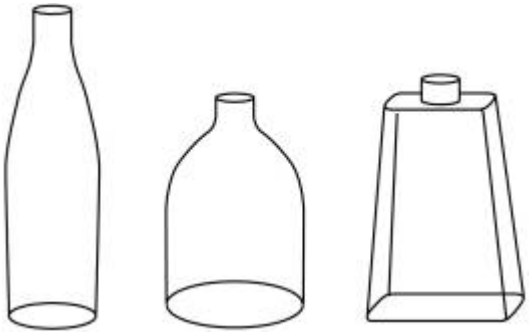
1. You are going to the park on a hot day and need to take some water with you. You have three different bottles, as shown in the picture below. You want to choose the bottle that will hold the most water. Explain how you can find out which bottle holds the most water.



Question 1

Scoring Guide

Score & Description
Complete Student demonstrates an understanding of how to measure and compare the volumes of three different bottles by outlining a method for finding which bottle holds the most water. a. The bottles are filled with water and the water is measured in a graduated cylinder, measuring cup, or other measuring device to see which bottle holds the most water. b. Using a displacement method, each bottle is filled with water. Then placing each bottle into a measured volume of water, the amount of displaced water is measured. The bottle displacing the most water has the greatest volume. c. Filling one bottle with water and pouring it into the other bottles, the one that holds the most water can be determined. d. Weighing the bottles with and without water, the bottle that holds the greatest weight in water can be determined. e. Student fills each bottle at the same constant rate to determine which takes longest to fill.
Partial Student demonstrates some understanding, but does not state a specific method. a. Water is put in the bottles and then measured (weighed, checked). b. Student fills each bottle to determine which takes longest to fill, without mentioning that they are filled at a constant rate.
Unsatisfactory/Incorrect Student response is based on the shape or height of the bottle, not on its volume. Student may also compare the time required to pour water out of each bottle.

Complete - Student Response

1 You are going to the park on a hot day and need to take some water with you. You have three different bottles, as shown in the picture below. You want to choose the bottle that will hold the most water. Explain how you can find out which bottle holds the most water.

You put water in and then poor it into a measuring cup and see which has the most.

Scorer Comments:
The student response specifies a correct method to determine the volume of each bottle using an appropriate measuring device. The water is poured from each bottle into a measuring cup.

1 You are going to the park on a hot day and need to take some water with you. You have three different bottles, as shown in the picture below. You want to choose the bottle that will hold the most water. Explain how you can find out which bottle holds the most water.

You can get a couple cups that are the same size, poor water in the cups and poor the water in the jugs and wich ever one takes the most cups can fit more water.

Scorer Comments:
The student response specifies a correct method to determine the volume of each bottle using an appropriate measuring device. The water is poured from cups of uniform size into the bottles. The volume of each bottle in terms of the number of cups is compared.

Partial - Student Response

1 You are going to the park on a hot day and need to take some water with you. You have three different bottles, as shown in the picture below. You want to choose the bottle that will hold the most water. Explain how you can find out which bottle holds the most water.

You could find out witch bottle holds the most water by measuring it with water in it

Scorer Comments:
The student response states that the bottles holding the water need to be measured, but does not provide a method.

1 You are going to the park on a hot day and need to take some water with you. You have three different bottles, as shown in the picture below. You want to choose the bottle that will hold the most water. Explain how you can find out which bottle holds the most water.

measure the bottle or see which one fills up the fastest.

Scorer Comments:
The student response provides two options. The first method, measuring the bottle, is inappropriate because there is no reference to measuring the amount of water that the bottle holds. The second method, partially correct, refers to measuring how long it takes to fill up each bottle, however, the method is not complete because uniformity of the rate of water flow is not specified.

Unsatisfactory/Incorrect - Student Response

1 You are going to the park on a hot day and need to take some water with you. You have three different bottles, as shown in the picture below. You want to choose the bottle that will hold the most water. Explain how you can find out which bottle holds the most water.

The one in the midle because it is wider than the other ones.

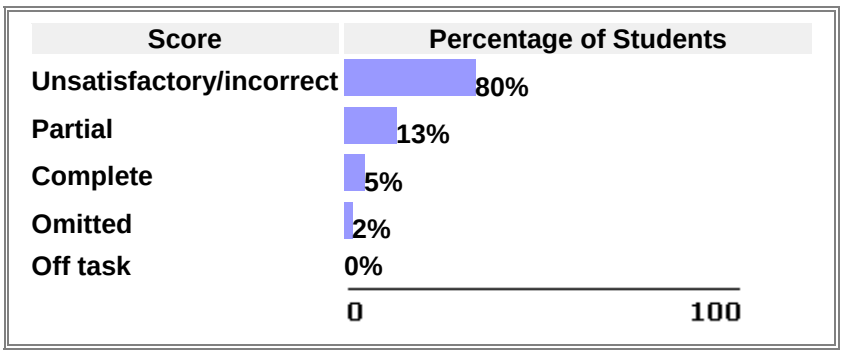
Scorer Comments:
The student response refers only to the width of the bottle and does not provide a method of finding out how much water each bottle holds.

1 You are going to the park on a hot day and need to take some water with you. You have three different bottles, as shown in the picture below. You want to choose the bottle that will hold the most water. Explain how you can find out which bottle holds the most water.

First I would fell them all up then pour them out the one that it last is the largest.

Scorer Comments:
The student response provides an inappropriate method of determining how much water each bottle holds. The rate of pouring water out of the bottles is not easily controlled, so comparing the time it takes to empty each bottle is not an accurate method of comparing their volumes.

2000 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.