

Developmental Series Sample

2008 Edition

Objective 4: The student will demonstrate an understanding of the concepts and uses of measurement.

Knowledge and Skills Statement

(3.11) Measurement: The student directly compares the attributes of length, area, weight/mass, and capacity, and uses comparative language to solve problems and answer questions. The student selects and uses standard units to describe length, area, capacity/volume, and weight/mass.

Student Expectation

(F) The student is expected to use models that approximate cubic units to determine the volume of a given container or other three-dimensional geometric figure.

ACTIVITY

Volume Control

Materials

Volume Control one-inch cube pattern (enough to create a large number of cubes)
 Several different-sized, empty boxes (e.g., cereal boxes, shoe boxes, tea boxes)
 Scissors
 Glue or tape

Procedure

Collect boxes of various sizes. They should be at least an inch long on each side, and each side should measure a whole number of inches. Ensure the boxes are not too big, keeping in mind they will be filled with cubes. Use scissors and glue or tape to assemble the desired number of one-inch cubes, or students may assemble them over several days. Alternatively, plastic one-inch cubes can be used, if available, as can one-centimeter cubes (though, in this case, the discussion would need to be modified to accommodate metric units). The class needs at least enough cubes to fill the largest box.

Tell students volume is the amount of space something takes up. One way volume is measured is by counting the number of cubes that can fit in an object. Remind students cubes have the same length on every side. Show them a one-inch cube, and tell them it is one inch long on every side. It has a volume of one cubic inch. Tell students cubic inches and cubic feet are common customary units used to measure volume. Ask students for the volume of a cube that is a centimeter long on every side. Tell them cubic centimeters and cubic meters are common metric units. Demonstrate how cubic units are written (e.g., 3 cm^3 , 3 cubic centimeters).

Invite a group of students to go to the front of the room and fill one of the boxes with cubes. Students count the number of cubes it takes to fill the box. Point out



this is the measure of the box's volume in cubic inches. Ask students to count how high the box is, in cubes. Write that number on the board. Ask them to count how long and wide it is, and write those numbers on the board. Multiply the three numbers together using the volume formula to show another way volume can be calculated ($V = l \times w \times h$). Finally, use the dimensions on the board to build a model of the box with the cubes. Explain that this is another way to find volume. Invite other students to repeat this until every student has had an opportunity to participate.

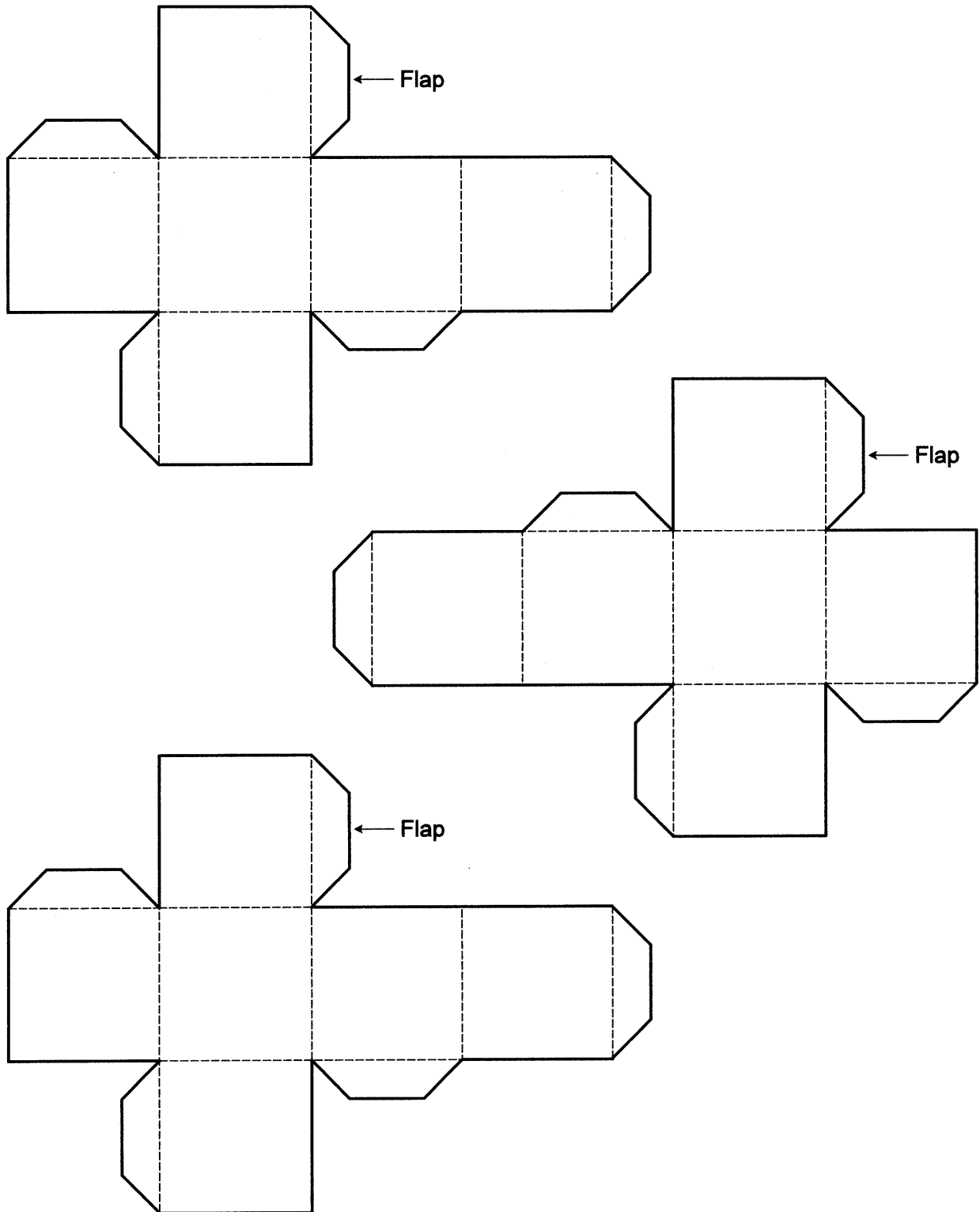
Variation

Students work independently or in pairs at their desks to measure volume, if enough boxes and cubes are available.



Volume Control One-Inch Cube Pattern

Cut along the solid lines. Fold along dashed lines. Glue "flaps" to insides of cube.



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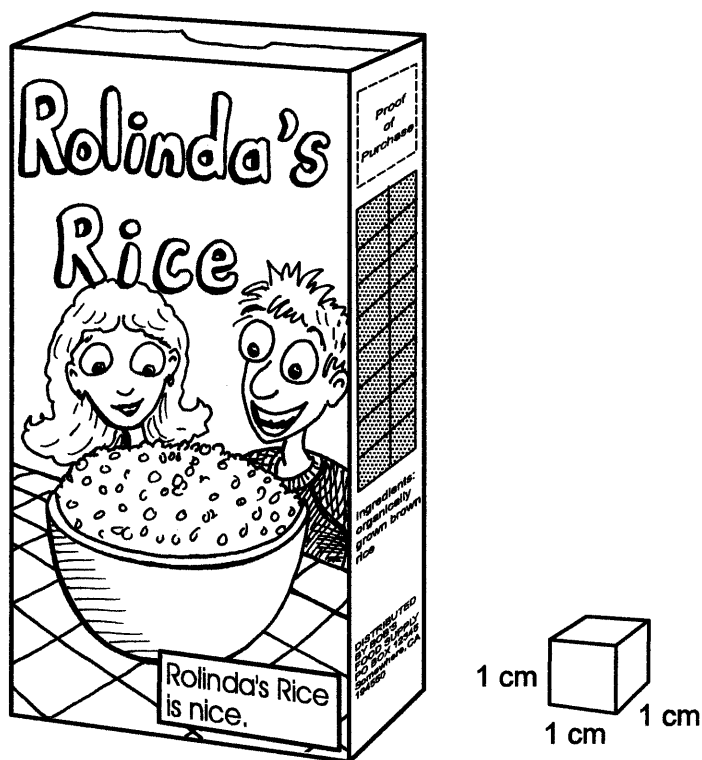
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(Question 1 of 6)

1 Look at the following picture.



Use the one-centimeter cube to estimate the volume of the rice box, in cubic centimeters. Which of the following is the best estimate of the volume of the rice box?

- (A) The rice box has a volume of about 1 cm^3 .
- (B) The rice box has a volume of about 10 cm^3 .
- (C) The rice box has a volume of about 100 cm^3 .
- (D) The rice box has a volume of about $1,000 \text{ cm}^3$.

