



Classroom Teacher Preparation

Scientific Practices 5: Measuring Volume

Please use the following to prepare for the next SfS lesson.

Description:

By exploring different methods to measure an object's volume, students will gain a deeper understanding that volume is the space a substance occupies or contains. Students will get a chance to measure the volumes of at least three different 3D figures and explore measuring volume using unit cubes, rulers (& formulas if known), and/or water & graduated cylinders. Students will then share their results and discuss the pros and cons of each method. Older students will also get a chance to use volume by displacement with marbles.

Lesson Objectives – SWBAT (“Students Will Be Able To...”):

3rd-8th

- Measure and record volume for three-dimensional objects using different tools (including unit cubes, graduated cylinders, and rulers)
- Evaluate the pros and cons of using different tools/methods to measure volume

Mathematics Core Idea

- (3rd) Solve problems involving measurement and estimation
- (5th) Geometric measurement: understand concepts of volume
- (7th) Solve real-life and mathematical problems involving angle measure, area, surface area, and volume

Science & Engineering Practice (SEP)

Planning and Carrying Out Investigations

- (3rd-5th) Evaluate appropriate methods and/or tools for collecting data.
- (3rd-5th) Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.

Analyzing and Interpreting Data

- (6th-8th) Consider limitations of data analysis (e.g., measurement error), and/or seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials).

Crosscutting Concept (CCC)

Scale, Proportion, and Quantity

- (3rd-5th) Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

Preparation:

This is intended to be an introductory lesson on volume and methods of measurement.



Room Set Up for Activities:

Students will work in pairs at their desks to measure the volume of small objects.

Safety:

No special safety precautions are needed.

Related Modules:

This lesson may be taught as a part of a sequence or group of related modules on **volume** and **density**. Related modules include:

Physics 17: Density - Students explore density with a boat-related challenge and a polydensity bottle. Students construct boats out of aluminum foil to float in small ponds.

Scientific Practices 11: Mean, Median and Mode - Students explore different ways to analyze data including calculating the mean, median, and mode for a given data set. Students will collect measurements of height for students in the classroom to use as their data set.

For other module sequences and groups, look here: www.sciencefromscientists.org/sequences

Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state:

www.sciencefromscientists.org/standards/

Lessons are matched to both national NGSS and local state standards.

After Our Visit:

Extend this lesson by practicing some more volume with Minecraft!

Access this Extension activity by visiting the Classroom Post found on our website at sciencefromscientists.org/cohorts. Use the name of your school/cohort and password to log in.

To help Evaluate, check out our Open Response questions online at sciencefromscientists.org/open-response-questions. They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

Additional Resources:

- A volume game: https://www.mathplayground.com/cube_perspective.html
- Video explaining shapes and their attributes (2:48): <https://mass.pbslearningmedia.org/resource/kids-lab-activity-pegpluscat-shapes-attributes/shapes-and-their-attributes/>