



Title: Birthday Cake

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Theme: Even simple food items require a large amount of energy input.

Objectives:

- Students will understand the different inputs of energy required for making a birthday cake or other simple food item.
- Students will measure and combine ingredients to bake a cake (optional).

Duration: 1 hour

Age Range: 4th-8th Grade

Materials:

- Student notebooks
- Pencils
- Cake Recipe
- Cake Ingredients
- Cake Pan
- Measuring Cups
- Mixing Bowl
- Mixing spoon
- Whiteboard or posterboard
- Markers

Background:

March 24, 2014 is the 25th anniversary (birthday) of the *Exxon Valdez* Oil Spill. It was a tragic event that we do not want to celebrate - but instead, remember for the lessons we can learn. Our oil resources are very precious as is shown by the many oil products we use just to make a cake. Hopefully, by working together we can conserve energy, reduce our need for oil, and prevent more oil spills.

Toast, a classic movie about the energy needed to produce a simple piece of toast, complements this lesson very well. It is available through Bullfrog

Films: <http://www.bullfrogfilms.com/catalog/t.html>

Preparation:

If you do not have access to an oven at school, you will probably want to prepare the cake beforehand. If you do have access, however, baking the cake as a class is an excellent way to reinforce basic math, measuring, and cooperation skills. Preheat the oven before you begin class.

Introduction:

Begin by brainstorming about the ingredients for a cake, or by breaking the class into small groups to brainstorm a list of ingredients. Compile these lists on the whiteboard or posterboard.

Activities & Procedures:

From the list, discuss what happens to these ingredients in order to make them available to the consumer. Choose one ingredient to demonstrate to the class. For example: sugar= grow cane - harvest - store - transport - process - package - transport - shelve - sell. Break students into small groups to work on the other ingredients.

Once the lists have been compiled, have each group place the appropriate amount of their ingredient into the bowl. Mix well, and pour into the cake pan. Place the cake in the oven and set the timer.

Now, revisit the energy involved at each step of the food production process. For example:

- 1) sugar: grow cane - oil and gas for equipment, planting for growing, and fertilizing.
- 2) harvest - gas and oil to run harvesting equipment, human power.
- 3) storage - electricity to light, heat or cool.

Outline one ingredient as an example then break into small groups. Assign each group 1-4 ingredients. Have groups share the energy inputs that went into creating each food item. Remind students that most of this energy comes from oil and natural gas. In the United States, 1 calorie of food requires an average of about 8 calories of energy to produce.

Wrap-Up:

Take the cake out of the oven and eat it! Ask the students if it tastes different now that they know how much oil it took to make the cake. Discuss ways a cake could be made with less energy. Brainstorm ways that students can reduce the energy required to produce, process, and transport their food. Have students describe their feelings and reactions in their journals. If the students want to, share their comments.

Evaluation:

Assess student reflections in their notebooks as a formative assessment. A successful cake will serve as an assessment of students' ability to follow directions and measure appropriately. Evaluate student lists for completeness and comprehension. Observe student cooperation and participation during group work.

Birthday Cake

Concepts of Physical Science: Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.

SB2

Students develop an understanding that energy appears in different forms, can be transformed from one form to another, can be transferred or moved from one place or system to another, may be unavailable for use, and is ultimately conserved.

The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by:

[6] SB2.1 recognizing that energy can exist in many forms (i.e., heat, light, chemical, electrical, mechanical)

[7] SB2.1 explaining that energy (i.e., heat, light, chemical, electrical, mechanical) can change form

[8] SB2.1 identifying the initial source and resulting change in forms of energy in common phenomena (e.g., sun to tree to wood to stove to cabin heat)