

Matter, Heat and Insulation

Name _____

List three structural designs that you think the hot beverage thermos has that enables it to keep hot chocolate warm for a long time.

- 1.
- 2.
- 3.

Materials: Using these ideas and materials you will design a container to keep your water hot. You will need one plastic cup, hot water, bubble wrap, cotton balls, wool, other insulating materials, a roll of tape and a thermometer, per group

Initial Container Design: Draw the container below as you will be using it for your first experiment. The hot water, entire container and insulation materials must be included and labeled.

Evidence Section

Data Table (your evidence from the experiment): Measure and record the temperature of water in the container every five minutes. While waiting, work through the scenarios that follow this data table.

| Container # | Temp Start | Temp 5 min. | Temp 10 min. | Temp 15 min. | Temp 20 min. | Temp 25 min. |
|-------------|------------|-------------|--------------|--------------|--------------|--------------|
| Trial #1 | | | | | | |
| Trial #2 | | | | | | |

Redesign your second container with its insulation and sketch it here. Label all the changes that you are going to make. Write a statement describing how the structure of differing materials allows them to function as insulators.

Now run your experiment again and enter your data into the table above.

Reasoning

1. Which container maintained the original or starting temperature for the longest period of time? Why do you think this was the case?

2. Which container maintained the original or starting temperature for the shortest period of time?

Why do you think this was the case?

Explanation: Write a claim statement providing evidence (data) to support the claim. You must include reasoning and describe why the structure of your insulating materials functioned as an insulator. Include phrases such as "heat transfer," "heat energy," "temperature" and "heat loss" in your explanation.