# Workshop 5
# Energy in Food

Interviews with children, scientists, and people on the street present the wide range of ideas concerning food and energy that teachers encounter in learners. Simple explanations through demonstrations and real-world examples explore how chemical potential energy is stored in food and then in our bodies, and how it is converted into kinetic energy when it is needed.

This program presents the scientific definition of *calorie,* a word often heard in connection with food, and shows that the process of "burning calories" is not so different from what happens when a fire burns. The program also explores photosynthesis, the process by which plant cells capture and use the energy of sunlight.

# On-Site Activities

## Getting Ready (30 minutes)

### Developing a Common Understanding

Before you discuss the homework you did for the last session, take a few minutes to write down the definition you used for "energy content" and "nutritional value" when you ranked the food items. Save these for the discussion at the end of the following activity.

### There Is More to Nutrition Than Calories

For your homework, you were asked to evaluate the following list of food items for energy content and nutritional value.

Apple

Potato

Slice of pizza

Serving of broccoli

Candy apple

Hamburger

Bag of candy

1. With a partner, discuss the rationale for your order, and try to come to consensus on your rankings.

2. As a group, develop one set of rankings that represent the judgement of all the participants. (Make sure that you all agree on the definitions of "energy content" and "nutritional value" that you wrote at the beginning of the session.)

3. Finally, consider two more items, a glass of water and a glass of soda. Where would they fall on your consensus lists both for energy content and nutritional value?

## Watch the Video (60 minutes)

As you watch the video, consider the following questions and answers:

| | |
|---|---|
| 1. Where do we get energy? | ***All of our energy for life comes from food.*** |
| 2. How do we get energy from food? | ***Digestion breaks food down to nutrient molecules. Nutrient molecules then move to all the cells in the body. The process of respiration releases all the energy stored in these molecules.*** |
| 3. Which foods give us the most energy? | ***Foods high in fat contain the most energy.*** |
| 4. Where does food get energy? | ***The Sun is the original source of all the energy in our food.*** |

# On-Site Activities, cont'd.

## Going Further (30 minutes)

### How High a Staircase Can You Climb?

1. If all the energy in the food you consume could be transformed into useful work, how high a staircase could you climb? If that energy went directly into carrying you up the stairs, then the work you do while climbing the stairs equals the energy in the food eaten.

2. To make the calculation, you will need two pieces of information: your weight (in pounds) and the total calories you need for your body size and activity level. Select your appropriate calorie intake and enter it below along with your approximate weight.

**Calorie Intake:**

Most women, some older adults: about 1,600 calories

Active women, most men: about 2,200 calories

Active men: about 2,800 calories

Your weight (in pounds) _____

Total calories required _____

3. To do your calculation, you will use the equation work = force x distance, where the work you do comes from the food energy you take in. The force is simply your weight in pounds and the distance is the height of the stairs. A conversion factor has been put into the equation so you can calculate the height in feet.

$$\frac{\text{(calories consumed) x (3088)}}{\text{your weight}} = \text{height of the stairs (in feet)}$$

How high a flight of stairs could you climb that day (in feet)? _____

4. If these stairs went up a building that was 10 feet per story, how many stories would you be able to climb that day? _____

5. Discuss your results with your group. Is this is a realistic number?

6. How does this height compare to Mount Everest or other well-known mountains?

| | | |
|---|---|---|
| Mt. Everest | 29,035 ft. | 8,850 m. |
| Mt. McKinley | 20,320 ft. | 6,194 m. |
| Mt. Kilimanjaro | 19,563 ft. | 5,963 m. |

7. If you don't actually do the equivalent of climbing a tall mountain each day, where does your excess energy go? Discuss your answer with others in your group.

# For Next Time

## Homework Assignment

### The Power of Household Appliances

1. Choose one room in your house that contains at least five electrical appliances. Make a list of all the appliances in the room and record the watts of power generated by each appliance. You can get the number of watts from the back of the appliance. If the power is not listed on the appliance, write down the current (in amps) that is on the back of the appliance and convert this into watts.

To convert amps to watts, multiply the number of amps by 120—the number of volts used by most appliances. Large appliances like ovens or air conditioners might use 220 volts but if you are unsure, use 120.

2. Record the amount of time that the appliance is on in a 24-hour period. Be sure to record this in hours, not minutes (e.g. record 0.5 h rather than 30 min.).

| Appliance | Power (in W) | Total time in use (in h) |
|---|---|---|
| | | |
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### Materials Needed for Next Time

Bring your household appliances list to the next workshop session.