat, the solids the class brought from home, and paper and pencils. Encourage the students to recreate the graph done as a class. Students can record the findings of their graph with the paper and pencils provided.

Family Connections

Prepare a Take Home Backpack, which includes geometric solid activities for students to share with their families. You could include books on geometric solids, geometric solid sorting activity, etc.

Send home a letter to parents encourage families to go on a Family Geometric Solid Hunt

together. Family members can all draw pictures of the things they find on their hunt.

Assessment Plan

During the geometric solid sorting and graphing activity, observe students as they identify their object. Are they able to sort their object on their own? Are they looking at their classmates for help? Are they misidentifying their object? Make a note of any students who are struggling. During Math Centers, walk around and make notes of student behaviors, conversations, and any thought processes you observe. Note any areas of difficulty or mastery of geometric solids. Observe students and listen to the interaction and conversation they are having during the whole group discussion on geometric solids.

Bibliography

Research Basis

Andrews, A.G., (2004). Adapting manipulatives to foster the thinking of young children. *Teaching Children Mathematics*, 11(1), 15-17.

Children can use pattern blocks to investigate and predict how to combine shapes. By adding magnetic strips to the back of pattern blocks, a teacher found it easier and less frustrating for her young students to manipulate the blocks. The students were given more opportunities to learn about the geometric terms of flip, slide and turns.

Clements, D.H. (1999). Geometric and spatial thinking in young children. In *Mathematics in the Early Years*, ed. J.V. Copley, 66-79. Reston: VA: National Council of Teachers of Mathematics.

Passively looking at shapes does not help children formulate ideas about shapes. Children's ideas about shapes "come as children's bodies, hands, eyes... and minds...engage in action." Young children need to not only see and name shapes but to explore them and learn their parts and attributes. Manipulatives, especially solid manipulatives, help children learn about geometric shapes through their senses.

Oberdorf, C., (1999). Shape up! *Teaching Children Mathematics*, 5(6), 340-345.

The common misunderstandings young children have about geometry can be attributed to incorrect definitions of key vocabulary words and to a small number of "authentic experiences" with geometry. Manipulating objects, investigating objects and discussion about objects really help build children's understanding of geometry.

Authors

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