

## Ice Cube Race

### Student Objective

The student:

- will be able to explain energy transfer in common terms
- will know several methods of energy transfers and several energy sources.

<b>Key Words:</b> absorption energy source energy transfer
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### Materials (per group):

- small block of ice (100 ml water frozen in paper cup and then removed)
- plastic bag with zip seal
- graduated cylinder
- Science Journal

### Time:

1 class period

### Procedure

1. Divide class into groups of two students per group.
2. Explain procedure to class:
  - each group will place a 100 ml ice cube in a baggie
  - they will have 5 minutes to transfer as much energy as they can to their cube (to melt it). They may place the baggie anywhere they want or do anything to it, as long as the bag remains sealed.
  - at the end of 5 minutes each group will measure the amount of water in their bag using a graduated cylinder
3. Pass out materials and begin timing.
4. Help students as needed during the five minute interval.
5. After students measure their water, lead a discussion on which methods produced the most water emphasizing what type of energy transfer is occurring in each case and what was the energy source used.
6. Students should complete their Science Journal.

### Further Research

1. Have the students do a second trial using what they learned from the first trial. Graph the results of both trials to see the class improvement.
2. Discuss the energy transfers as far back as possible (to the Sun if possible)
3. Make ice cream and discuss the energy transfer involved.
4. Place pieces of screen on the tops of mason jars. Divide class into groups of 'sun' and

‘shade’. The sun groups place their jars in the sun and the shade groups place theirs in the shade. Put a 100 ml ice cube on the top of each jar. The groups measure the amount of water in the containers every three minutes and graph their results (return the water to the jar after each measurement). As a class average the interval amounts together for the sun trials and for the shade trials. Plot these averages on a two line graph.

### **Related Reading**

- Energy: Heat, Light, and Fuel by Darlene R. Stille, Paul Ohmann PhD, Susan Kesselring, and Sheree Boyd (Picture Window Books, 2004)  
Energy: Heat, Light, and Fuel introduces children to the ways that energy changes forms, such as when food is used for movement. The text includes questions, examples, and explanations.

### **Internet Sites**

**<http://www.sciencenetlinks.com/interactives/powerplay.html>**

American Association for the Advancement of Science, Science Netlinks’ Power Play site. Power Play is an interactive activity that helps users learn about harnessing energy from different power sources.

## Ice Cube Race

			.1	.2	.3	.4	.5	.6
Nature of Matter	Standard 1	SC.A.1.2-		X				
	Standard 2	SC.A.2.2-						
Energy	Standard 1	SC.B.1.2-		X		X	X	X
	Standard 2	SC.B.2.2-						
Nature of Science	Standard 1	SC.H.1.2-		X	X	X		
	Standard 2	SC.H.2.2-						
	Standard 3	SC.H.3.2-						

**Benchmark SC.A.1.2.2** - The student knows that common materials can be changed from one state to another by heating and cooling.

### Grade Level Expectations

The student:

*Third*

- understands that physical changes in the states of matter can be produced by heating and cooling

*Fifth*

- knows that matter is conserved during heating and cooling.

**Benchmark SC.B.1.2.2** -The student recognizes various forms of energy.

### Grade Level Expectations

The student:

*Third*

- knows different forms of energy.

**Benchmark SC.B.1.2.4** -The student knows the many ways in which energy can be transformed from one type to another.

### Grade Level Expectations

The student:

*Third*

- knows that heat can be produced by chemical reactions, electrical machines, and friction

*Fourth*

- knows ways that energy can be transformed.

**Benchmark SC.B.1.2.5** - The student knows that various forms of energy can be measured in ways that make it possible to determine the amount of energy that is transformed.

**Grade Level Expectations**

The student:

*Third*

- uses a variety of tools to measure the gain or loss of energy

*Fourth*

- extends and refines use of a variety of tools to measure the gain or loss of energy

*Fifth*

- extends and refines use of a variety of tools to measure the gain or loss of energy.

**Benchmark SC.B.1.2.6** - The student knows ways that heat can move from one object to another.

**Grade Level Expectations**

The student:

*Third*

- knows that when a warmer object comes in contact with a cooler one, the warm object loses heat and the cool one gains it until they are both at the same temperature

*Fifth*

- understands that convection, radiation, and conduction are methods of heat transfer.

**Benchmark SC.H.1.2.2** - The student knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results.

**Grade Level Expectations**

The student:

*Third*

- plans and investigates an experiment that defines a problem, proposes a solution, identifies variables, collects and organizes data, interprets data, and presents findings
- uses various kinds of instruments to collect and analyze information

*Fourth*

- plans and investigates experiments in which hypotheses are formulated based on cause and effect relationships.

**Benchmark SC.H.1.2.3** - The student knows that to work collaboratively, all team members should be free to reach, explain, and justify their own individual conclusions.

**Grade Level Expectations**

The student:

*Third*

- knows that to work collaboratively, all team members should be free to reach, explain, and justify their own individual conclusions.

*Fourth*

- works collaboratively to collect, share, and record information for a scientific investigation.

**Benchmark SC.H.1.2.4** - The student knows that to compare and contrast observations and

results is an essential skill in science.

**Grade Level Expectations**

The student:

*Third*

- knows that to compare and contrast observations and results is an essential skill in science

*Fourth*

- knows that comparisons between experiments can be made when conditions are the same.

### Ice Cube Race

**absorption** - the process of light energy changing into heat energy when light falls on an object and is taken into it

**energy source** - object or material that produces energy by changing it from one source to another

**energy transfer** - the transformation from one type of energy into another

**Ice Cube Race**

1. How much water did you have at the end of 5 minutes? \_\_\_\_\_

2. What did you do to your baggie to help melt the ice? \_\_\_\_\_

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3. In your class, what method seemed to melt the ice the best? \_\_\_\_\_

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4. If you could repeat the experiment, what would you like to try this time?

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