

LEARN NC

Modeling volume

This activity helps the students see how the volume of something includes the third dimension (width or depth) which is different from area. This activity also helps the students "prove" that the volume formula actually works. Students will already know that the volume of a rectangular prism is found by multiplying the object's length, width, and height. By using the blocks as models of volume, the students should come to realize that volume can be calculated simply by multiplying the area of the base by the height of the rectangular prism. Thus, they will come to realize that there is no need to try and fill the entire box with the tiny 1cm cubes, they can simply fill the bottom (to see how many cubes are there) and figure out how many rows there will be and multiply.

A lesson plan for grade 8 Mathematics

BY ERIN FOERSTER

Learning outcomes

The students should learn the following:

- Volume of a rectangular prism can be calculated by multiplying the area of the base by the height of the particular object.
- Volume of rectangular prisms can also be found by filling them tightly/compactly with cubed blocks of various sizes (1cm, 1in, etc.)
- Cubed units are used for stating volume because there is an added dimension when you are calculating volume--depth.

Teacher planning

TIME REQUIRED FOR LESSON

90 Minutes

MATERIALS/RESOURCES

- 10 mini-cereal boxes (the single serving size)
- Big bucket of 1cm cube blocks (1000-2000 total)
- Ruler
- Pencil
- Paper

Learn more

RELATED PAGES

- [Chocolate!](#)
[Chocolate!](#)
[Chocolate!:](#) Using chocolate as a theme, students will become involved in reading, writing, math, word study/spelling and other developmentally appropriate (integrated) activities. The unit includes centers for the classroom along with whole group activities.
- [Water, water everywhere...:](#) This is a good beginning of the year lesson to

Pre-activities

The students should know:

- Area of a rectangle is found by multiplying its length by its width.
- Volume of a rectangular prism is calculated by multiplying the figure's length by its width by its height.

Activities

1. Before class begins, divide the class into groups of 3-4 students. Review the concepts of area and volume in reference to rectangles and rectangular prisms. Afterward, the students should be told their groups and given a designated spot.
2. Each group should receive a cereal box, several large handfuls of the 1cm cube blocks, and a ruler.
3. Instruct the students to find the volume of the box first by using their ruler (finding the length, width, height and multiplying) and then by filling it, tightly/compactly, with the 1cm cube blocks. Try not to tell the students exactly how to do this. They need to try different methods and figure out the one that works best for them.
4. Circle the room and answer students' questions. Initially, the students may become frustrated because it is difficult to get the cm cube blocks tightly into the cereal box. Give suggestions.
5. Some groups will begin to realize that they do not need to actually fill the entire box with the 1cm cube blocks. Some students may ask the question, "Can't we just see how many cover the bottom, count them, and figure out how many rows will be needed to get all the way to the top? Then can't we multiply the number of blocks on the bottom by the number of rows needed?" Encourage the students further and ask them to explain why that would work.
6. At this point, other groups may notice this strategy as well. Ask the students to head back to their seats. Once there, discuss what they have learned. For example, talk about the fact that it was not necessary to fill the entire box once you realize that you can find the area of the base and simply multiply that by the height. Have some of the students explain what they began to realize once they were filling up their box.
7. Also, discuss how the 1cm cube blocks "prove" that the volume formula works. Let's say the students found, by using their ruler and the volume formula, that the cereal box had a volume of 224 cubic centimeters. That exact amount of 1cm cube blocks would fit into that cereal box, therefore "proving" that the volume formula has calculated correctly. Those groups that discovered how to quickly use the blocks to find their volume would have already discovered this, those groups who did not will benefit from the discussion. You may need to do some demonstrations for the entire class.

review fractions, decimals, geometry (the number of degrees in a circle and drawing a circle with a protractor), graphing, and metric measurement. This lesson is a good way for students to meet their peers while working cooperatively in a task-oriented group. The watermelon you will be using for the activity is also a good start-of-the-year treat. Be sure to get an extra watermelon or two to share at the end of the activity.

- Measurement centers: During a center-based activity groups of students will rotate around the classroom practicing non-standard unit of measurement concepts. In addition, they will have the opportunity to familiarize themselves with measuring with rulers and will participate in a lesson about capacity.

RELATED TOPICS

- Learn more about area, cooperative learning, hands-on, mathematics, measurement, and volume.

Assessment

Administer the attached [quiz](#). Because there are only 4 questions on this quiz, each question should be worth at least 5 points. I assign partial credit when I can and recommend doing that for this quiz as well.

Supplemental information

The teacher must be familiar with using 1cm cube blocks and should try this activity before doing it with the students. As I mentioned, the blocks do fit into the cereal boxes, but you must put them in a certain way and you must work slowly and precisely.

COMMENTS

Although there are many steps for this lesson plan, it is really very simple. I planned this lesson because my students were having a difficult time understanding the abstract concept of volume. They needed this hands-on activity in order to believe that you could simply multiply length, width, and height to get the volume of something. It also clearly showed them the relationship between area and volume. Good luck with this! Have fun. The kids will love it.

North Carolina Curriculum Alignment

MATHEMATICS (2004)

Grade 8

- **Goal 2:** Measurement - The learner will understand and use measurement concepts.
 - **Objective 2.01:** Determine the effect on perimeter, area or volume when one or more dimensions of two- and three-dimensional figures are changed.

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