Is It Icy Water or Watery Ice?

You are familiar with ice and water coexisting—ice on a pond or ice cubes in your drink. But where is the point at which water turns into ice, or ice into water? In this activity you will study the borderline between water and ice.

Procedure

1. Choose one person in your team to run the experiment, one to be the timekeeper, and one to be the recorder.
2. Fill one beaker with ice water and one beaker with room-temperature water. Put ice in the 16-ounce foam cup.
3. Make an ice/salt bath in your 8-ounce foam cup. Put 2 tablespoons of ice water in the cup, add a teaspoon of salt, and stir well with your plastic spoon. Add ice in halfway up the cup and stir well again.
4. Add 3 centimeters of room-temperature water to your test tube. Place the thermometer in the water for 1 minute and then record the temperature in the data table on your "Experiment Data Sheet" handout. Hold the test tube at the top as you do this so that your hand does not increase the temperature of the water.
5. Place the test tube all the way into the foam cup, and have the timekeeper start timing when you do so. Don't let any ice get in the test tube.
6. Record the temperature every 15 seconds. Once each minute, the student running the experiment should quickly pull out the test tube to see if any ice has formed, and the recorder should note the tester's observations.
7. At the end of every 3 minutes, the recorder should add more ice to make up for any ice that has melted. Ice can be added all the way to the top of the cup.
8. Continue the experiment for 12 minutes.
9. When you finish, put the test tube in warm water to melt the ice and free the thermometer.
10. Using your graph paper, graph your results with time on the *x*-axis and temperature on the *y*-axis.

Questions

Write your answers on a separate sheet of paper.

1. What was the temperature of the flat section in your graph?
2. How long did the temperature stay the same? Why do you think it remained the same?
3. Why do you think the temperature began to fall again at the end of the flat section?
4. What can you conclude about the temperature when you had a liquid-only state? A solid-only state? What about when both states coexisted?
5. How would the shape of the graph change if you started with more water in the test tube? Explain your reasoning.