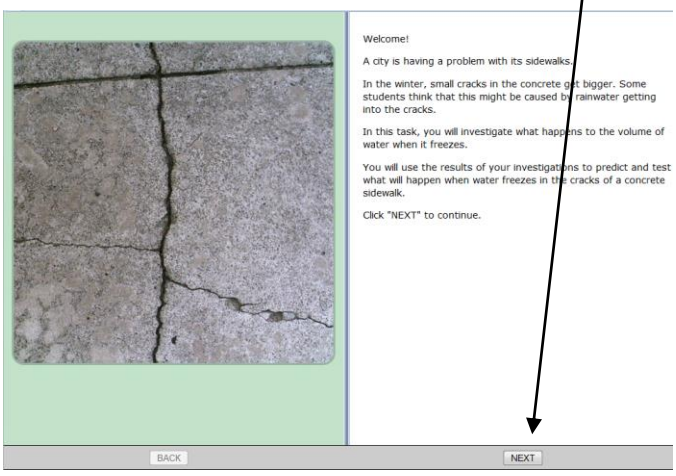
Student Activity Guide for NAEP Interactive Science Task: Cracking Concrete

http://www.nationsreportcard.gov/science_2009/ict_tasks.asp

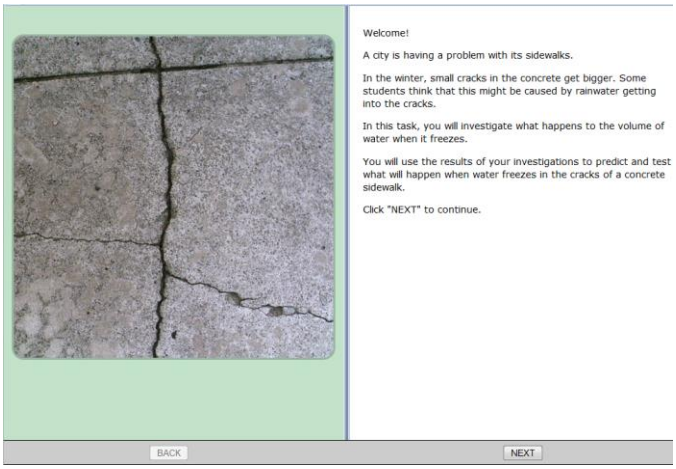
Select "Take this task" under Cracking Concrete.

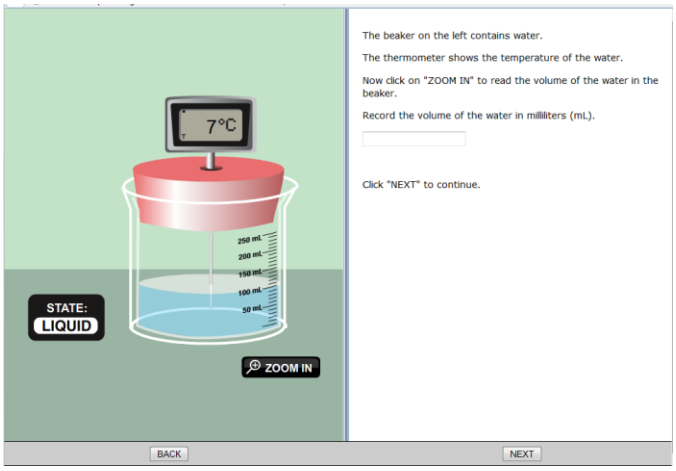
In this task, you will investigate what happens to the volume of water when it freezes. Then you will use the results of your investigations to predict and test what will happen when water freezes in the cracks of a concrete sidewalk.

Read the information on each screen. Select "NEXT" when you have finished reading the information on the screen. Screen shots of each screen are on this worksheet.



This task comes from the National Assessment of Educational Progress (NAEP), commonly referred to as "the Nation's Report Card." NAEP is the largest nationally representative and continuing assessment of what America's students know and can do in various subject subjects. For more information, go to http://www.nationsreportcard.gov/.



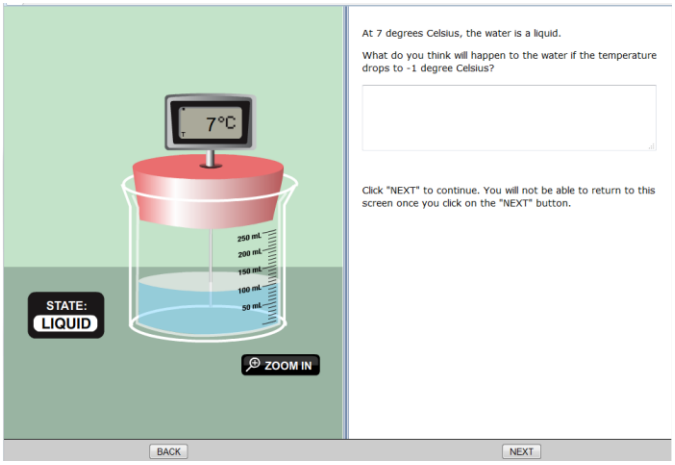


When there is a question, write your answer on this worksheet, not on the computer screen. If you answer directly on the computer, your answer will not be saved. You do not need to answer anything directly on the computer. After answering, select "NEXT" to continue.

Question 1

Record the volume of the water in milliliters.

_____

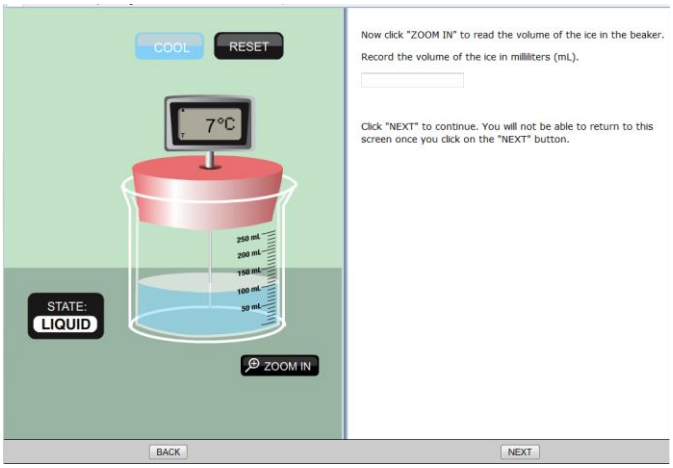


Question 2

At 7 degrees Celsius, the water is a liquid. What do you think will happen to the water if the temperature drops to -1 degree Celsius?

_____

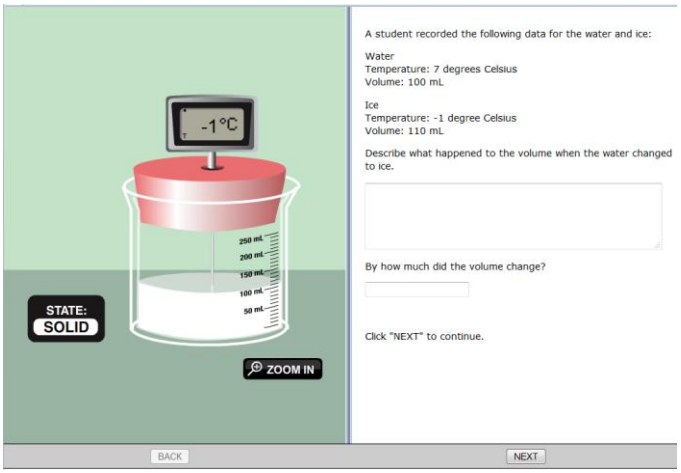
_____



Question 3

Record the volume of the ice in milliliters (mL).

_____



Question 4

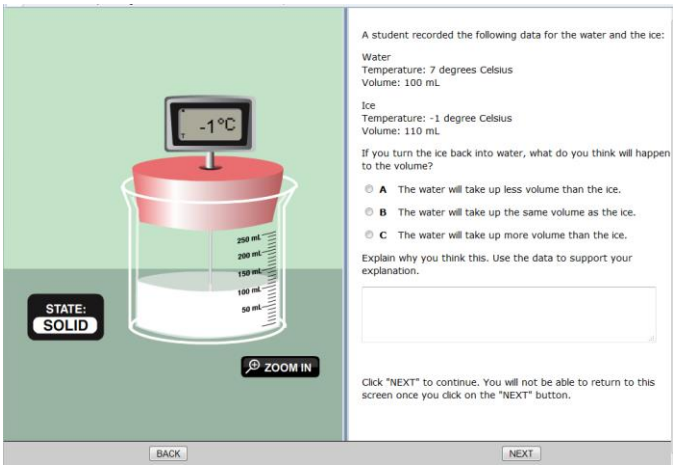
Describe what happened to the volume when the water changed to ice.

_____

_____

By how much did the volume change?

_____



Question 5

A student recorded the following data for the water and the ice:

Water Temperature: 7 degrees Celsius
Volume: 100 mL

Ice Temperature: -1 degree Celsius
Volume: 110 mL

If you turn the ice back into water, what do you think will happen to the volume?

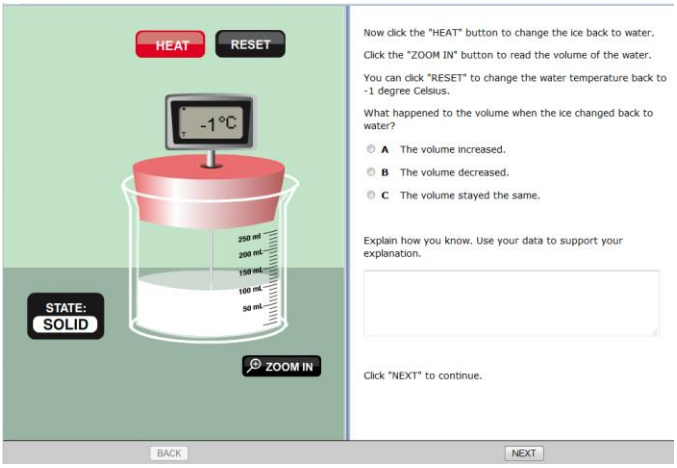
A. The water will take up less volume than the ice.
B. The water will take up the same volume as the ice.
C. The water will take up more volume than the ice.

Explain why you think this. Use the data to support your explanation.

_____

_____

_____



Question 6

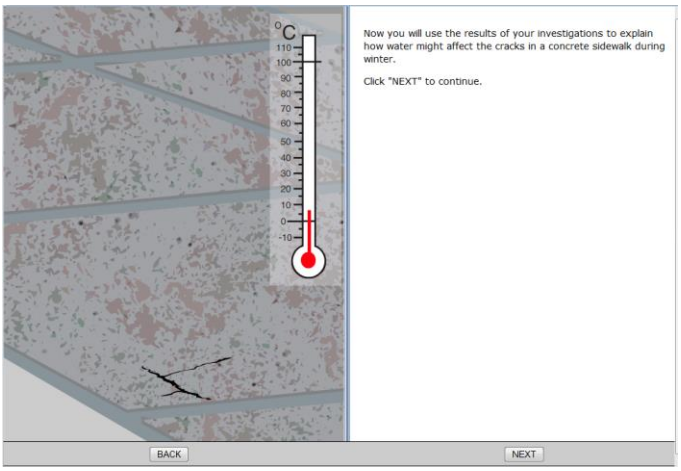
What happened to the volume when the ice changed back to water?
A. The volume increased.
B. The volume decreased.
C. The volume stayed the same.

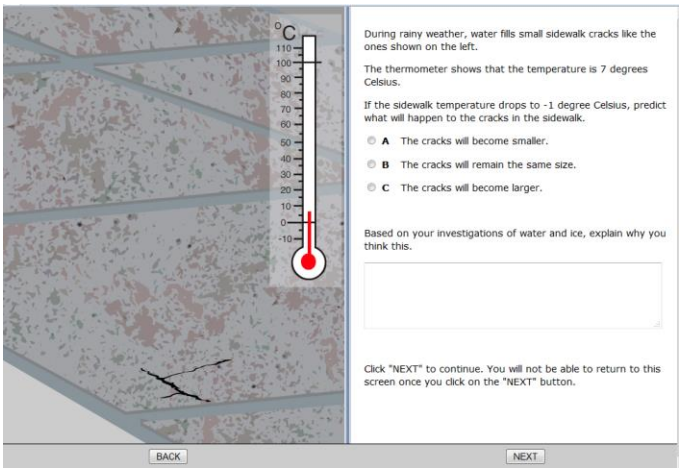
Explain how you know. Use your data to support your explanation.

_____

_____

_____





Question 7

During rainy weather, water fills small sidewalk cracks like the ones shown on the left.
The thermometer shows that the temperature is 7 degrees Celsius.

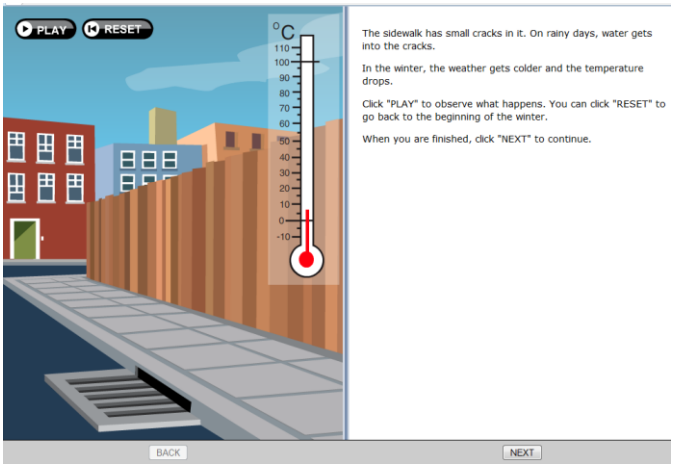
If the sidewalk temperature drops to -1 degree Celsius, predict what will happen to the cracks in the sidewalk.
A. The cracks will become smaller.
B. The cracks will remain the same size.
C. The cracks will become larger.

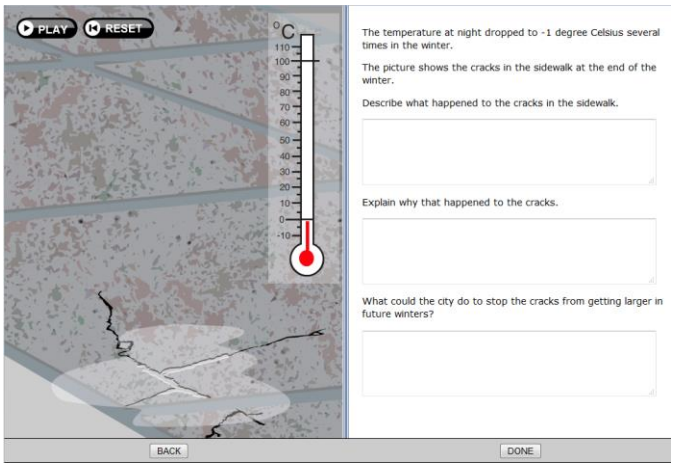
Based on your investigations of water and ice, explain why you think this.

_____

_____

_____





Question 8

The temperature at night dropped to -1 degree Celsius several times in the winter.

The picture shows the cracks in the sidewalk at the end of the winter.
Describe what happened to the cracks in the sidewalk.

_____

_____

_____

Explain why that happened to the cracks.

_____

_____

_____

Question 9

What could the city do to stop the cracks from getting larger in future winters?

_____

_____

_____

_____

_____

_____