

Comparing the Fat Content of Foods

Purpose

To compare the fat content of common foods.

Process Skills

Predict, observe, measure, communicate, collect data, interpret data, draw conclusions

Background

Fat is one of the important **nutrients** of a healthy **diet**. While too much fat can hurt your body, you need some fat in order to stay healthy. Your brain, **cells**, nerves, lungs, eyes, immune system, and heart all need fat in order to work properly. Fat cells store **vitamins**, cushion organs, and help maintain body temperature. Much of your energy comes from your body burning fat.

Nutrition labels often list the four main categories of dietary fats found in foods: *saturated fat*, *trans fat*, *polyunsaturated fat*, and *monounsaturated fat*.

Saturated fat is found mostly in food from animals, including meat, eggs, and dairy products. Trans fats are often found in baked and fried commercial

foods. Polyunsaturated and monounsaturated fats are primarily found in oils that come from vegetables, nuts, and seeds. Two types of polyunsaturated fats are *omega-3 fatty acids* (found in many fish, as well as in walnuts and flaxseeds), and *omega-6 fatty acids* (found in many vegetable oils, nuts, and seeds).

To stay healthy, it is recommended that all fats combined should make up no more than 20 to 35 percent of your total daily calories and you should eat the fat types in a proper balance. Health experts suggest that you eat saturated and trans fat sparingly. Some low-fat or fat-free foods wind up containing a high amount of fat when cooked or prepared with fatty oils. Many people are careful about how much fat and which kinds of fat they consume, both when eating at home and when eating out.

Time – about 1 hour

Grouping – Small groups

Materials

(per group)

- Data Sheets 1 and 2
- Placemat copied on printer paper
- plastic knife
- paper plate
- wax paper
- 6 foods for testing (e.g., cookies, chocolate chips, peanuts, plain and buttery popcorn, doughnut, plain tortilla chips, nacho chips, cheese puffs, marshmallow cereal treat, slices of cheese, slices of deli meats, slices of fruit)
- clock, wristwatch, or stopwatch
- warm location or warm lamp

Optional Materials

- small cylindrical object
- paper towels
- digital camera

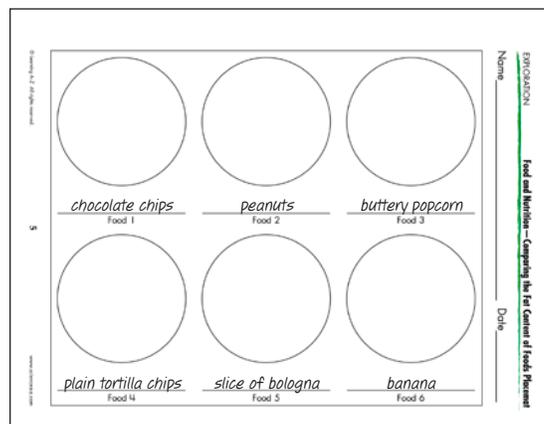
Procedure

Prediction: In this activity, you will place six foods on paper for 30 minutes and observe the stain each food leaves on the paper. You will use the stain to estimate which of the foods has the greatest fat content and which has the least. As a group, select six foods you would like to use; see the Materials list for suggestions. Then list the six foods on Data Sheet 1.

Discuss what you know about the ingredients of each food as well as some of its properties. Make a group prediction about which food will stain the paper the most, due to its fat content, and which will stain the paper the least. Complete the *Predictions* on Data Sheet 1.

! Safety: Since several people will handle the foods in this activity, do not eat any foods that have been handled.

1. Get a copy of the Placemat from your teacher and write your names on it. The Placemat provides six blank circles. Alternatively, use a small cylindrical object (e.g., a paper cup, a jar lid) to draw six equal-sized circles on paper towels, making sure none of the circles are too close together. Below each circle, label the name of one of the foods you have chosen to observe (see sample).



2. Prepare a sample of each food large enough to fill one circle on the paper. As you prepare each food, set it on a piece of wax paper until timing begins. For foods with a nutrition label, save the container or wrapper for use in step 10.
 - If a food is *larger than the circle*, set it on the paper plate and either break off pieces (if the food is firm) or carefully use a plastic knife (if the food is soft) to reduce the size of the food to closely match the size and shape of the circle.
 - If a food is *smaller than the circle*, gather enough pieces of that food to fill one circle. If necessary, crush the food into small bits so that the food will contact as much of the surface of the circle as possible.

- Prepare to start timing for 30 minutes, either by recording the starting time of day on your data sheet or by being ready to start a stopwatch.



- Choose a warm spot, such as a sunny windowsill or a counter under a warm lamp. Set the paper in this spot.

! Safety: Keep all paper and food a safe distance from the lamp, and *never* leave the lamp unattended.

Set each food within its circle on the paper, filling each circle as much as possible without spilling into any other circles (see sample in Figure A).

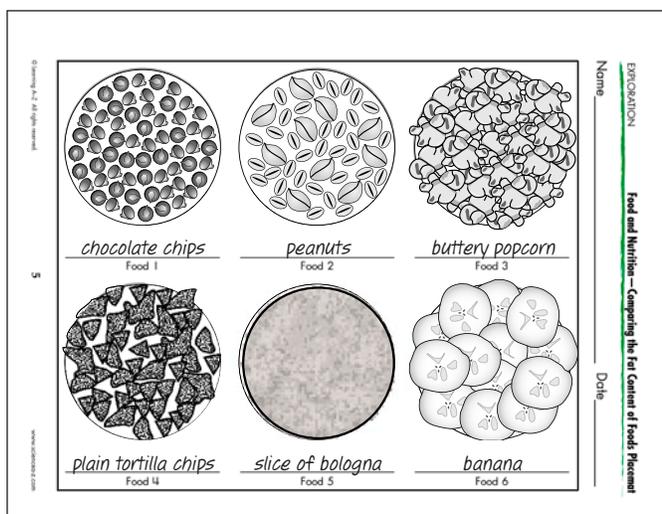


Figure A

- Start timing for 30 minutes. Clean up the preparation materials, after which your teacher will instruct you on what else to work on while you wait. During this time, do not disturb the foods on the paper.
- After 30 minutes, remove and discard all the foods from the paper. You might need to use the plastic knife to scrape off some of the foods. Observe the circles by holding the paper up to the light. On Data Sheet 1, describe the stain (if any) for each food. Also, fill in the blank circles on the data sheet with an accurate drawing of the stain made by each food. Finally, estimate which of the six foods contained the most fat and rank them from 1 to 6 on your data sheet, with 1 being the food you estimate to contain the *most* fat and 6 being the food with the *least* fat. (If a digital camera is available, take a picture of the Placemat so you can compare these results with later results.)
- As a group, review your predictions from Data Sheet 1 and discuss whether or not they turned out to be correct. Also, discuss why the results turned out the way they did. If any of the results surprised your group, discuss why you think they turned out the way they did.

8. Some of the staining you observed in step 6 may have been caused by a food's *water* content rather than its *fat* content. To judge how much of the stain was actually due to fat, you can let the water evaporate off the paper, leaving behind only the stain that was made by the fat. Complete the *Predictions* on Data Sheet 2. Then set your paper in the warm spot again, or hang the paper with tape so that air will flow around it (see sample in Figure B). Record the starting time or start a stopwatch. Once again, your teacher will instruct you on what to work on while you wait.
9. After 30 minutes have passed, observe the circles again. Complete Data Sheet 2 in the same manner that you completed Data Sheet 1. (If a digital camera is available, take a picture of the paper so you can compare these results with the earlier results.) Compare the results with those of Data Sheet 1 and discuss as a group which of the stains changed the most after evaporation and why.
10. For all the foods that came in a commercial wrapper or container, review the fat content listed on each food's nutrition label. Compare your rankings with the actual fat content per serving listed on the various labels. Then discuss as a group why your estimates may have been different from the actual fat content.
11. As a group, discuss which of the foods might be healthier choices than others for a person trying to reduce the amount of fat in his or her diet. You might also consider the types of fat listed on the nutrition label for each food. (See the Background section on page 1 for information on types of fat.)

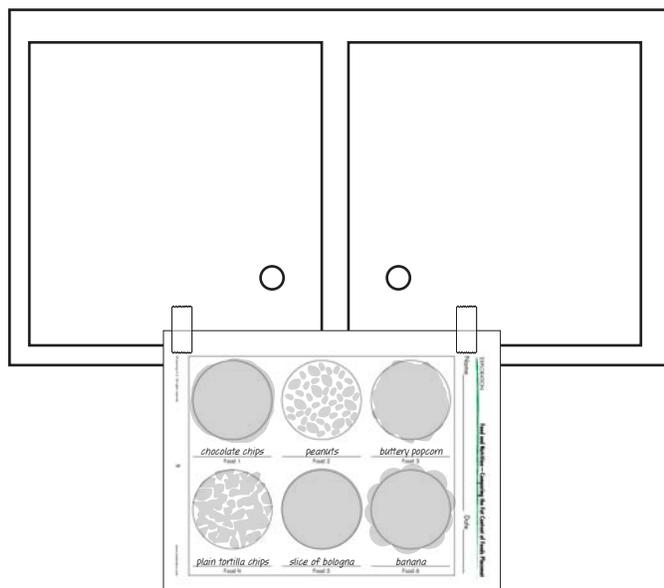
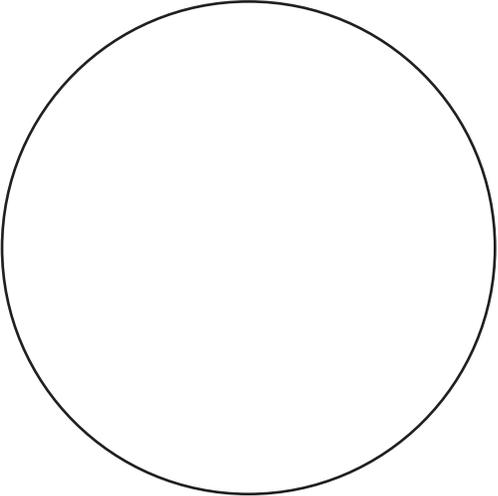
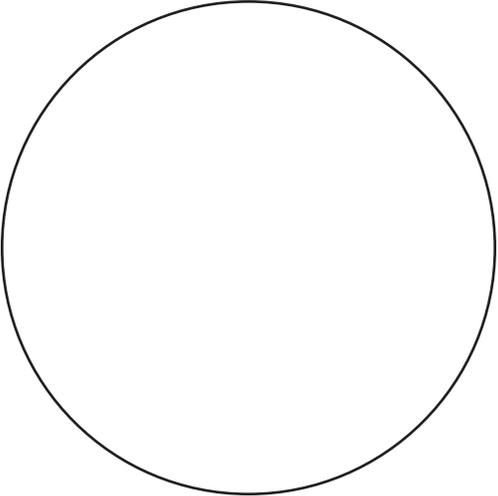
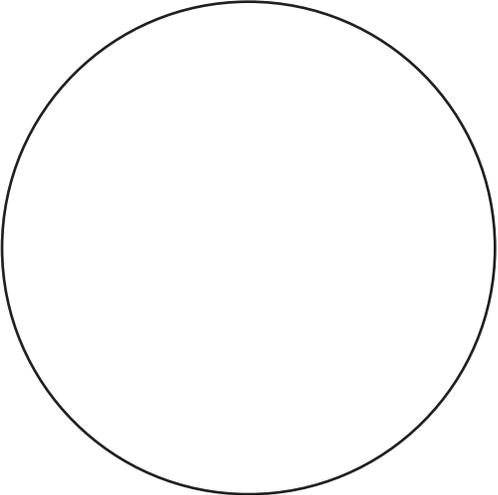
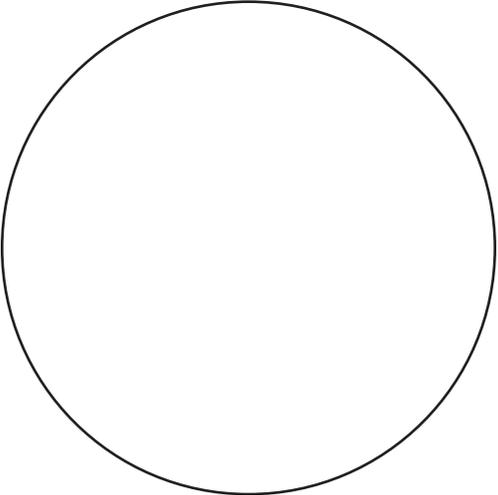
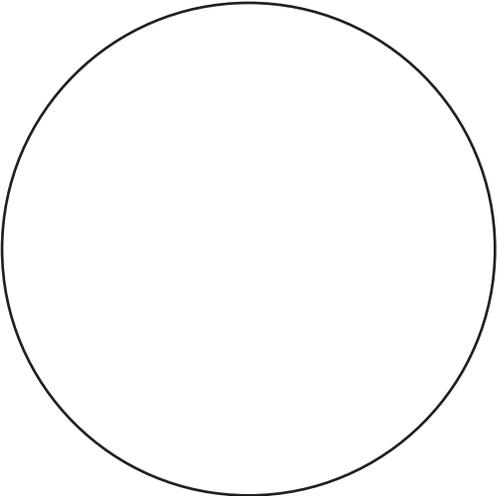
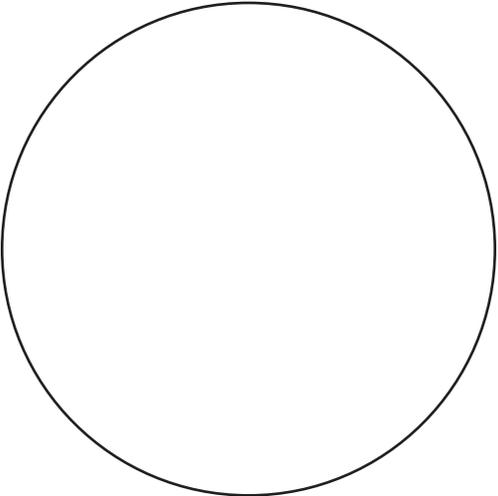


Figure B

Name _____ Date _____

	Food 1		Food 4
	Food 2		Food 5
	Food 3		Food 6

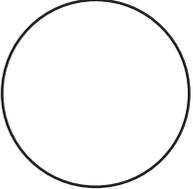
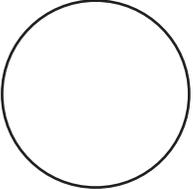
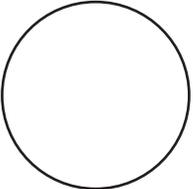
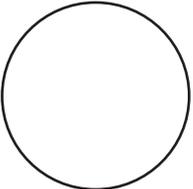
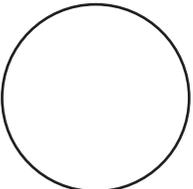
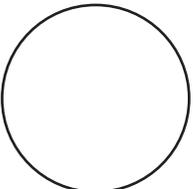
Name _____ Date _____

Predictions: Which food will stain the paper the *most* due to its fat content, and which food will stain the paper the *least*, after the foods have sat on the paper for 30 minutes?

Most: _____ Least: _____

Collect Data

Starting Time: _____

Name of food	Description of stain on paper	Drawing of stain on paper	Estimated ranking of fat content
			
			
			
			
			
			

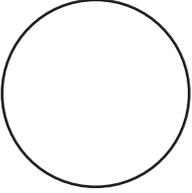
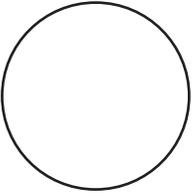
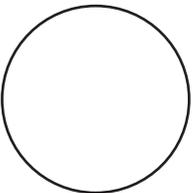
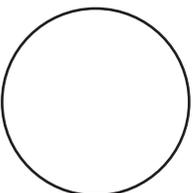
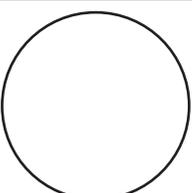
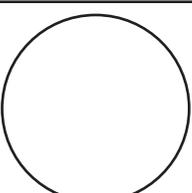
Name _____ Date _____

Predictions: Which stain will change the *most* due to evaporation, and which stain will change the *least*, after the stained paper has dried in a warm spot for 30 minutes?

Most: _____ Least: _____

Collect Data

Starting Time: _____

Name of food	Description of stain on paper	Drawing of stain on paper	Estimated ranking of fat content
			
			
			
			
			
			

Name _____ Date _____

Analyze Data

1. Which food stained the paper the *most* when left on the paper for 30 minutes?
Why do you think this was so?

2. Which food stained the paper the *least* when left on the paper for 30 minutes?
Why do you think this was so?

3. Which food's stain changed the *most* when the food was removed and the paper was left to dry for 30 minutes? Why do you think this was so?

4. Which food's stain changed the *least* when the food was removed and the paper was left to dry for 30 minutes? Why do you think this was so?

5. Based solely on the results of this activity, what kinds of foods seem to contain the *most* fat, and what kinds of foods seem to contain the *least* fat?

Comparing the Fat Content of Foods

TEACHING TIPS

These process activities will help students understand that organisms require food to produce energy. Plants are able to make their own food through the process of photosynthesis, but animals must eat plants, animals, or a combination of both. Foods provide varying amounts of important nutrients. By completing these activities, students may come to appreciate the importance of establishing a diet made up of foods that provide a healthy balance of nutrients.

SET-UP AND PROCEDURES

- Before students test the food items themselves, you may want to conduct your own investigation so that you will be able to judge whether students' food selections will yield observable results and whether the results on their data sheets are reasonable.
- Remind students to break large or oddly shaped food items (e.g., tortilla chips, peanuts) into very small pieces as necessary to cover the circle on the Placemat. Smaller pieces allow for greater surface contact with the paper and allow more accurate comparisons among the various foods.
- During food preparation, instruct students to quickly transfer the foods from the paper plate to wax paper so the paper plate does not absorb too much of the fat.
- Decide in advance where groups will set their Placemats in an undisturbed, warm spot. It may be interesting to let different groups try the exploration by setting their Placemats in different locations and comparing results.
- Depending on the warmth of the spot in which the papers are placed, it may not be necessary for students to wait the full 30 minutes, or it may be necessary to wait longer than 30 minutes. Plan other activities for students to work on during each of the two waiting periods.
- Discuss the importance of allowing the moisture to evaporate off the paper, which identifies how much of each stain was caused by fat as opposed to water content.
- If using cooperative groups, assign jobs for each student within each group. Examples include getter, recorder, food preparer, Placemat manager, and reporter.
- Reinforce relevant vocabulary terms (e.g., *nutrients, fat, lipids, health*) throughout the exploration.

 SAFETY

- Do not let students eat the food samples, as several people will handle the foods in this activity.
- If using a lamp, remind students that the bulb may become very hot. All paper and food should be kept a safe distance from any lamps, and students should not touch the bulbs. Lamps should never be left unattended.

MATERIALS

- It may not be necessary to purchase foods just for this activity; use what you and/or students already have. You might ask several volunteers to each bring in a sample of a different kind of food; if so, request that they bring enough of that food for all groups to use. It may be helpful to pre-measure enough of each food sample to fit onto a Placemat circle for each group and to place it in a sealed baggie.
- When possible, select foods with nutrition labels so that students can compare their subjective observations with actual nutritional data.
- Have extra materials available in case of spills.
- It may be helpful to provide a cutting board for food preparation.
- Groups may need to use everyday objects to weigh down their Placemat to keep it from moving or flipping over.
- If using lamps as a heat source, choose lamps with incandescent bulbs (as opposed to fluorescent bulbs, which emit very little heat).
- Have students discard all food samples they remove from the Placemat.
- Placemats should not be recycled because of the fat stains.
- To reduce the cost of making copies, you can have students draw circles of equal size on paper towels. Students may find it interesting to compare how well different surfaces (e.g., printer paper, paper towels, cardboard) absorb fat from the foods.

EXTENSIONS AND VARIATIONS

- *Variation/Inquiry Science:* Repeat the exploration, but this time ask some groups to test snack items advertised as “low fat” and other groups to use the traditional version of the same snack. Do foods that are advertised as “low fat” produce less of a stain?
- *Variation/Inquiry Science:* As a demonstration or activity with close adult supervision, help students explore the fat content of various cooked meats (e.g., lean vs. regular ground beef vs. ground turkey). Safely heat the meats in separate pans on a burner or in a microwave. Then filter the meat through cheesecloth, allowing the fat to drain through. Ask students to measure the fat from eat type of meat and discuss the results.
- *Research/Technology:* Let students take a close-up picture of each stain using a digital camera. Load these images onto a computer and have students create a digital slideshow to present their results.

- *Research/Technology:* Using projected data sheets or butcher paper, combine and record the data collected by all groups on Data Sheets 1 and 2. Use this aggregate data to lead a discussion about the results of the exploration. Then use a graphing program to visually display the results of this exploration. Add another set of data to represent the true fat content, as shown on the nutrition label of each food.
- *ESL/ELL:* Have students create a dictionary or word wall in which each letter of the English alphabet begins a type of food. Challenge students to add an estimate of the fat content of each food between 1–10, with 10 being the fattiest. Examples: Apple: 1 (extremely low fat); Butter: 10 (extremely high fat).
- *Home Connection:* Have students take blank Placemats home and test various foods. Challenge students to find foods with very low and very high fat content. Invite students to share their results with the class.
- *Environment:* If your school composts for a garden, place appropriate foods from this activity in the compost pile.
- *Field Trip:* Visit the school cafeteria or a nearby restaurant, and ask the manager to discuss the fat content and additional nutritional values of various school lunches. If allowed, use samples from school meals and repeat the exploration to compare various foods.
- *Research:* See Using the Internet in the *Unit Guide* for suggested websites to extend the learning.

ANSWER KEY

Refer to the suggested responses below for Data Sheets 1 and 2. Students should complete Data Sheet 1 after the foods have sat on the Placemat for 30 minutes. Students should complete Data Sheet 2 after removing the foods from the Placemat and letting the water evaporate off the paper for 30 additional minutes (or until dry).

EXPLORATION **Food and Nutrition—Comparing the Fat Content of Foods Data Sheet 1**

Name _____ Date _____

Predictions: Which food will stain the paper the *most* due to its fat content, and which food will stain the paper the *least*, after the foods have sat on the paper for 30 minutes?

Most: *Predictions will vary* _____ Least: *Predictions will vary* _____

Collect Data

Starting Time: _____

Name of food	Description of stain on paper	Drawing of stain on paper	Estimated ranking of fat content
<p><i>Have students list the six foods they observed in the same sequence used on the Placemat.</i></p>	<p><i>Descriptions will vary and will be largely subjective. Students might estimate a percentage of the circle that was obscured by fat stains or use a ruler to measure the stain's dimensions. They may also use terminology such as opaque, translucent, or transparent to describe how much light passes through the paper when it is held up to a light source.</i></p> <p><i>Check whether students' descriptions seem reasonable. If necessary, verify the recorded results by observing the group's Placemat.</i></p>	<p><i>Students' sketches should accurately reflect the stain made by each food.</i></p>	<p><i>Students should use their observations and descriptions to rank the foods from 1 to 6, with 1 being the food they estimate contains the most fat and 6 being the food with the least fat.</i></p>

ANSWER KEY AND EXPLANATIONS**Analyze Data**

1. Which food stained the paper the *most* when left on the paper for 30 minutes? Why do you think this was so?

Results will vary, but the group's choice should demonstrate that they used careful observation and made comparisons between stains before evaporation. Reasons may include students' prior knowledge about the fat and moisture content of the food that students selected.

2. Which food stained the paper the *least* when left on the paper for 30 minutes? Why do you think this was so?

Results will vary, but the group's choice should demonstrate that they used careful observation and made comparisons between stains before evaporation. Reasons may include students' prior knowledge about the fat and moisture content of the food that students selected.

3. Which food's stain changed the *most* when the food was removed and the paper was left to dry for 30 minutes? Why do you think this was so?

Results will vary, but the group's choice should demonstrate that they used careful observation and made comparisons between stains after evaporation. Reasons should focus on the moisture content of the food that students selected.

4. Which food's stain changed the *least* when the food was removed and the paper was left to dry for 30 minutes? Why do you think this was so?

Results will vary, but the group's choice should demonstrate that they used careful observation and made comparisons between stains after evaporation. Reasons should focus on the moisture content of the food that students selected.

5. Based solely on the results of this activity, what kinds of foods seem to contain the *most* fat, and what kinds of foods seem to contain the *least* fat?

Results will vary, depending on the types of foods used on the Placemat. Responses should be based solely on students' actual observations in this exploration. Fried foods, meats, and foods containing saturated fats—such as butter or cheese—will tend to produce the largest stains. Conversely, grains and other dry foods may produce minor stains or no stains at all. Fruits may leave large stains before evaporation, but the stains will likely disappear after evaporation since they were created by moisture, not fat.

ANSWER KEY AND EXPLANATIONS**Draw Conclusions**

1. Were the methods used in this activity a precise way to measure the fat content of foods? Why or why not? What other methods could you use?

This exploration provided a subjective way to observe and compare the fat content of various foods. The methods used were not a scientifically precise way to measure fat content. The degree of contact that each sample had with the Placemat was not consistent, due to differences in sizes of food particles. Also, air temperature affects the degree of infiltration differently for different types of fat. Suggestions for other methods of fat extraction might include straining, rinsing, heating (e.g., boiling or baking), or freezing the samples and then using quantitative measurement rather than subjective observation. However, explain to students that both types of study can be useful in science.

2. Did the results of this activity match what you predicted about the fat content of these foods? Did they match the information on the nutrition labels? Why do you think the results were or were not the same as your predictions and research?

Answers will vary but should include an explanation of why students' predictions might have turned out to be correct or incorrect. Explanations might focus on the saturation rate of the paper, possible absorption by the original wrapper, or insufficient time for complete absorption. Students may be surprised to learn that certain foods contain more or less fat than expected.

3. How can knowing the fat content of foods be helpful to you?

Eating too much of any type of fat is not good for your body and can contribute to weight gain, heart disease, and cancer. By knowing the fat content of foods, you can make smarter decisions about where your fat calories come from and how much of each type of fat you eat. Certain fats are essential for your health and, in fact, are very beneficial when eaten in the proper balance.