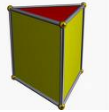


Tips for Helping at Home

• Questions to ask:

- What is a silhouette? How is it produced?
- What words can you use to describe solids?
- What things in the real world look like a _____ (sphere, cylinder, etc.)?
- What silhouettes can this triangular prism make?



• Activities you can do with your child at home:

• You and your child can set up a bright light (such as a reading lamp) in a darkened room, with a piece of paper taped to a wall. Take turns trying to draw your predictions of what kinds of shadows different objects will cast. Use objects with simple geometric shapes, like soup cans (cylinders), cereal boxes (rectangular prisms), and balls (spheres). You might want to select some objects with your child before playing and agree on what would be too easy or too hard.

• Similarly, you might make above-the-neck silhouettes of different family members using the same set-up (a bright lamp, paper taped to a wall, a darkened room). Afterward your child might like to see if she or he can match the different silhouettes to the people who posed for them.

Web Resources

You will find web resources at:

<http://www.dreamsbeginhere.org/static/aboutdcps/departments/acadprog/mathematics/index.asp>

Mathematical Emphasis

Investigation 1—Making and Visualizing Cube Buildings

- Developing concepts and language needed to reflect on and communicate about spatial relationships in 3-D environments
- Understanding standard drawings to 3-D cube configurations
- Exploring spatial relationships between components of 3-D figures.
- Developing visualization skills
- Starting to think about problems related to volume.

Investigation 2—Exploring Geometric Silhouettes

- Understanding how 3-D geometric solids project shadows with 2-D shapes (for example, how a cone can project a triangular shadow)
- Understanding geometric perspective
- Learning to visualize objects from different perspectives
- Integrating different views of an object to form a mental model of the whole object

Investigation 3—"How-To" Instructions for Cube Buildings

- Interpreting different types of instructions for building the cubes
- Evaluating the effectiveness of different forms of "how-to" instructions
- Developing visualization skills
- Integrating information given in separate views or presented verbally to form one coherent mental model of a cube building.

Investigation 4—The Cube Toy Project

- Interpreting different types of instructions for building the cubes
- Evaluating the effectiveness of different forms of "how-to" instructions
- Developing visualization skills
- Communicating effectively about three-dimensional objects.

Duval County Public Schools



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Investigations in Number, Data, and Space



Seeing Solids and Silhouettes Grade 4

3-D Geometry

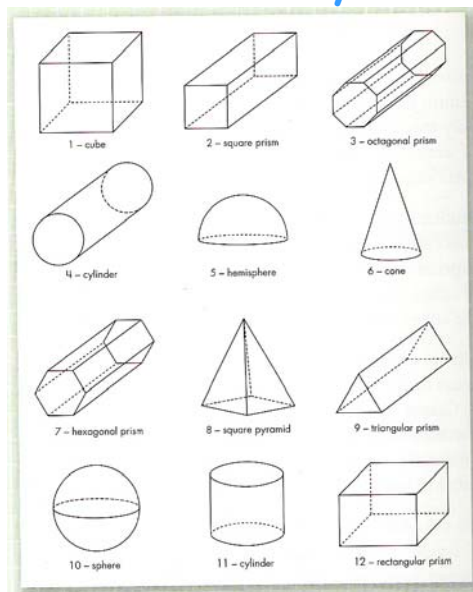
Unit Goals:

- Students develop spatial visualization skills, a part of geometry that is often neglected in elementary mathematics
- Students explore ways to pictorially represent solid shapes
- Students build cube configurations from pictures, mental images, and different types of building instructions.
- Students investigate silhouettes projected by geometric solids and explore what objects look like from different perspectives
- Students communicate about 3-D objects.

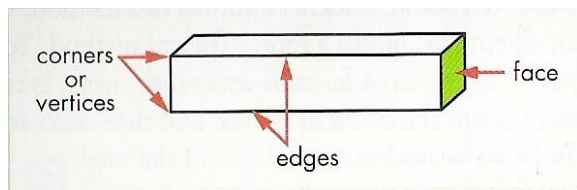
Proposed Time Frame:

3 weeks

Vocabulary



Geometric Solids—There are many types of geometric solids. Several, such as spheres, cones, and cylinders (Figures 4, 5, 6, 10, and 11 above) have curved surfaces. Others (Figures 1, 2, 3, 7, 8, 9, and 12) called **Polyhedra**, have only flat surfaces.



vertices—point where surfaces meet, corners

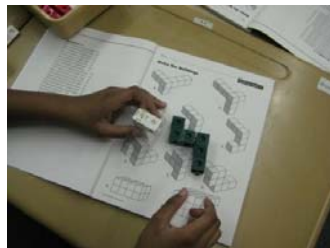
face—flat surfaces of a three-dimensional shape

edges—where two surfaces join, intersect.

Making and Visualizing Cube Buildings

During the first Investigation in this unit, students put interlocking cubes together to form cube buildings shown in drawings. They verbalize their strategies for building, and compare sizes of different structures.

Below are some examples of students cube buildings:



After students have completed this activity they are asked to briefly look at a picture of a cube building, and then construct it from memory by forming and inspecting a mental image of it. This activity gives students experience with visual organization and analysis of images, and more practice communicating about 3-D drawings and structures.

Battista, M. & Clements, D. Investigations in Number, Data and Space: Seeing Solids and Silhouettes. Dale Seymour, 1998.

Close to 100

Materials:

One deck of Numeral Cards
Close to 100 Score Sheet per player

Players: 1, 2, or 3

How to Play:

- Deal out six Numeral Cards to each player.
- Use any four of your cards to make two numbers. For example: 6 and 5 could make 65 or 56. Wild cards can be used as any numeral. Try to make numbers that, when added, give you a total that is close to 100.
- Write these two numbers and their total on the Close to 100 Score Sheet. For example: $42 + 56 = 98$.
- Find your score. Your score is the difference between your total and 100. For example: If your total is 98, your score is 2. If your total is 105, your score is 5.
- Put the cards you used in a discard pile. Keep two cards you didn't use for the next round.

6. For the next round, deal four new cards to each player. Make more numbers that come close to 100. When you run out of cards, mix up the discard pile and use those cards again.

7. Five rounds make one game. Total your scores for the five rounds. **LOWEST** score wins!

Score Sheet example: Score

Round 1: _____ + _____ = _____

Round 2: _____ + _____ = _____

Round 3: _____ + _____ = _____

Round 4: _____ + _____ = _____

Round 5: _____ + _____ = _____

Total Score _____