

1. Explain how you can find out the volume of a solid object, such as a small rock, using only water and either a measuring cup or a graduated cylinder.

Scoring Guide

Score & Description

Complete

Student correctly describes how to determine the volume of a solid object using water and a measuring cup or graduated cylinder. Comparison or change in volume of water should be explicit.

Method A:

- a. Pour some water into the graduated cylinder
- b. Record the water level
- c. Then put the rock in the graduated cylinder
- d. Record the water level again
- e. The difference between the first and second volume measurements is the volume of the rock

Method B:

Spillage Responses = Fill cup (to the top), add rock, catch the water that overflows in separate container, and measure the overflow. Overflow = volume of the rock.

Partial

Student gives the first four of the steps involved in measuring the volume of a solid object, but does not compare the change in water level or mentions three or fewer of the steps but does discuss the change in water level.

Method A:

Procedure (steps a-d above) or volume calculation (step e)

OR

Method B:

Procedure, including measuring the overflow or stating the overflow equals the volume of the rock

Unsatisfactory/Incorrect

Student demonstrates no understanding of how to use water and a graduated cylinder to measure volume.

Complete - Student Response

- 1 Explain how you can find out the volume of a solid object, such as a small rock, using only water and either a measuring cup or a graduated cylinder.

You can find the volume of a solid object using only water and either a measuring cup or a graduated cylinder. First you put water in the graduated cylinder, not up to the top but half way. Mark down the number the water reaches and place the small rock in. Record the number you get and subtract the number before the rock was put in from the number after the rock was put in. What you get is the rock's volume.

- 1 Explain how you can find out the volume of a solid object, such as a small rock, using only water and either a measuring cup or a graduated cylinder.

Fill the cylinder with water until the top. I would then drop in the rock. Water would flow out. Then I would pour out the water into another cylinder without the rock. Then I ^{would} see how much water is missing and measure it.

Scorer Comments:

The first response describes a complete displacement method (method A) for measuring the volume of a solid object. The second response describes an overflow method (method B).

Partial - Student Response

- 1 Explain how you can find out the volume of a solid object, such as a small rock, using only water and either a measuring cup or a graduated cylinder.

First you measure the water in the cylinder, then place the rock in. Find out how high the water raised, Subtract the increase from the original level of the water & you have the volume.

- 1 Explain how you can find out the volume of a solid object, such as a small rock, using only water and either a measuring cup or a graduated cylinder.

The volume can be determined by submerging the object in a cupful of water. The change in the water level is equal to the volume of the object.

Scorer Comments:

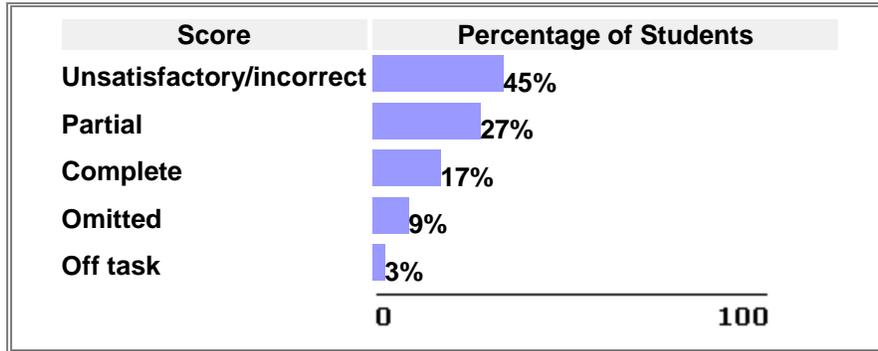
The first response describes a correct method, but the subtraction of volume readings is incorrect. The second response provides an incomplete method, but correctly recognizes that the amount of water displaced is the volume of the object.

Unsatisfactory/Incorrect - Student Response

- 1 Explain how you can find out the volume of a solid object, such as a small rock, using only water and either a measuring cup or a graduated cylinder.

You can use a measuring cup and water to find the volume of a small rock. You can fill the measuring cup with water and put the rock into it. By knowing how much water is in the cup before the rock went in, you can find the volume of the rock.

2005 National Performance Results



Note:

- These results are for public and nonpublic school students.
- Percentages may not add to 100 due to rounding.

The Fields of Science: *Physical Sciences* (Sub content classification: *Matter and Its Transformations*)

Knowing and Doing Science : *Scientific Investigation*

The Fields of Science

Physical Sciences

This question measures basic knowledge and understanding of the following:

Knowing and Doing Science

Scientific Investigation

Scientific investigation probes students' abilities to use the tools of science, including both cognitive and laboratory tools. Students should be able to acquire new information, plan appropriate investigations, use a variety of scientific tools, and communicate the results of their investigations.