SUGAR CUBED

Understanding Volume

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Sugar Cubed
Understanding Volume

Skill Level
Beginner, 5th Grade

Learner Outcomes
The learner will be able to:
- Explain measurements of volume.
- Identify uses for calculating volume.
- Calculate volume for square and rectangular prisms.

Educational Standard(s) Supported
Math 5.MD.C.3

Success Indicator
Learners will be successful if they:
- Construct a rectangular prism showing volume and calculate the same prism using the formula.

Time Needed
30 Minutes

Materials List
- Sugar Cubes or Square Legos
- Pencil
- Paper
- Internet Access
- Whiteboard or Chalkboard

Introduction to Content

This lesson gives a hands-on demonstration of volume with sugar cubes. Students will group, add and multiply numbers to find volume using manipulatives.

Introduction to Methodology

This lesson uses modeling and hands-on approaches to aid comprehension of students. The lesson begins with assessing students' prior knowledge of fractions, progressing to independent addition and subtraction with like denominators.

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Terms and Concepts Introduction

Volume – the amount of space occupied by a three-dimensional object as measured in cubic units
Cube – a regular solid of six equal square sides
Unit Cube – a unit cube, more formally a cube of side 1, is a cube whose sides are 1 unit long. The volume of a 3-dimensional unit cube is 1 cubic unit, and its total surface area is 6 square unites.

Setting the Stage and Opening Questions

Introduce rectangular prisms and the concept of volume by asking students where they have seen rectangular prisms. Briefly discuss how we see volume in our everyday life.

Discuss how we observe volume. Point out that volume simply represents a measurement of a solid shape. Remember to be comfortable with this content to put students at ease and to instill confidence in your lesson instruction.

After sharing with the students, ask questions to both determine and assess prior knowledge.
- What is volume?
- How do we calculate volume?
  For a rectangular prism, length x width x height = volume.
- What is a cube?

Tell students, **"By the end of this lesson, you will be able to explain measurements of volume, identify uses for calculating volume and calculate volume for square and rectangular prisms.**

Experience

Using sugar cubes or legos, model a 2 x 4 x 3 rectangle for students. Explain that you can calculate the dimensions of the rectangular prism by counting and recording the length, width, and height. Ask the following questions and record the answers on the whiteboard or chalkboard.

- How many sugar cubes long is it? (Length)
- How many sugar cubes wide is it? (Width)
- How many sugar cubes high is it? (Height)

Substitute these recorded dimensions into the volume formula for a rectangular prism. To check the answer, simply take the prism apart and count the sugar cubes!

Instruct students to build a 4 x 3 x 3 rectangle together as a class so they understand how the process works. Repeat the process of calculating the volume. Then, ask students to build a rectangular prism of any size on their own. To ease into the concept, encourage them to start small and work toward building bigger models. Ask students to calculate the dimensions of their rectangular prisms and then check the answers by counting.

If the answer was correct, have students build a new model and try the formula again. If they got the answer wrong, help them check the calculations and see where the mistake occurred.

Share

Ask the students the following questions:

- What is meant by the term unit cube? *The volume taken up by 1 in x 1 in x 1 in cube*

- What other materials or forms could you use to demonstrate this idea?

Process

- What did you notice about the formula compared to the model?

- For which shapes could this be used?

Generalize

- What are some everyday situations where you might need to be able to find volume?

- Could you find the volume of all shapes using this method? Why or why not?

Apply

Present the students with some real-world problems to solve.
- How many boxes of the same size will it take to fill an enclosed truck?

- How many bags of sand will it take to fill a sandbox?

- Will a refrigerator fit into this space?

Supplemental Information
Educational Standards Met

5th Grade Math

Measurement and Data

5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.