

## **Linking Cube Volume**

**STRAND:** Measurement and Geometry

**STRAND CONCEPT:** Volume and Surface Area

**SOL 7.4a**

### ***Remediation Plan Summary***

Students measure the surface area and volume of solid figures in order to rank them least to greatest. Students practice measuring square and cubic units, comparing and contrasting the processes.

### ***Common Errors and Misconceptions***

Students have difficulty with volume measurement. They treat three-dimensional figures as two-dimensional ones. Students have difficulty with creating the arrays that fill the prism. They confuse the volume with surface area and vice versa.

### ***Materials***

- Linking Cubes to make 3D solids
- Labeled plastic zip lock bags
- Copies of attached “Volume and surface Area” handout

### ***Introductory Activity***

- Display two solids made from linking cubes. One might be a rectangular prism while the other might be an irregular solid. Ask the students to sketch and compare these two solid figures. Ask: “Which has the greater surface area? Which has the greater volume? How can you tell?” Allow students to manipulate the two solids you made. Have them write down strategies in their math logs for determining surface area and volume as well as for comparing the surface areas and volumes of the two solids.
- Have students share their various strategies for determining surface area and volume. Ask them to decide which figure has the greater surface area and which has the greater volume. Reinforce that square units describe surface area and cubic units describe volume.

### ***Plan for Instruction***

1. Use linking cubes to create at least eight solids, including a cube, a rectangular prism that is not a cube, and several irregular solids. Place each one in a plastic zip-top bag, label the bags with letters, and place them in a prominent spot in the front of the room.
2. Give each student a copy of the attached “Volume and Surface Area” handout.

### *AR Remediation Plan – Volume and Surface Area*

3. Ask pairs of students to discuss how to rank the solids in the bags from least to greatest by volume. Have each pair work together to form a hypothesis and rank the solids by writing down the bag numbers in order.
4. Repeat step 3 for surface area.
5. Tell the class they are going to check their hypotheses by measuring. Give each pair of students one of the bagged solids, and challenge them to figure out how to measure the surface area of the solid by counting the number of square units covering its surface. Then, have them figure out how to measure the volume of the solid by counting the number of cubic units, or cubes, it contains. Instruct students to record their answers on the handouts.
6. Rotate the bags among the pairs of students every three minutes. After all solids have been measured by all pairs, have each pair share their measurement of the last solid they measured and explain their measurement strategy.
7. Have students arrange the bagged solids in order from least to greatest by volume. Next, have them rearrange the bags from least to greatest by surface area. Discuss what they notice about this process.

### ***Pulling It All Together (Reflection)***

Display a  $2 \times 3 \times 4$  rectangular prism made from linking cubes. Ask students to sketch this solid and explain in writing how to measure its surface area and volume. Also, ask them to explain in writing how measuring surface area and volume are similar and how they are different.

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**

Virginia Department of Education 2018

Name: \_\_\_\_\_

## Volume and Surface Area

1. Rank the linking-cube solids from least to greatest by volume. (Keep in mind that volume is measured by the number of *cubic units* making up the solid.)

<b>Least</b> <span style="font-size: 2em;">→</span> <b>Greatest</b>
<b>Solid:</b> _____

2. Rank the linking-cube solids from least to greatest by surface area. (Keep in mind that surface area is measured by the number of *square units* covering the surface of the solid.)

<b>Least</b> <span style="font-size: 2em;">→</span> <b>Greatest</b>
<b>Solid:</b> _____

3. Measure each solid, and record your data in the chart below.

Solid	Volume (cubic units)	Surface area (square units)	Rank L to G by volume	Rank L to G by surface area
A				
B				
C				
D				
E				
F				
G				
H				

4. Explain your method for measuring the volume of each solid.
5. Explain your method for measuring the surface area of each solid.
6. What surprised you about the final rankings of the solids?
7. Share one thing you learned while working with your partner on this problem.

