**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd:\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Energy Transfer Lab Investigation: Operation Ice Cube**

**Purpose**: In order to learn more about heat transfer, insulators and conductors we will complete an ice cube competition

|  |  |  |
| --- | --- | --- |
| 1 Small Cup/1 Large Cup | **“Ice Preserver” Options (Choose 3)** | |
| 1 Plastic Baggie | Fabric | Paper Towels |
| 1 Ice Cube | Construction Paper | Aluminum Foil |
| Scale | Notebook Paper | Wax Paper |

**Materials:**

**Procedure:**

1. Choose 3 items from the “ice preserver” materials list. *NO ADDTIONALS, DELETIONS, OR SUBSTITUATIONS ALLOWED*. Once your team has selected and received their materials, they are **FINAL**!

**Day One**: With your team, create a design for an ice preserver. **Your goal is to conserve the ice as long as possible.**

* 1. Your design must include the following…
     1. A detailed and labeled sketch/drawing of your ice preserver.
     2. An explanation of why you chose your specific design (including materials used). Be able to defend your choices!
     3. An explanation of why you **did not** choose the remaining materials. Be able to defend your choices!
  2. Include a hypothesis of amount of energy loss after 15 minutes (i.e. in terms of mass). Explain your reasoning.
  3. List your independent and dependent variables.
  4. Your final design MUST be verified and approved by one additional group and the teacher.

1. **Day Two:** Set up your “ice-preserver” in the large cup provided. All teams will receive an ice cube in a small bag. ***THE ICE CUBE MUST STAY IN THE BAG AT ALL TIMES. IF, AT ANY TIME, THE ICE CUBE IS REMOVED FROM THE BAG, YOUR TEAM IS DISQUALIFIED FROM THE COMPETITION.***
2. Allow your device to remain undisturbed for 15 minutes.
3. During the 15 minute “wait time” bring your small cup to one of the scales in the room and find its mass (in grams). Record this data.
4. After the 15 minute time frame, carefully pour any water from your bag into the small cup and determine the mass. Record this data.
5. Clean your station completely. It should look better than before you started.

**Operation Ice Cube Data Sheet**

|  |  |
| --- | --- |
| **Labeled Diagram** | |
| **Explanation of materials & Design** | |
| **Explanation of materials rejected** | |
| **Hypothesis (if/then statement)** | **Independent Variable:**  **Dependent Variable:** |
| **Approval of team (names of students)**  **Approval of teacher** | |

|  |  |
| --- | --- |
| **Mass of empty cup (grams)** | **Mass of Water + cup (grams)** |

Analysis: (must be written in complete sentences)

1. How much water melted from your ice cube by the end of the investigation? **Hint:** this will be a calculation.
2. Describe how heat transferred in your “ice preserver.”

1. What would you do differently if you did this experiment again? Be specific.
2. Describe how you would create an “ice super melter.” Be specific and explain your reasoning. A drawing may help you explain.