

# ALLERGY BUSTERS!



## TEACHER'S GUIDE

*Written by*

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Baylor  
College of  
Medicine

**BioEd Teacher Resources**

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## TEACHER RESOURCES FROM THE CENTER FOR EDUCATIONAL OUTREACH AT BAYLOR COLLEGE OF MEDICINE

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# Table of Contents

<b>1. What's My Allergy?</b>	<b>1</b>
<i>Using Survey Techniques to Gather Information</i>	
<b>2. The Birthday Party Menu</b>	<b>7</b>
<i>Meal Planning with Allergies in Mind</i>	
<b>3. Pardon My Dust</b>	<b>15</b>
<i>Investigating Airborne Sources of Allergies</i>	
<b>4. From Where Does Pollen Come?</b>	<b>21</b>
<i>Flowering Plant Reproduction</i>	
<b>5. Pollen in Your Region</b>	<b>28</b>
<i>Tracking Pollen Counts</i>	
<b>6. Cockroach Patrol</b>	<b>33</b>
<i>Cockroach Reproduction and Allergies</i>	
<b>7. Go Fish for Allergens</b>	<b>36</b>
<i>Use Your Knowledge to Win!</i>	
<b>8. Your Story</b>	<b>49</b>
<i>Using Information</i>	

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The *Allergy Busters Teacher's Guide* is an integrated approach using survey techniques and graphing to help students learn about allergies, the immune system and allergy-causing organisms.

The activities in the guide are designed to be used with two short stories, *Where's Noah?* and *Cockroach School and the Bigfoot Monsters*. All components are available for free download from [www.bioedonline.com](http://www.bioedonline.com).



# 1. What's My Allergy?

*Using Survey Techniques to Gather Information*

**Objective:** Introduce students to types of allergies and survey methods

**Time Needed:** 2–3 class periods plus homework assignment

## **BACKGROUND**

Worldwide, almost 50% of children and adults are affected by allergies. According to the National Institute of Allergy and Infectious Diseases, approximately 5 percent of children and 4 percent of adults in the United States have food allergies. Asthma affects more than 17 million adults and 7 million children. Hay fever, respiratory allergies, and other allergies (e.g., Latex, drugs, chemicals, etc.) affect approximately 10 percent of children 18 and under. Clearly, allergies are a significant health issue.

Allergies result when the body's immune system (white blood cells, glands, and some organs such as the skin, thymus, and spleen) misidentifies harmless substances and treats them as harmful. The immune system is the body's frontline defense against disease. The immune system is responsible for identifying, attacking and remembering harmful microorganisms, like some kinds of bacteria and viruses. However, when the immune system encounters a substance that is harmless, but still treats it like it is harmful, an allergic reaction will occur. Itching, rashes, breathing difficulties, fevers, and more can be present. In some cases, the reaction is so severe that emergency care is needed immediately or the person will die. This sometimes happens with food allergens (the agents that cause the allergy) such as peanuts or with insect stings or bites.

Recent studies by teams at the National Institute for Allergies and Infectious Diseases (National Institutes of Health) have pointed to the possible mechanisms for the development of allergies. The mechanism depends on the structure of proteins from outside and inside the body. Proteins, which are made of long chains of amino acids, perform a vast array of body functions. Somewhat surprisingly, the investigators found that the most allergenic proteins are those that are least similar in structure to comparable proteins within the body. Thus, the more an allergen (such as in food or insect stings) differs in structure from a person's own protein, the more allergenic it is.

Allergies exist in many different forms. Some of the things to which people can be allergic include the following: cockroach waste and body parts; medications; the components in dust, especially animal saliva and skin flakes; dust mites and their waste; various foods (for example, peanuts, tree nuts or shellfish); insect stings; natural latex; mold; animals (cats, dogs, etc.); pollen; or plant irritants (such as those contained in oily residue from Poison Ivy).

In this activity students will conduct an allergy survey with family and friends and compile the result in a classroom database. They will draw conclusions on what the most common allergies in their sample group are.

## **Materials Needed**

**Teacher**

- Copy of *Where's Noah?* storybook
- Stapler

**Per student group**

- Sticky notes
- Various art supplies and writing materials
- Poster boards or newsprint

**Per student**

- Completed copy of "Letter for Parents or Guardians" (see "Setup")
- 3 copies of the "Allergy Survey Form"
- Copy of "Where's Noah?" storybook

**SETUP**

Photocopy the "Letter for Parents or Guardians" on school stationery, if possible. Complete the information on the letter. Make one copy per student. Make three photocopies of the "Allergy Survey Form" per student. Staple the letter to the front of the three "Allergy Survey" pages. (Optional: Place unstapled pages inside of an envelope.)

Have students work in teams of 2-4 for Part 2.

**PROCEDURE****Part 1. Reading and Vocabulary**

1. Read aloud or have students read the story "Where's Noah?" This story describes the experiences of Noah, an elementary school student with peanut allergies.
2. As you or students read the story, create a list of new words on the board. In particular, make sure your students become familiar with the terms allergy, allergies, allergic, allergen, and immune system. A vocabulary list also is included at the end of the story. (You will need the class graph created in this activity for use with Activity 3.)

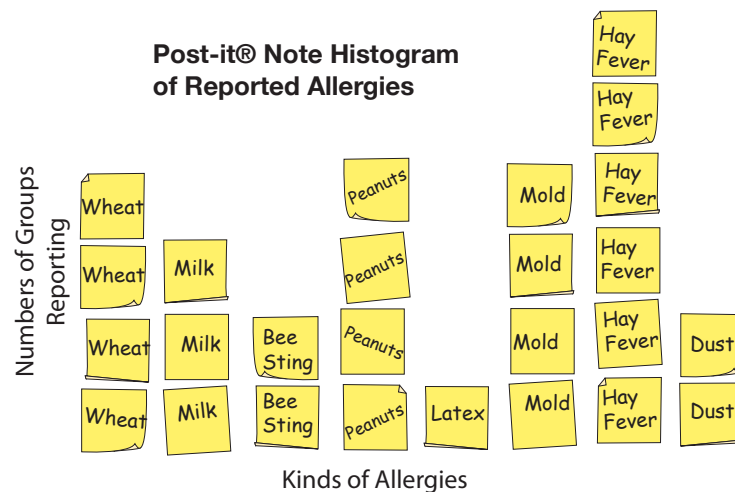
**Part 2. Conducting the Survey**

1. Ask students, *Do you know anyone with allergies, either to a food (like Noah) or to something else?* If they do know people with allergies, list the different allergies on the board.
2. Tell your students that the class will be doing a project on allergies. Explain to students that surveys are an important tool of scientists and allergy researchers to gather data they need to do their work, and that students will conduct an allergy survey as a homework assignment. Each student should interview 9 people (3 forms per page), and ask questions of family members, friends and others. Students will record the answers to questions on their forms. Students also should complete one form for themselves.
3. Show the forms to your students. Go over how the forms need to be completed. At the top of each page is an example of a short introductory speech they may use to begin each interview. Have students write their names and the name of the school in areas provided. Instruct students not to cut apart any of the survey sheets.
4. Point out to your students that the forms do not have a place for people's names. Explain that when biomedical surveys are conducted, researchers are especially careful to respect the privacy of the individuals studied. By not including names on the forms for this study, privacy will be protected.
5. On the day when students take home the allergy survey forms, also provide students with the "Letter for Parents or Guardians," (if not stapled to the survey pages), that explains the project.

6. Give students a deadline for completing their forms. Students should try to conduct 9 interviews, but may not be able to conduct more than a few interviews. Accept whatever they bring back. Remind students that they should fill out one survey form for themselves.
7. If a student has trouble finding people to interview, suggest that the student interview students and teachers in other classes or school staff members.

### Part 3. Analyzing Data and Graphing the Results

1. Tell students that the data they collected needs to be organized before it can be used and interpreted. Ask, *What are some ways the data can be organized?* Discuss students' responses. Examples might include grouping answers by gender (male vs. female), age (adult vs. child), or whether persons have allergies and if so, which ones.
2. Have students cut apart the sheets into individual forms. Then in groups of two or four, have students begin to organize their data. Begin by having groups count the number of participant surveys collected and the numbers of survey participants who have different kinds of allergies. Have each group report its totals, while you record and tally the data. This is an excellent time to use fractions and percentages to illustrate the data with the entire class. Ask, *Do you think the percentages would change if there were more data? Why or why not?*
3. Students can then create a histogram of the different data categories on chart paper. Remind students that each graph must be labeled. Each group shares its graph with the class and draws at least one conclusion from the data. For instance, twice as many people have hay fever as dust allergies or few people have latex allergies. Ask students if they can draw any other conclusions from the data. Then, have students consider the likelihood that there will be any similar conclusions when they combine their data in the next step to create a class graph-



4. To make a class graph, ask each group of students to make one sticky note for each allergy they tabulated as a group. Have groups, one at a time, bring their allergy sticky notes to a central area to create a class graph (histogram) of survey information. See the illustration below for how to create the graph. Allow room for double columns if needed for the most “popular” allergies. Once all the sticky notes have been organized, ask students to draw conclusions.
5. Other possible questions that could be answered through class graphs of different categories of data include the following.

- a. How many males and females have allergies?
  - b. How many children and adults have allergies?
  - c. Relate the sex or age of the participant to the allergies they list. For example, is there an allergy that is more common for female children than for male children or male or female adults?
6. Challenge student to create posters about their allergy study results (graphs, drawings, etc.) and about allergies in general. Display their posters in the school corridors for other students and teachers to see.
  7. Have student groups write a report to give to their parents or guardians summarizing what they learned doing the survey and data analysis.

### **ELABORATE AND EXTEND**

Ask students to tell you what they learned about allergies by conducting the survey.

Obtain allergy books from the library for students to read. See the websites below for information on allergy books and information on allergies by the National Institute for Allergies and Infectious diseases and by the American Academy of Allergy, Asthma & Immunology.

Have students watch the video listed below at home or show it in class. It explains how one family, helps a child cope with multiple food allergies.

<https://www.youtube.com/watch?v=RygbssWDdCI>

Learn more about the immune system.

<http://www.niaid.nih.gov/topics/immuneSystem/Pages/overview.aspx>

More on allergies

<http://www.niaid.nih.gov/topics/allergicdiseases/Pages/default.aspx>

<http://www.aaaai.org/about-the-aaaai/newsroom/allergy-statistics.aspx>

Children's trade books on allergies

<http://www.pinterest.com/allergicchild/children-s-books-food-allergy>

# Letter for Parents or Guardians

Dear Parent or Guardian,

The \_\_\_\_\_ grade class at \_\_\_\_\_ school is about to begin an exciting, real world science project. We will be conducting a survey of allergies. Allergies are a common ailment for many people. Millions of people of all ages in the United States suffer from one or more allergies.

Our survey will focus on students, family, and friends to learn some important things about allergies. How many people have allergies? What are the allergies? Are there differences in the ways in which allergies affect children and adults? The forms have spaces for 9 interviews. Your child does not have to conduct all 9 interviews.

As professional researchers are required to do, we will be respecting privacy by not recording individual names on the surveys. The questions your child will ask are simple: age group, male or female, do you have an allergy, what is the allergy? There are no risks to persons who answer the survey questions.

When the survey forms are returned, teams of students will analyze the data and create reports and posters. The class will also write a report to be taken home, so that you can see the results.

If you have any questions, I can be reached at \_\_\_\_\_.

By doing this survey, your child will experience a real-world research technique followed by professional biomedical researchers.

Thank you for your cooperation.

Teacher name \_\_\_\_\_



# Allergy Survey Form

Hello: My name is \_\_\_\_\_. We are conducting an allergy survey in my class at the \_\_\_\_\_ school. Would you be willing to answer a few questions? We don't use people's names in our survey. Thank You

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## Allergy Survey

Male  Age: 0 to 17  18 and up   
Female   
Do you have an allergy? YES  NO   
If yes, ask: What are you allergic to?  
\_\_\_\_\_

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## Allergy Survey

Male  Age: 0 to 17  18 and up   
Female   
Do you have an allergy? YES  NO   
If yes, ask: What are you allergic to?  
\_\_\_\_\_

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## Allergy Survey

Male  Age: 0 to 17  18 and up   
Female   
Do you have an allergy? YES  NO   
If yes, ask: What are you allergic to?  
\_\_\_\_\_

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## 2. The Birthday Party Menu

### *Meal Planning with Allergies in Mind*

**Objective:** Student teams will select food items from a buffet, based on the five major food groups recommended by the USDA MyPlate program and specific food allergies.

**Time Needed:** 2 class periods

### **BACKGROUND**

Components of certain foods are among the major causes of human allergies in the United States. Eight food allergens are so prevalent that federal law requires that they be listed on food ingredient labels when they are present in the food product. The eight food allergens that must be identified, by law, are:

1. Milk
2. Eggs
3. Fish (e.g., salmon, tuna, halibut, anchovies)
4. Crustacean shellfish (e.g., crab, lobster, shrimp)
5. Tree nuts (e.g., almonds, walnuts, pecans)
6. Peanuts
7. Wheat
8. Soybeans

People who are allergic to these main food allergens will suffer a variety of symptoms if they eat these foods. Symptoms might include: hives; rash; tingling or itchy mouth; face, tongue, or lip swelling; vomiting or diarrhea; abdominal cramps; coughing or wheezing; dizziness; swelling of throat; difficulty breathing; or passing out.

In extreme cases, food allergies can lead to a life threatening reaction called anaphylaxis. The airways can become constricted, blood pressure drops, shock may occur, and swelling of the throat may lead to suffocation.

People also can be allergic to chemical food additives, such as nitrates and nitrites (found in processed meats, such as ham, bacon and bologna) or sulfites (found in dried fruits and wine). These chemicals are added as preservatives to certain foods to prevent spoilage.

In this activity, pairs of students will work together to select foods from a Buffet Menu to create a meal for a special friend. After completing their choices, each team will draw a card from a pack. The cards will inform the teams that their special friend is allergic to a particular food. Teams will then have to go back over their food selections and make adjustments based on the ingredients list.

### **MATERIALS**

#### **Per Team of 2**

- Allergy Cards (one set)
- Copy of “Buffet Menu Choices,” “Food Ingredients List,” and “My Friend’s Plate” pages
- Sheets of blank paper or science notebooks for recording food selections

## **SETUP**

Have students work in teams of two.

## **PROCEDURE**

1. Invite your students to describe a birthday dinner they have attended for themselves or someone else. Ask, *What did you have to eat?* Make a list on the board of the different foods served.
2. Divide the students into teams of two for the activity. Tell students that they will plan a surprise birthday dinner for a friend. They need to make sure that there are healthy foods available, and that their friend, who has food allergies, is able to find foods he or she can eat.
3. To begin, ask *What are the basic five food groups?* (fruit, vegetables, grains, protein, and dairy; solid fats and oils also can be considered a group). Discuss and record their answers on the board. Then review the ChooseMyPlate.gov Web site or a handout of the information. (<http://www.choosemyplate.gov/>).
4. You may wish to show one or more videos from ChooseMyPlate.gov about healthy food choices, or have students listen to the “Alive with Five Groups” song at <http://www.choosemyplate.gov/kids/downloads/Song-alivewithfive.mp3>.
5. Explain that each team will be given a list of menu choices, an ingredients list, and a list of food basics from Choose MyPlate.gov. Their task is to create a meal by selecting food items from the menu that includes the requirements from Choose MyPlate.gov.
6. Distribute the student sheets to each team, and have students create their menu. Students should list the foods they selected on a sheet of paper or in their notebooks.
7. Pass out the allergy cards, one or two per team, and have each team make the needed adjustments to the meal they planned.
8. Prompt teams to complete the “My Friend’s Plate” page with names or drawings of the foods they selected for their friend within each category. Display the different sheets in the classroom.

## **Elaborate and Extend**

Have teams talk about what they had to do to prevent feeding their special friends foods to which they are allergic, and the changes they made in their food choices.

Discuss how it is important for a person with allergies to know what is in his or her food, even when eating out. This is why all food labels must list all ingredients and if the food was prepared in an area where any type of allergen was processed, that must be stated on the label.

Bring several packaged food items and have students examine the ingredient labels to look for common allergens.

<http://www.fda.gov/forconsumers/consumerupdates/ucm254504.htm>

<http://www.foodallergy.org/>

# Buffet Menu Choices

**Buffet Menu**

<p><b>Appetizer</b></p> <ul style="list-style-type: none"> <li>Mixed Nuts</li> <li>Deviled Eggs</li> <li>Potato Skins with Cheese and Bacon</li> <li>Chicken Strips with Mustard Sauce</li> </ul> <p><b>Soup</b></p> <ul style="list-style-type: none"> <li>Cream of Tomato Soup</li> <li>Chicken Noodle Soup</li> <li>Broccoli and Cheese Soup</li> </ul> <p><b>Salad and Fruit</b></p> <ul style="list-style-type: none"> <li>Garden Salad</li> <li>Fruit Salad</li> <li>Tomatoes and Cucumbers</li> <li>Celery and Carrot Sticks with Ranch Dip</li> </ul> <p><b>Main Course</b></p> <ul style="list-style-type: none"> <li>Cheeseburgers</li> <li>Hot Dogs</li> <li>Fried Chicken</li> <li>Steak</li> <li>Spaghetti and Meatballs</li> <li>Hamburgers</li> <li>Roast Turkey</li> <li>Fish Sticks</li> <li>Pizza</li> </ul>	<p><b>Bread</b></p> <ul style="list-style-type: none"> <li>Crackers</li> <li>Bread Sticks</li> <li>Dinner Rolls</li> </ul> <p><b>Side Dishes</b></p> <ul style="list-style-type: none"> <li>Corn</li> <li>Green Beans</li> <li>Green Peas</li> <li>French Fries</li> <li>Baked potatoes with Sour Cream and Bacon Bits</li> <li>Apple Sauce</li> <li>Carrots</li> </ul> <p><b>Dessert</b></p> <ul style="list-style-type: none"> <li>Ice Cream</li> <li>Apple Pie</li> <li>Cheesecake</li> <li>Peach Slices</li> <li>Chocolate Chip Cookies with Nuts</li> <li>Chocolate Covered Strawberries</li> <li>Chocolate Cake</li> <li>Banana Cream Pie</li> <li>Candy Bars</li> </ul> <p><b>Beverage</b></p> <ul style="list-style-type: none"> <li>Milk</li> <li>Soft Drink</li> <li>Coffee</li> <li>Chocolate Milk</li> <li>Water</li> <li>Iced Tea</li> </ul>
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# Food Ingredients List

Apple Pie: Apples, Sugar, Wheat Flour, Cinnamon, Butter, Salt

Apple Sauce - Apples, Sugar, Cinnamon

Baked Potato with Sour Cream and Bacon Bits: Potato, Cream (milk product), Bacon (pork, salt, and sometimes preservatives)

Banana Cream Pie: Wheat Flour, Butter, Sugar, Bananas, Eggs, Cream (whipped), Vanilla, Salt

Broccoli and Cheese Soup: Broccoli, Butter, Chicken Broth, Cheese, Milk, Wheat Flour, Salt

Candy Bars: Chocolate, Peanuts, Caramel, Sugar, Cocoa Butter, Eggs, Milk, Salt

Chocolate Chip Cookies with Nuts: Wheat Flour, Sugar, Chocolate Chips, Nuts, Butter, Eggs, Vanilla, Salt

Chocolate Covered Strawberries: Chocolate, Sugar, Milk, Strawberries

Celery and Carrot Sticks: Celery, Carrot Sticks

Cheeseburger: Hamburger, Bread (Wheat, Yeast, Salt, Vegetable Oil), Cheese, Tomato, Lettuce, Ketchup, Mustard, Salt

Cheesecake: Cream Cheese, Eggs, Graham Crackers (Wheat), Sour Cream, Milk, Butter, Salt

Chicken, Fried: Chicken, Wheat Bread Crumbs, Eggs, Pepper, Paprika, Salt

Chicken Strips with Mustard Sauce: Chicken, Wheat Bread Crumbs, Mustard, Pepper, Paprika, Salt

Chicken Noodle Soup: Chicken, Egg Noodles (Wheat and Eggs), Celery, Carrots, Onion, Bay Leaves, Thyme, Pepper, Salt

Chocolate Cake: Wheat Flour, Sugar, Cocoa Powder, Eggs, Milk, Water, Vegetable Oil, Baking Powder, Salt

Crackers: Wheat Flour, Butter, Salt

Corn: Corn, Salt

Cream of Tomato Soup: Tomatoes, Cream, Butter, Onion, Salt

Deviled Eggs: Boiled Eggs, Mayonnaise (eggs and vegetable oil), Pickles (Cucumbers, Vinegar, Salt and Spices)

Fish Sticks: Pollock (kind of fish), Wheat Flour, Corn Flour, Vegetable Oil, Sugar, Onion Powder, Salt

Ranch Dip: Buttermilk, Salt, Onion, Parsley, Chives, Salt

French Fries: Potatoes, Vegetable Oil, Salt

Fried Cheese Sticks: Cheese, Eggs, Wheat Bread Crumbs, Salt

Fruit Salad: Fresh Fruit, Mayonnaise – Eggs, Oil, Lemon Juice, Salt

Garden Salad: Lettuce, Tomatoes, Cucumber, Onions, Vinegar, Oil, Salt, Pepper

Green Beans: Green Beans, Salt

Green Peas: Green Peas, Salt

Hamburger: Ground Beef, Bread (Wheat, Yeast, Salt, Vegetable Oil), Tomato, Lettuce, Ketchup (Tomatoes, Vinegar, Corn Syrup, Salt, Onion Powder), Mustard (Mustard Seeds, Vinegar, Salt)

Hot Dogs: Pork, Beef, Onion, Egg, Milk, Salt, Garlic, Paprika, Preservatives, Bread (Wheat, Yeast, Salt, Vegetable Oil), Ketchup (Tomatoes, Vinegar, Corn Syrup or Sugar, Salt, Onion Powder), Mustard (Mustard Seeds, Vinegar, Salt)

Ice Cream: Cream, Milk, Sugar, Vanilla or Chocolate, Salt

Mixed Nuts: Peanuts, Cashews, Almonds, Walnuts, Hazel Nuts, Brazil Nuts, Vegetable Oil, Salt

Nachos with Cheese: Corn, Vegetable Oil, American Cheese, Butter, Milk, Salt

Peach Slices: Peaches, Sugar, Water

Pizza: Wheat, Yeast, Salad Oil, Tomatoes, Onions, Basil, Cheese, Salt, Pepper

Pork Chops: Pork, Wheat Flour, Vegetable Oil, Salt

Potato Skins with Cheese and Bacon: Potatoes, Cheese, Bacon (pork and salt)

Spaghetti and Meatballs: Spaghetti Pasta (made from wheat), Beef, Onions, Wheat Breadcrumbs, Egg, Salt, Pepper, Tomatoes, Onion, Basil, Olive Oil, Salt, Pepper







Steak: Beef, Salt, Pepper

Tomatoes and Cucumbers: Tomatoes, Cucumbers, Vinegar, Salt, Pepper

Turkey, Roast: Turkey, Salt, Pepper







Iced Tea: Tea, Sugar, Water

# Allergy Cards

<p>Your Special Friend Has Allergies</p>  <p>Peanuts</p>	<p>Your Special Friend Has Allergies</p>  <p>Milk</p>	<p>Your Special Friend Has Allergies</p>  <p>Fish</p>
<p>Your Special Friend Has Allergies</p>  <p>Wheat</p>	<p>Your Special Friend Has Allergies</p>  <p>Tree Nuts</p>	<p>Your Special Friend Has Allergies</p>  <p>Eggs</p>

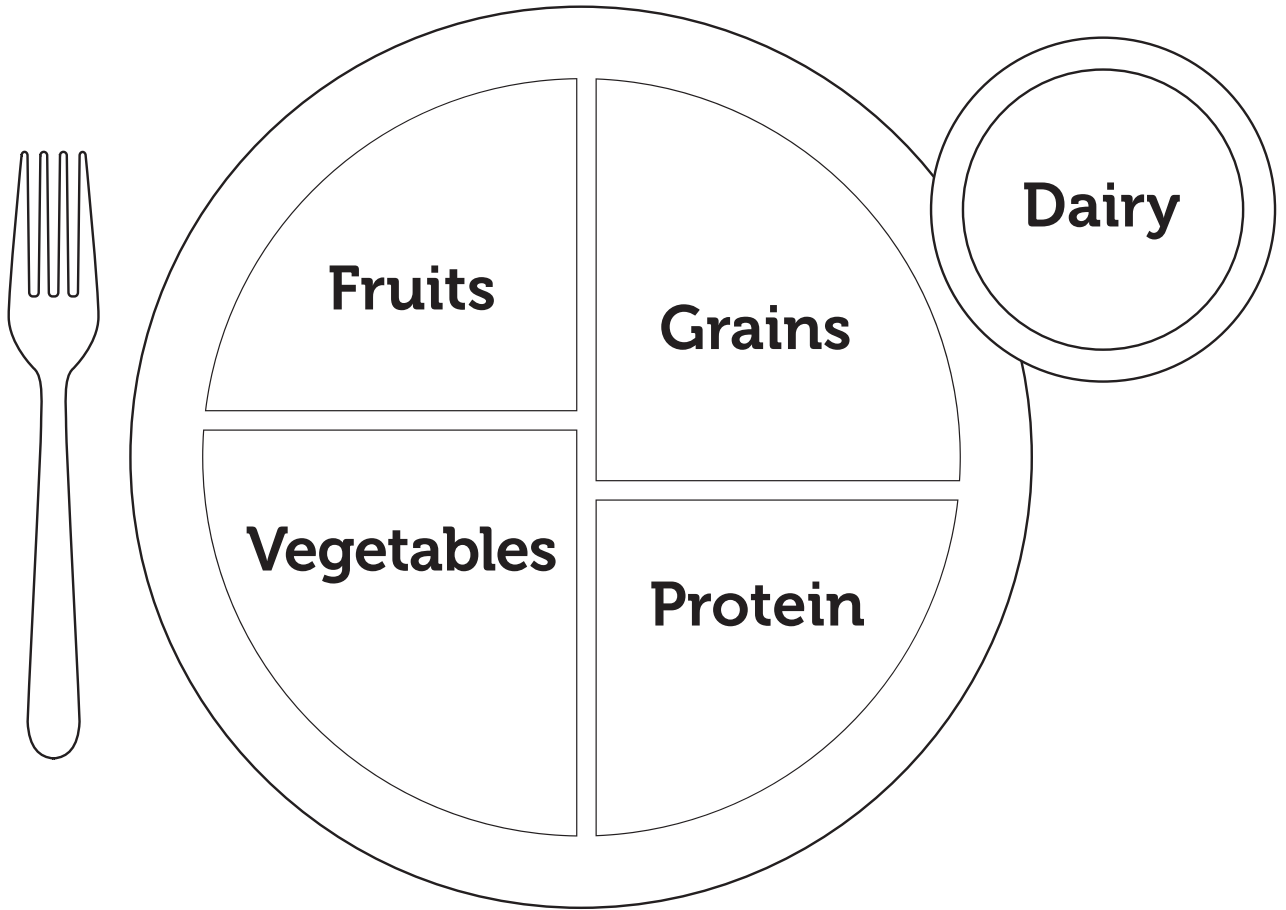


## Allergy Cards Continued

<p>Your Special Friend Has Allergies</p>  <p>Peanuts</p>	<p>Your Special Friend Has Allergies</p>  <p>Eggs</p>	<p>Your Special Friend Has Allergies</p>  <p>Shellfish</p>
<p>Your Special Friend Has Allergies</p>  <p>Milk</p>	<p>Your Special Friend Has Allergies</p>  <p>Soybeans</p>	<p>Your Special Friend Has Allergies</p>  <p>Wheat</p>



## My Friend's Plate



Choose **MyPlate**.gov



### 3. Pardon My Dust

#### *Investigating Airborne Sources of Allergies*

**Objective:** Students will learn about an important source of allergens by creating a simple device to collect dust.

**Time Needed:** 2 class periods separated by several days, plus homework assignment

#### **BACKGROUND**

Approximately 20 million Americans are allergic to household dust. As with other allergies, dust allergy symptoms include red, itchy and watery eyes, runny stuffy nose, and sneezing in what seems like an endless cold. One of the main culprits behind dust allergies is a very tiny arachnid (spider relative) called a dust mite. Dust mites are almost too small for us to see. Their typical size is about 0.25 millimeters or 0.01 inches across. One gram of dust could contain up to 500 mites.

Male dust mites live for up to 20 days, while females last for up to 70 days. During their life span, females lay about 60 to 100 eggs. Dust mites feed on organic material such as shed human skin. The proteins in their feces are among the primary allergens in dust affecting people. A typical mite will produce thousands of particles and even fragments of their exoskeleton can contribute to an allergic reaction.

Dust mites aren't the only component of dust that can cause allergic reactions. Dust also contains human and animal skin flakes, called dander, that dust mites like to eat. Still other dust components are fragments of dead cockroaches, cockroach waste (saliva and feces), dried saliva from pets, and mold spores.

The most important message regarding dust is that every household has dust and dust mites, and in warmer climates, roaches. Many people are allergic to these things. Getting rid of dust, and in particular dust mites, or at least keeping the mites under control is possible. Dust mites like temperatures higher than 70 F and humidity in the 75 to 80% range. Having a dehumidifier does much to control mites. Washing sheets in hot water every week is an effective control, and so are airtight dust mite covers for pillows and mattresses.

In this activity, students will take home dust sampling devices and place them in locations that will be undisturbed for several days. Students will return the devices to



Dust mite. ([www.wikipedia.org](http://www.wikipedia.org))

class and examine them with magnifying glasses. Because the samplers will be placed on shelves or tables or other surfaces above the floor, the samplers will not be collecting mites. Instead, they will collect airborne dust. Students will not be bringing mites to school.

### **MATERIALS NEEDED**

- Transparency film for copiers (see alternative to transparency film in the instructions below) 1 sheet for every 6 students.
- 4-in. x 7-in. cardboard rectangles cut from white poster board (1 rectangle per student)
- Pure petroleum jelly (large jar)
- Hand magnifiers (1 per student or per group of students)
- Masking tape (1 small roll)
- Sandwich bags (1 per student)
- Copy of “Dear Parent or Guardian” letter, copied onto school letterhead, if possible (1 per student)

### **SETUP**

You will need the class graph with all of the allergens your students discovered in their allergy surveys (Activity 1). If none of the survey respondents mentioned being allergic to dust, add dust to the list.

### **PROCEDURE**

#### **Conducting the Survey**

1. Print the dust sampler master on several sheets of transparency paper for printers. When cut apart, each sheet will have 6 samplers. Pre-fold the samplers on the dashed line. Press the folds to make them sharp.
2. Have students tape the samplers flat on to their poster board rectangles. Use masking tape at the corners.
3. Give each student a sandwich bag with a small dollop of pure petroleum jelly inside.
4. Show students how to set up their sampler. Demonstrate by opening the sandwich bag and touching an index finger to the petroleum jelly. Smear the petroleum jelly over the circle. It is OK if the petroleum jelly extends beyond the circle. Then place the sampler on a tabletop. Ask students to come up with ideas where they can place their samplers where they won't be disturbed (for example, on top of home entertainment center, bookshelf, window sill, kitchen counter, mantle, etc.)
5. Have students take home their dust samplers and the petroleum jelly, along with a note to parents explaining the study (see “Dear Parent of Guardian” letter template).
6. Ask students to return their samplers on a specific day (about 2 to 3 days later). Show students how to prepare their samplers for return. The masking tape on the end of the samplers, without the circles, should be lifted. The plastic should be folded over the circle side and held down with the tape pieces. Students should be encouraged not to squeeze the plastic.

#### **Alternative to transparency paper samplers**

Print the sampler circle on white paper. Cut out the squares and tape them to poster board rectangles. Cover the circle with clear packing tape, wax paper, or laminate them. Have students use a piece of plastic wrap to cover the samplers when returning them to school.

**Note:** If any student is unable to participate in the study at home, give that student the assignment of placing a dust sampler somewhere in the classroom or other area of the school.

### **Analyzing the Results**

1. Distribute hand magnifiers to your students. Have them examine their samples through the plastic or plastic wrap. Do not have them open up the samplers.
2. Have students make sketches and notes of what they see. A list of questions can be placed on the board for students to answer in their journals as they examine the sample.
  - What are the shapes of particles? (circular, irregular—like a square, etc.)
  - Are the particles all the same size or different sizes?
  - What kinds of edges do the particles have? (smooth, irregular, jagged, etc.)
  - What colors are the particles?
  - How many particles (total) are in one or more squares?
  - How many of each kind of particle (by size, shape, color, etc.) are in one or more squares?
3. List student observations on the board, and allow time for each student to share any unique observations.
4. If time permits, have students swap samples for observation.
5. Have each team create a list of their discoveries in dust. The lists can be shared with parents at home as a report on the investigation.

### **ELABORATE AND EXTEND**

Ask students for their ideas on how the dust and possibly other particles were trapped on the dust sampler. Dust is carried by air currents. Explain dust mite droppings are a common component of dust. Dust mites are very small arachnids (eight-legged invertebrates). One of their main food sources is dried flakes of skin, which also are found in dust. Help students understand that many people have allergies to dust and that dust allergies can be reduced by vacuuming and dusting more often, washing sheets weekly in hot water, wearing a face mask when dusting and vacuuming, wiping feet before coming indoors, etc. If students are not able to come up with any strategies on their own, have them visit one of the websites below for tips on reducing dust inside homes and reducing exposures to dust.

Learn what to do if you have a dust allergy.

<http://www.nlm.nih.gov/medlineplus/ency/patientinstructions/000487.htm>

Find out about dust allergy diagnosis, treatment, and how to reduce household dust allergens.

<http://www.aaaai.org/allergist/allergies/types/dust-allergy-information/pages/default.aspx>

[http://en.wikipedia.org/wiki/House\\_dust\\_mite](http://en.wikipedia.org/wiki/House_dust_mite)

# Letter for Parents or Guardians

Dear Parent or Guardian:

The \_\_\_\_\_ grade class at \_\_\_\_\_ school is learning about allergies. In our current research project, we will be studying dust. More than 20 million Americans are allergic to dust.

The sample device your child has brought home will passively collect dust. As you know, dust is a part of every home environment. Your child will be looking for a place to set a simple dust sampler, above the floor level where it will not be disturbed for a few days. You can help your child select the location.

After \_\_\_ days, the sampler will be covered and returned to school where we will examine it under magnification. Your child will be making sketches of and taking notes on what he or she discovers.

When the survey forms are returned, teams will analyze the data and create reports and posters. The class will also write a report to be taken home so that you can see the results.

By doing this study, your child will experience a real-world research technique followed by professional biomedical scientists, and learn about the allergies that affect so many people.

If you have any questions, I can be reached at \_\_\_\_\_.

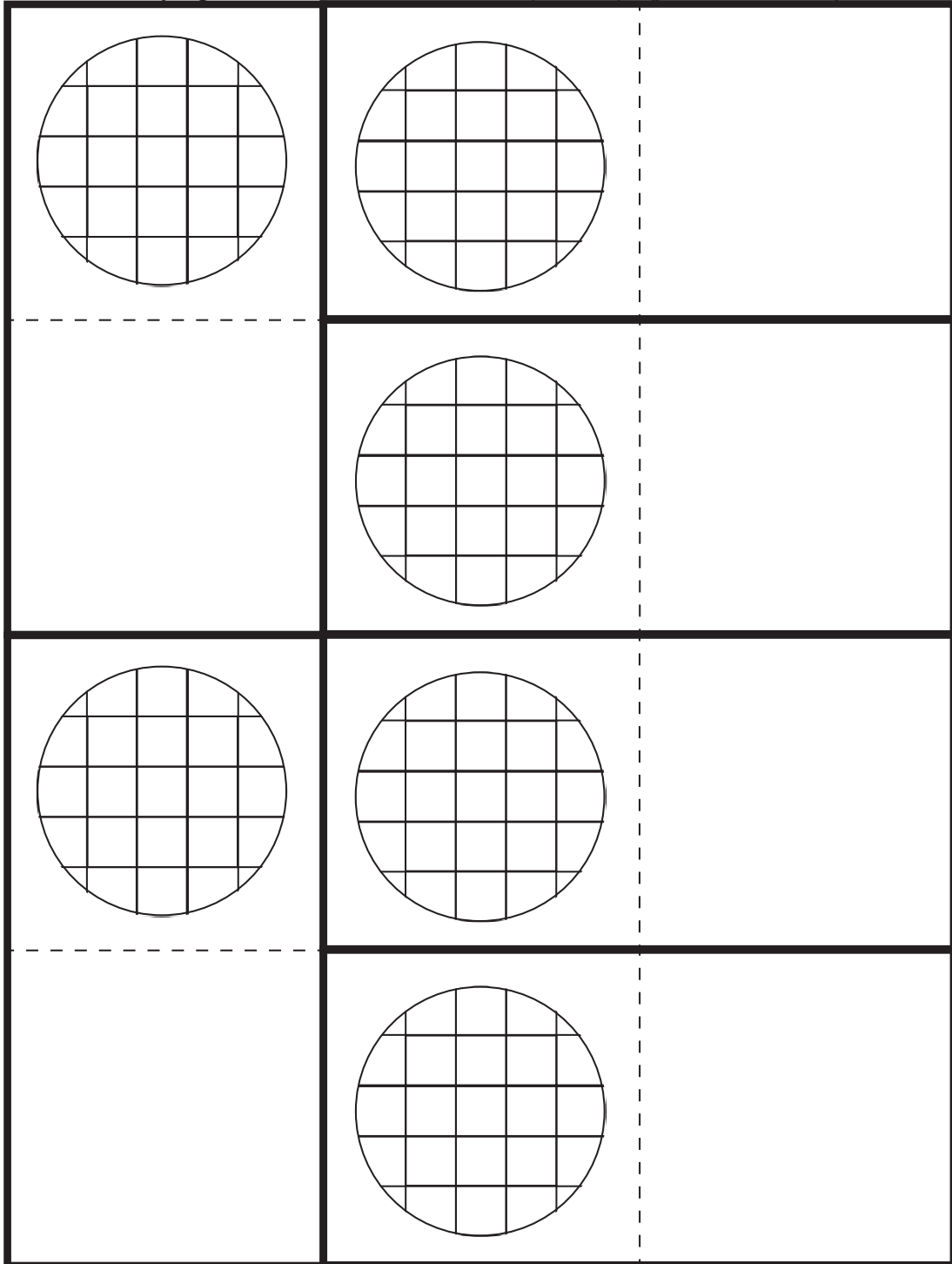
Thank you for your cooperation.

Teacher name \_\_\_\_\_

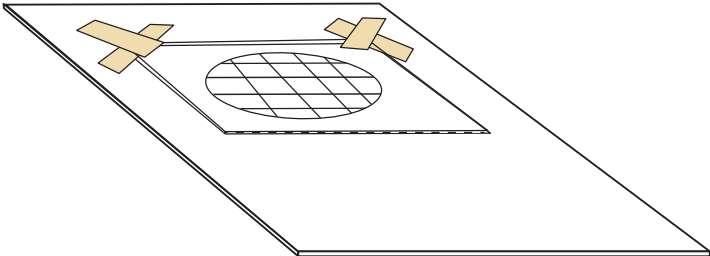
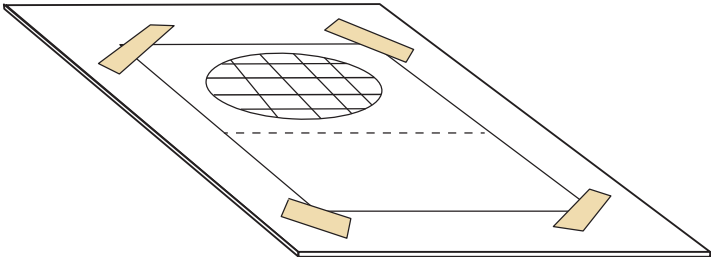
# Dust Sampling Templates

Six Dust Sampling Devices

Cut out each two-square sampling device on the heavy black lines



# Completed Dust Sampling Device





## 4. From Where Does Pollen Come?

### *Flowering Plant Reproduction*

**Objective:** Your students will learn about flowering plant reproduction, and why wind-pollinated plants produce much more pollen than insect-pollinated plants. They will relate this information to pollen allergies (hay fever), which are caused by wind-pollinated plants.

**Time:** 2 or 3 class periods of 45 minutes

#### **BACKGROUND**

Pollen is one of the most common causes of allergies. In fact, about 10% of US children under the age of 18 have annual pollen allergy symptoms. Often called hay fever, pollen allergies typically cause a runny nose, sneezing, congestion, an irritated throat, or itchy, watery eyes. The symptoms usually appear about the same time each year, when certain plants produce their flowers.

The offending substance, pollen, is essential for sexual reproduction in all flowering plants (and in some other kinds of plants, such as pine trees). To produce seeds, pollen from the anthers of one flower is transported to the pistil of another flower (usually on a different plant). Once it lands on the tip of the pistil (stigma), the pollen grain produces a tube through which sperm nuclei (containing genetic material) are delivered to an ovule located within the base of the pistil. This process is referred to as fertilization. If a flower has many ovules, a different pollen grain delivers genetic material to each ovule. After fertilization, development of the seeds and fruit begins. Each fertilized ovule gives rise to a seed. The base of the pistil itself develops to become a fruit.

Brightly colored flowers, such as those used by florists or found in gardens, usually do not provoke hay fever. These flowers are pollinated by insects and produce relatively low numbers of large-sized pollen grains. Plants that are pollinated by wind, on the other hand, produce copious amounts of tiny pollen grains from inconspicuous white or green flowers. Wind-pollinated plants have no need to attract insects through colorful petals. Instead, they invest their resources in producing millions of pollen grains that are released into the air in hopes of reaching another individual of the same species—and achieving seed production.



Large hanging clusters of male flowers produced by the wind-pollinated alder tree (*Alnus serrulata*). Photo Credit: SimonP, pollinator, Wikimedia Commons.



Cluster of flowers from orchard grass (*Dactylis glomerata*). Notice how the anthers extend beyond the edges of the flower in order to maximize exposure to the wind (see arrow). Photo credit: USDA,

<https://plants.usda.gov/java/largeImage?imageID=d>



You may have noticed the hanging clusters of wind-pollinated flowers on oak, birch or cedar trees each spring. These clusters release their pollen grains into the air. Pine trees and their relatives, while technically not considered flowering plants, also release large amounts of yellow pollen in springtime.

Grasses are wind-pollinated. Their flowers are very tiny, and consist only of a few scales, anthers and pistils. The anthers are labeled in the accompanying photograph of orchard grass. Many weeds, such as common ragweed, are wind pollinated and also cause allergy problems.

### **MATERIALS NEEDED**

- 1 or more large lily flowers (from the grocery store or a florist)
- 1 bunch of Alstroemeria flowers (these flowers are sold at low-cost in the grocery store or a florist; lilies also are appropriate for students to dissect; you will need one flower per two students)
- Sharp knife or razor blade (for use by teacher only)
- 12 sets of colored pencils or plain graphite pencils (for drawing flowers, colored markers are not suitable)
- Small package of unflavored, uncooked white rice
- 12 zip-top plastic sandwich bags
- Magnifying lenses (1 per student)
- 2 pads of sticky notes (two different colors)
- Glue stick or tape
- Permanent ink pen (such as Sharpie®) to label the sandwich bags
- 6 lids from large cardboard boxes or 6 large trays (such as cafeteria trays)
- 6 copies of the Flower Diagrams page
- Copies of the My Flower Observations page (one per student)
- PowerPoint® slide set provided with this lesson, and computer and projector—or interactive white board.

### **SETUP**

Before class, you will need to purchase fresh flowers (see below) for students to examine.

### **PROCEDURE**

#### **Demonstration**

1. Ask students to raise their hands in response to the question, *Have you ever heard of anyone getting hay fever?* Give students time to share any experiences with hay fever (sneezing, itchy eyes, etc.).
2. Tell students that hay fever is not related to any kind of contagious disease, instead, it is a kind of allergy caused by plants. Plants produce pollen grains, which float in air. Some people are allergic to pollen.
3. Next, ask, *Where can you find pollen on a plant?* [flower] Explain that students will be able to see where plants produce pollen.



Lily flower with parts of the stamen (anther and filament) and pistil (stigma and style) labeled. The ovary at the base of the pistil is not shown. The pink segments are called tepals. Photo credit: Michael Gregory, [http://faculty.clintoncc.suny.edu/faculty/michael.gregory/files/bio%20102/Bio%20102%20Laboratory/Seed%20Plants/Seed\\_Plants.htm](http://faculty.clintoncc.suny.edu/faculty/michael.gregory/files/bio%20102/Bio%20102%20Laboratory/Seed%20Plants/Seed_Plants.htm)

4. Use a lily, with its conspicuous parts, to demonstrate the structure of a flower. Point out the colored or white outer sections of the flower. Tell students that these segments are called petals when a plant has green segments (sepals) and colored segments (petals). When a flower only has colored segments, they are called tepals (which is the case with a lily). Petals or tepals help attract insects
5. Point out the stamens inside the flower. The stamens produce pollen in the paired structures, called anthers, at their tips. Pollen provides half of the genetic information needed to produce a seed, which will become a new plant.
6. The seed producing part of the plant is called a pistil. In lilies, the pistil is a single column located in the center of the flower. The pistil consists of an enlarged base (ovary), a stalk (style) and a sticky tip for receiving pollen (stigma). In order to produce seeds, pollen from one flower must land on the stigma of another flower. Plants with brightly colored flowers rely on insects to carry the pollen from one plant to another.

### Dissecting the Flowers

1. Have students work in pairs. To each pair of students, give two magnifiers, an *Alstroemeria* or lily flower and two copies of the My Flower Observations sheet (or have them record their drawings in a notebook).
2. Use the accompanying slides to guide the students through their dissections. First, show Slide 1, which depicts the tepals and anthers. Tell students that the lines on the tepals help guide insects toward a nectar reward at the base of the flower. Have students draw their own flower on their Observations sheets.
3. Next, tell students to gently remove each of the tepals and place them on their work surface as shown in Slide 2. Have students draw at least one of each kind of tepal (usually the outer three tepals are different from the inner three tepals; you also may refer to the outer three segments as sepals, and the inner three as petals).
4. Finally, have students examine and draw the stamens and pistil. They should count and record the number of stamens, and identify the anthers. Tell students, Pollen is produced inside the anthers. Depending on the age of the flowers, students may be able to use magnifiers to observe the fine dust (pollen grains) that coats the anthers. In addition, have students find the long strand, called the “style,” which is part of the pistil, in the center of the flower.
5. Using a sharp knife, cut across the ovary (broad base of the pistil below the insertion point of the stamens) of the flowers for each group of students. Have students use their magnifiers to observe the ovules inside the ovary. Explain, Once a flower has been pollinated, the ovules begin to develop into seeds. The ovary also grows larger and becomes the fruit. You may want to describe examples of fruits, such as grapes, tomatoes or apples.

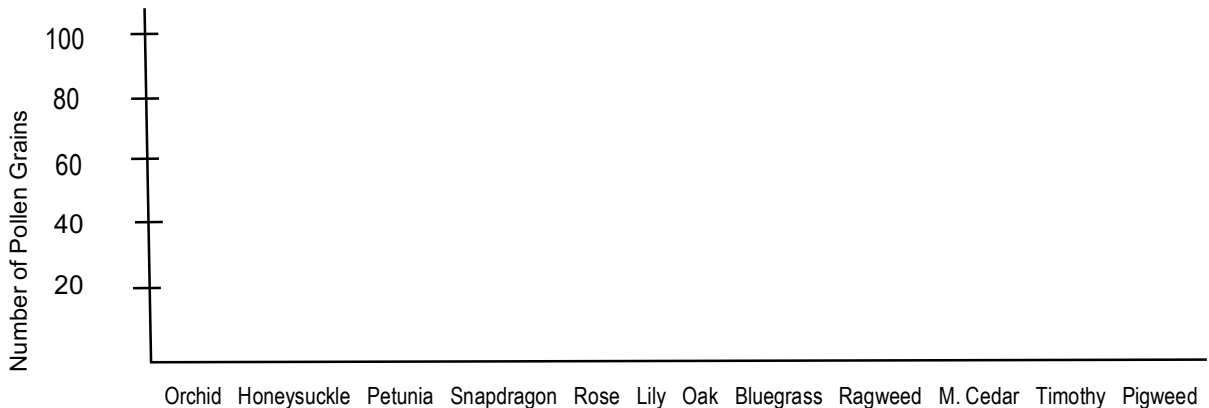


### Conducting Simulations

1. Students will work in groups of four for this part of the activity. Each group of students will conduct two simulations: one simulation of insect pollination and another of wind pollination. They will record their observations on sticky notes on a class graph. Use a different color sticky note for each simulation (insect vs. wind pollination).
2. For the insect pollination simulation, place approximately 10 grains of rice in each of six zip-top bags. Label each bag with one plant name, using the names listed below.

ORCHID (small plant)  
 HONEYSUCKLE (shrub or vine)  
 PETUNIA (small plant)  
 SNAPDRAGON (small plant)  
 ROSE (shrub)  
 LILY (small plant)

2. Make 6 copies of the “Flower Diagrams” page, and place one copy face up inside the bottom of a large box lid or the surface of a cafeteria-style tray. (The diagram is placed inside a tray to facilitate cleanup of rice after the activity.)
3. Create a large class graph on chart paper or a white board. Label the x axis with the 12 plant names used on the plastic bags. Label the y axis from 1–100, in intervals of 10 or 20.



4. Tell students that they are going to simulate pollination in plants, and that the rice grains represent individual pollen grains. Each group of students will enact insect pollinators. Follow the steps below.
  - a. Assign different roles to the members of each team: Bee, who will carry pollen to the flower; Counter, who will count the number of pollen grains that land on the stigma; Recorder, who writes the number on a sticky note for the class graph; Manager, who removes all the grains from the box and flower diagram.
  - b. Each “bee” should take all the grains out of the bag and drop a few grains on top of each of the areas marked “stigma” on the flower diagram. (Students may run out of grains, before reaching all of the stigmas.)
  - c. The “counter” will determine the number of grains that actually are within the circles identified as stigmas. This number will be written on a sticky note by the “recorder” and posted on the class graph.

- d. The “manager” removes all of the grains from the box and returns them to the plastic bag.
5. Next, the groups will enact wind pollination. Give each group a bag containing 1/2 teaspoon of grains of rice (approximately 100 grains). Label each bag with one plant name, using the names listed below.

Oak (tree)  
 Bluegrass (grass)  
 Ragweed (weed)  
 Mountain Cedar (tree)  
 Timothy (grass)  
 Pigweed (weed)

- a. Assign the following roles to the members of each team: Wind, who will carry pollen to the flower; Counter, who will count the number of pollen grains that reach the stigma; Recorder, who writes the number on a sticky note for the class graph; Manager, who removes all the grains from the box and flower diagram.
  - b. The student designated as “wind” should use the entire bag of grains. From about 10 inches above the diagram, he or she should sprinkle the entire contents of the bag, by hand, randomly over the flower diagram.
  - c. The “counter” will determine the number of grains that are within the circles identified as stigmas. This number will be written on a sticky note by the recorder and posted on the class graph.
  - d. The “manager” removes the grains from the box and returns them to the plastic bag.
8. Examine the graph of the numbers of pollen grains that reached the stigma for the two different types of flowers. Lead a class discussion using the following questions.  
 Which kind of pollination wastes more pollen grains? [wind pollination]  
 Which kind of pollination delivers pollen directly to where it needs to be (stigma)? [insect] What does this example tell us about why trees and grasses produce so much pollen in the air? [They have to produce large amounts of pollen, because they do not have a carrier that will take the pollen directly to the right kind of flower.]  
 Do you think wind pollinated flowers need to have showy petals and bright colors? [No, because they do not attract insects. Many wind pollinated plants live in places with few insects, or flower at times when insect populations are low.]

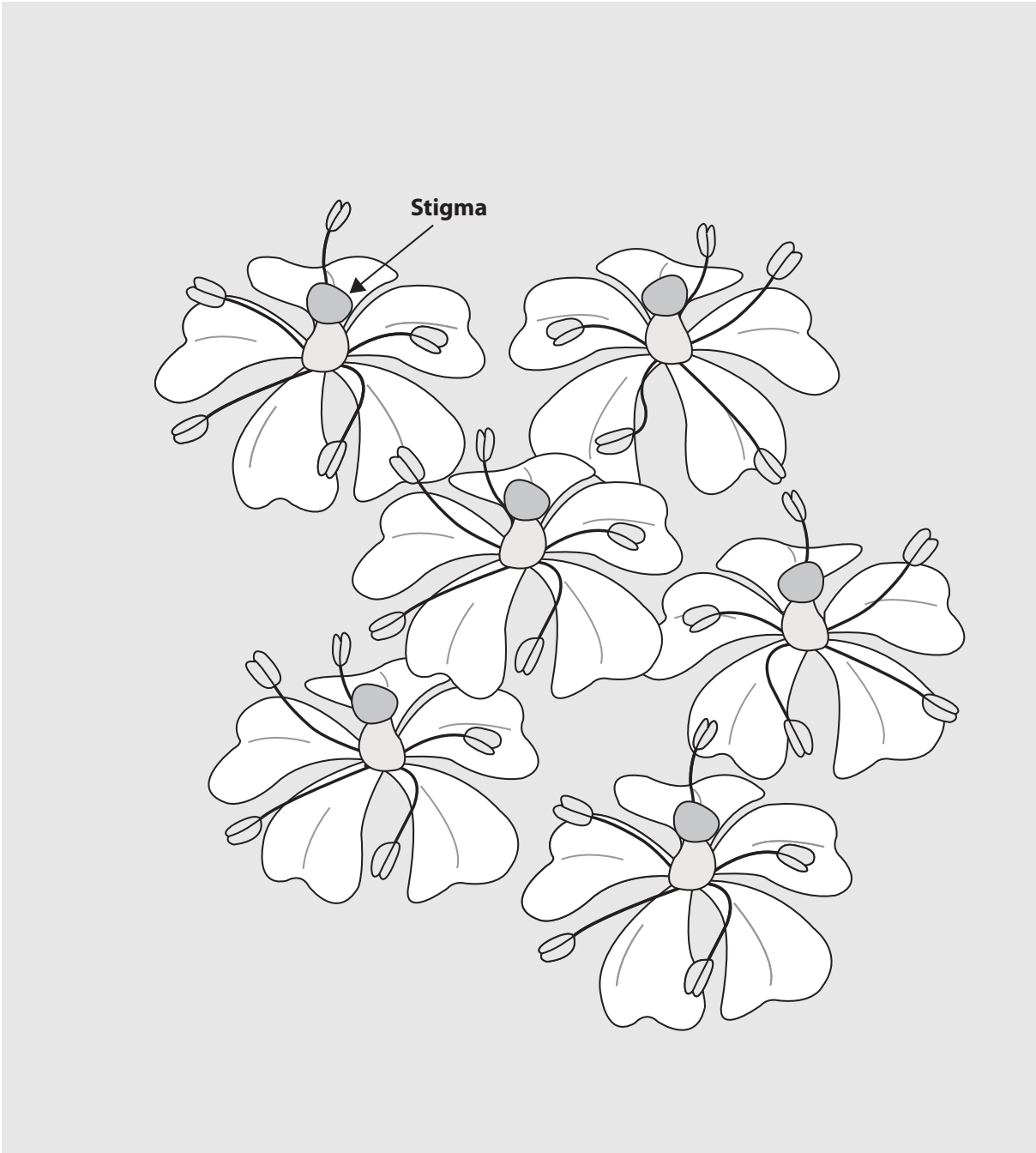
**ELABORATE AND EXTEND**

1. Conclude by discussing hay fever (pollen allergies) again. Did you know that hay fever is caused by pollen produced by wind-pollinated plants? Why might this be so? [Wind pollinated plants produce many small pollen grains that can be carried in air.]
2. Have students create a t-chart in their science notebooks that compares what they have learned about wind- and insect-pollinated flowers.

## My Flower Observations

1. Draw the complete flower.
2. Draw one of each of the petals and sepals, or the different kinds of colored segments (tepals).
3. Draw the stamens and pistil.

# Flower Diagram





## 5. Pollen in Your Region

### *Tracking Pollen Counts*

**Objective:** Students will use information from the National Allergy Bureau or local news media to graph pollen counts for their area over the course of several days or weeks.

**Time:** One class period to begin the activity, followed by 10 minutes daily for several successive days.

#### **BACKGROUND**

To help allergy sufferers, many agencies provide daily pollen counts and even forecast pollen conditions based on weather. The amount of pollen in the air often is higher during warm, dry and windy weather—these conditions are perfect for spreading pollen grains from plant to plant. Pollen counts also tend to be higher in the early mornings after any dew has dried. Rainy or cool weather leads to lower amounts of pollen—but cool damp weather usually is related to higher numbers of mold spores, which also can cause nasal allergies.

People with pollen or mold allergies should consider limiting their outdoor activities when pollen or mold counts are high. Other ways to reduce pollen exposures include keeping windows and doors closed, and using an air conditioner to filter out pollen grains. HEPA (high-efficiency particulate accumulator) filters will remove most of the pollen from indoor air. To further reduce exposures, it is good idea to remove and wash clothing, and shower to remove pollen grains from hair and skin after working or playing outdoors.

Time of year also affects the amounts and kinds of pollen. In general, tree pollens appear earliest each year (late January through May), followed by grasses, which typically begin producing pollen around May, and weeds, which are most active in late summer through fall. Mild winters usually lead to an earlier allergy season, because trees begin flowering sooner than usual.

The American Academy of Allergy, Asthma and Immunology provides regional pollen counts, and has a website that is free of advertising.

<http://www.aaaai.org/global/nab-pollen-counts.aspx>

The city of Houston, for example, reports detailed information about pollen concentrations. This information can be accessed at:

<http://www.houstontx.gov/health/Pollen-Mold/index.html>

Commercial sites, such as the Weather Channel ([www.weather.com](http://www.weather.com)), and local television stations provide pollen count information and forecasts of future pollen conditions to aid planning by allergy sufferers.

#### **MATERIALS NEEDED**

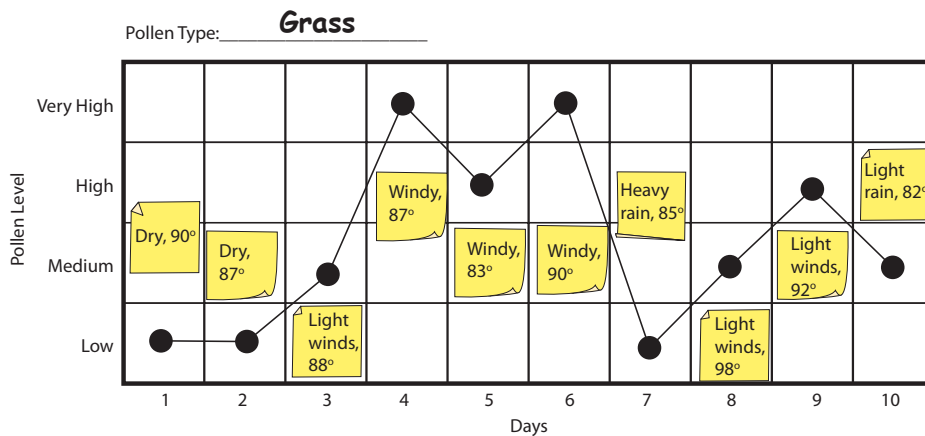
- Internet access and computers for students to look up daily pollen counts and weather information

- Interactive white board or computer and projector to show YouTube video (if access to YouTube is blocked in your school, download the video prior to class)
- Copies of “Daily Pollen Observations” page (one per group)
- 2 packages sticky notes
- Chart paper for class graphs

**SETUP**

The National Allergy Bureau reports pollen counts for most regions of the United States. You will want to find local pollen count resources on the Internet before beginning the activity.

Create four graphs for use by students on chart paper, a bulletin or white board. On the x-axis, mark off intervals for days, and add a different label for “trees,” “weeds,” “grass,” and “mold.” On the y-axis, mark off four intervals, corresponding to “low,” “medium,” “high,” and “very high.” Students will record daily information on the class graph.



**PROCEDURE**

**Observing and graphing daily pollen counts**

1. Ask students, *What do you think a person could do to reduce his or her exposure to pollen?* Compile a list of students’ ideas on the board. Possibilities include staying indoors when pollen amounts are high, filtering indoor air or wearing goggles when outdoors to protect eyes from pollen.
2. Follow by asking students, *Do you think it would be helpful to know when there will be a lot of pollen in the air?* Allow time for students to share their ideas. Then, explain that it is possible to collect pollen from air, and use a microscope to identify and count different kinds of pollen grains. If desired, show the following video, which describes a common pollen sampler. (<https://www.youtube.com/watch?v=qobfzn5sW3g>)
3. Tell students that local pollen count information is made available to help people with allergies. Each day, for 5–10 days, have students access one of the websites listed in the introduction to this activity, or the website of your local newspaper or television—to obtain information about the amount of pollen in the air and general weather conditions.
4. Have students work in teams of two for this activity. Each team will record their information on their pollen count daily either using the worksheet “Daily Pollen



Observations, or in their science journal. Pollen levels will be recorded as “0,” low, medium, high or very high (which is how counts usually are reported).

5. Each day, have teams place sticky notes to add information to the class graph for each of the pollen types and mold. Students will place a sticky note on the graph above each day at the appropriate pollen level. Have students write the date on the sticky notes before posting their findings, and the general weather conditions (e.g., temperature and precipitation).

#### **ELABORATE AND EXTEND**

1. Continue the activity for 5–10 days, depending on time available. To conclude the activity, conduct a class discussion. Have students look for patterns in the observations. For example, did pollen levels vary on different days? Was there a difference in pollen counts on rainy days as compared to days without rain?
2. Have each student write a paragraph in his or her science journal, or on a sheet of paper, about what he or she learned about pollen counts and allergies.
3. Have students track pollen counts on a regular basis, and report the information in the morning PA announcements at school every day.

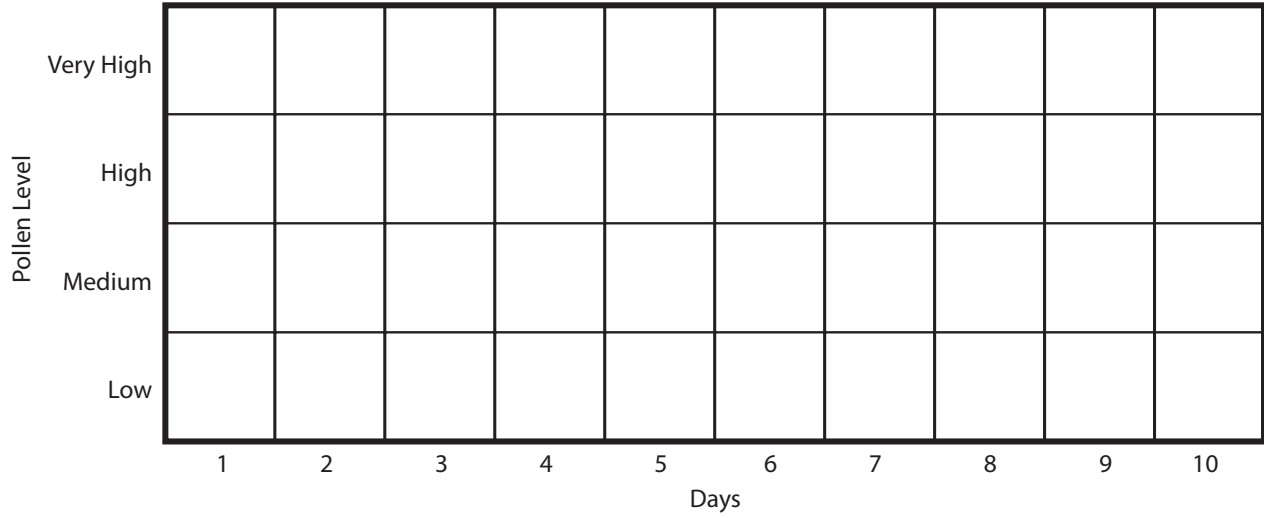
## Daily Pollen Observations

Using information from a news station, newspaper or weather website, find the following information about pollen and mold counts, and general weather conditions. For each day, record pollen and mold levels as 0, low, medium, high or very high.

Date	Tree Pollen	Grass Pollen	Weed Pollen	Mold Spores	Temperature (degrees F)	Rain (inches)

# Pollen Graph

Pollen Type: \_\_\_\_\_





## 6. Cockroach Patrol

### *Cockroach Reproduction and Allergies*

**Objective:** Students will learn about insect allergies and preventative action.

**Time Needed:** 2-3 class periods

#### **BACKGROUND**

Cockroaches have been on Earth for a very long time. The earliest cockroach fossils found so far are over 300 million years old! Today, there are approximately 4,500 different species of cockroaches. Of that number, about 30 species prefer to live in human habitats.

Most cockroaches are just a few centimeters long. However, the famous Madagascar hissing cockroach can grow to over 7 centimeters in length and be 2.5 centimeters wide. The Australian rhinoceros cockroach can grow to over 8 centimeters in length.

Three of the common human-habitat species in the United States are the American cockroach (*Periplaneta americana*), German cockroach (*Blattella germanica*), and the Oriental cockroach (*Blatta orientalis*). The American cockroach is the largest at about 3 centimeters in length and the smallest is the German cockroach at about 1.5 centimeters.



American cockroach.

Photo: Wikimedia Commons, Gary Alpert,  
<http://commons.wikimedia.org/wiki/File:American-cockroach.jpg>

These three species of cockroach do well in human habitats (homes, schools, restaurants, etc.) because these places are warm, moist, and provide ample food. Roaches prefer to move about in darkness. They have waxy shells that allow them to slip into tiny cracks and under furniture. They especially like moist places such as the gaps around pipes under sinks.

Roaches eat almost anything. They like human food scraps that are left on counters at night and scraps dropped on the floor. They dine on unwashed dishes and cookware. In a pinch, cockroaches will eat the glue holding together paper bags and cardboard boxes, and even eat dry human skin flakes and toenail

clippings. Some cockroaches prefer to eat soap, glue and even toothpaste.

Cockroaches can trigger human respiratory allergies and asthma. Cockroach allergens include feces, saliva, and the body parts of dead roaches. According to the Asthma and Allergy Foundation of America, experts in the field of allergies think the steady increase of asthma in children over the years may be due in part to the increase in the amount of time children play indoors rather than outdoors. Other studies indicate that between 78

and 98 percent of homes share their living space with 900 to over 300,000 roaches. One rule of thumb is that if you see one roach, there are at least 800 roaches hidden nearby.

Cockroaches are interesting animals. Unlike many insects, cockroaches reproduce through three stages of metamorphosis instead of four. This is called “incomplete metamorphosis.” The female roach produces an egg case that can contain dozens of eggs. The egg case is dropped and is often attacked by other roaches that eat the eggs. Those eggs that are not eaten will hatch and nymphs emerge. Cockroaches do not go through a larva stage, as do butterflies. Cockroach nymphs are immature (“baby”) roaches. Developing from egg to adult roach takes about three months. During that time, the nymphs molt weekly, leaving debris that can cause allergies in humans. Some roaches live about a year and are incredibly tough. They can survive for hours in sub-zero temperatures—and those that cannot, such as German cockroaches, and have been found in human dwellings in Nunavut, Canada, the northernmost permanently inhabited place in the world. Roaches also can survive after being exposed to levels of radiation six or more times higher than levels that would be lethal for humans. Other species can go without air for up to 45 minutes.



Cockroach egg case (ootheca) and nymph. (Wikipedia. Org)

In this activity, students learn about cockroaches and their relationships to people. They create posters for display around school on how to rid or discourage cockroaches from living in homes and other buildings.

### **MATERIALS NEEDED**

- Cockroach School and the Bigfoot Monsters story (individual copies for students to read, or project the story for the class to read together)
- Poster board and various art supplies

### **PROCEDURE**

1. Ask students if they have ever seen a cockroach. Explain that a cockroach is an insect. Some varieties of cockroaches like to live around humans. This can be a problem because many people are allergic to cockroaches. This activity teaches about insect allergies, and uses a short story about “Cockroach School,” to cover basic biology and prevention concepts.
2. Read the story *Cockroach School and the Bigfoot Monsters* to the class. Or, have students read the story individually or by taking turns in small groups.
3. Afterward, ask students to explain the meaning of different elements of the story.

- a. What is the dark space where the school was held? (kitchen)
  - b. What are the bigfoot monsters? (people)
  - c. What are the plastic water tunnels? (water pipes)
  - d. What is a nymph? (baby roach)
  - e. Why did the cockroaches have a party when the bigfoot monsters left? (food and drink spilled)
  - f. What are the things that cockroaches need to survive? (food, water, shelter)
  - g. Why do you think the visit from the exterminator didn't work, and the roaches were able to return? (The people still leave food scraps and liquids that attract the roaches.)
4. Point out to students that in addition to pollen, food, chemicals, and other materials, cockroach feces, saliva, and body parts from dead roaches also are allergens that can make us sick.
  5. Ask students for their ideas on how to discourage cockroaches from living with us. Have them use the Internet or library to gather additional information about cockroaches and the allergies they trigger in people.
  6. Have small teams of two or three students create posters that illustrate what they have learned about cockroaches and how to keep them out of homes and other places. This can include learning some basic facts about insects, including parts and physical development including complete and incomplete metamorphosis. For example, a poster might show the life cycle of a cockroach. Or, a poster might list tips for dealing with cockroaches such as never leaving food out on the counter overnight.

### **ELABORATE AND EXTEND**

Have teams exhibit their posters and talk about them in class. Then, display the posters around the school. They could also create dioramas illustrating parts of the story.

NIAID Study: Cockroaches Important Cause of Asthma Morbidity Among Inner-City Children

<http://www.niaid.nih.gov/news/newsreleases/1997/Pages/asthmanr.aspx>

Cockroach Allergy

<http://www.aafa.org/display.cfm?id=9&sub=22&cont=312>

Cockroach Infestation - National Geographic TV

<https://www.youtube.com/watch?v=CcpRfsLII2M>

National Cockroach Project

<http://news.nationalgeographic.com/news/2013/10/131007-cockroach-new-york-neighborhoods-insects-bugs-science/>



## 7. Go Fish for Allergens

**Using Knowledge to Win!**

**Objective:** Students will “be exposed” to many common allergies while playing a “Go Fish” type card game.

**Time Needed:** 1 class period

### BACKGROUND

The number of possible allergies is unlimited. Besides hundreds of food, plant matter, insect venom, and dust allergens, there are latex, detergent, wood, metal, medications, fur and dander, insects, monosodium glutamate (a food additive, known as MSG), and many more. People become sensitive to different things. The challenge for allergy specialists is to uncover the allergens to which a person is sensitive and then come up with treatments.

Fortunately, most allergies fall into general categories that can narrow the search for the allergen. These main categories of allergens include food, pollen, dust mites, mold, insect stings, and certain medications.

In this activity, students will learn about some common allergens and allergies by playing a card game based on the classic card game Go Fish. A special deck of cards is used for the game. When players accumulate four of a particular kind of allergen, the “book,” as it is called, is placed on the table. A player wins the game by making the most books. As each book is made, the player, who has made the book, selects the corresponding Allergy Information Card and reads the information contained on it to the other players.

### SETUP

Prepare enough decks of playing cards. Print the cards on card stock paper. Each deck consists of 52 cards and 12 information cards. If possible, laminate the cards for durability.

### MATERIALS NEEDED

#### Per Student Group of 4

- Deck of Allergen Playing Cards (make copies on cardstock; laminate cards if desired)



Poison ivy (*Toxicodendron radicans*) is a common poisonous plant that causing an itchy rash with blisters.

Photo: Wikimedia Commons,  
[http://commons.wikimedia.org/wiki/File:Toxicodendron\\_radicans.jpg](http://commons.wikimedia.org/wiki/File:Toxicodendron_radicans.jpg)

- Set of Allergen Information Cards (make copies on cardstock; laminate cards if desired)
- Copies of the Go Fish for Allergens rules

## **PROCEDURE**

### **Playing the Game**

1. Explain to students that they will play a card game to learn about common allergies and allergens. Ask if any of them have ever played the card game, “Go Fish.” Tell students that the game they will play is similar to Go Fish.
2. Show students the Allergen Playing Cards deck. Tell them that the deck consists of 12 allergens (4 cards each) and 4 wild cards that can be any allergen a player chooses. Also show students the Allergy Information Cards.
3. Read, along with the students, the rules for the game. Emphasize important parts of the instructions, such as how to ask for cards, what makes up a “book” of like cards, how someone wins, and how the Allergy Information Card needs to be placed in a central place on the table and will be read out loud each time a book is made.  
Tip: If students play more than one round of the game and have learned the information on the Allergy Cards, you may dispense with reading of the cards in subsequent rounds.

### **ELABORATE AND EXTEND**

Have students use the Internet to look up different kinds of allergies. Have them make a list and compare their lists to the results of the What’s My Allergy? survey done at the beginning of the unit.



# Go Fish for Allergens Rules

Go Fish for Allergens is a card game that is similar to the classic card game, Go Fish. A special deck of cards is used for the game. While playing, you will learn about allergens and allergies.

**Players:** 2, 3 or 4 (4 players is recommended)

**Deck Description:** Go Fish for Allergens deck consisting of 52 cards (48 allergy cards - 4 each of 12 allergens and 4 wild cards)

**Objective:** Players try to make allergy “book” of four of the same allergen cards. The player that makes the most books is the winner.

## Rules:

1. Any player deals out one card face up to each player. The first player who receives a “Peanuts” card is designated as the dealer. If no one gets a Peanuts card, deal more cards until someone does.
2. The dealer shuffles the cards and lets the person to his or her right cut the deck.
3. The dealer deals the cards one at a time face down to each player. If two or three people are playing, the dealer deals out 7 cards per player. If four people are playing, the dealer deals out 5 cards per player. As an alternative to dealing, players may, in turn, draw their cards from the deck placed face down on the table. The remaining cards are left in a stack face side down in the middle of the table.
4. The player to the left of the dealer starts the game by asking for cards of a particular type from any other player. When asking for cards, the asker may only request cards matching one or more of the cards in his or her hand.

For example, the starting player looks directly at one of the other players and asks him or her by name to “Do you have any “wheat” cards?” There are 12 different allergen cards that can be requested. If the player, who is asked, has one or more wheat cards (or any other card that was asked for), that player has to give the asker all of the requested cards in his or her hand.

If the asker receives one or more cards, that player may ask another player by name for more wheat cards or for cards for any other allergy.

As long as the asker receives cards, that player continues playing. If the player being asked for cards doesn’t have any of those cards, the asker is told to “Go Fish.” The asker takes a card from the stack to add to his or her collection. The turn passes to the next player on the left.

4. When a player assembles a complete set or “book” of four cards of a particular allergen, the cards are placed in a stack face up. See rule 7!

5. There are four wild cards in the deck. If a player receives a wild card, the card should be held until needed. The wild card is used for completing a book of any of the allergens. Only three of the same allergen cards will be needed to make a book if a wild card is used for the fourth card. Players may not ask for wild cards. If another player has the actual fourth card for that allergen, that player may remove the card from his or her hand and add it to the completed book.
6. If a player runs out of cards before all 12 sets are made, that player will draw a card from the stack on his or her next turn so that he or she may continue playing.
7. Special Rule: Each time a player makes a book of four cards, that player must pick up the information card on the same allergen and read the card to the group. If playing more rounds of this game, this rule can be dispensed with after the first round.
8. The game ends when all 12 books are made. The player with the most completed books is the winner. If there is a tie with two or more players completing the same number of books, shuffle the cards again and deal seven cards face up to each of the players who are tied. The winner will be the person with the most pairs of cards. If no player has a pair or there is still a tie, deal another card. Continue dealing until one player has a pair or one more pair than any other tied player.



**Dust Mites**



**Dust Mites**



**Dust Mites**



**Dust Mites**



**Mold**



**Mold**



**Mold**



**Mold**



**Wheat**



**Wheat**



**Wheat**



**Wheat**



**Weeds**



**Weeds**



**Weeds**



**Weeds**



**Milk**



**Milk**





**Milk**



**Milk**



**Fish**



**Fish**



**Fish**



**Fish**



**Soybeans**



**Soybeans**



**Soybeans**



**Soybeans**



**Grass**



**Grass**



**Grass**



**Grass**



**Insect Stings**












**Insect Stings**






**Insect Stings**



**Insect Stings**

 <p><b>Shellfish</b></p>	 <p><b>Shellfish</b></p>	 <p><b>Shellfish</b></p>
 <p><b>Shellfish</b></p>	 <p><b>Eggs</b></p>	 <p><b>Eggs</b></p>
 <p><b>Eggs</b></p>	 <p><b>Eggs</b></p>	 <p><b>Peanuts</b></p>



 <p><b>Peanuts</b></p>	 <p><b>Peanuts</b></p>	 <p><b>Peanuts</b></p>
<p><b>Any Allergy</b></p> <p><b>Wild Card</b></p>	<p><b>Any Allergy</b></p> <p><b>Wild Card</b></p>	<p><b>Any Allergy</b></p> <p><b>Wild Card</b></p>
<p><b>Any Allergy</b></p> <p><b>Wild Card</b></p>		



## Dust Mites



**Dust Mites** live in our homes. They are tiny relatives of spiders. This is how big dust mites are. How many do you see below?



Dust mites feed on flakes of dried human skin. Many people are allergic to dust mite poop. You can reduce dust mites in your home by washing bed sheets in hot water once a week and by vacuuming carpets.

Answer: 30

## Peanuts



**Peanut** allergies are very common, especially in children. Peanuts are found in many foods. Candy, energy bars, cookies, muffins, and bread may contain peanuts. Peanut butter is loaded with peanuts!

For some people, even a tiny bit of a peanut is enough to cause a severe allergy attack.

If you have a peanut allergy, always check food labels to see if the food includes peanuts.

## Eggs



**Egg** allergies are common in children. It is the whites of eggs that cause the reactions.

People with egg allergies should avoid all egg products. It is very hard to separate egg yolks from the whites. Some egg white always sticks to the yolks and causes allergic reactions.

Eggs are found in cakes, cookies, cheesecakes, some soups, marshmallows, mayonaise, breakfast sandwiches and tacos, and macaroni.

## Mold



**Mold** is a type of fungus that breaks down dead material. Some mold forms green patches on old fruit. Mold also grows in damp places inside buildings

Mold spreads through tiny spores that are carried though the air. We breathe in the spores. Some people only experience mold allergies when conditions are damp or wet.

Avoid damp places and keep your bathroom dry. Air conditioning also helps reduce mold.

## Wheat



**Wheat** is found in many foods such as breads, cakes, breakfast cereals, pasta, gravy, crackers, and even ketchup.

People with a wheat allergy should avoid all wheat. This is not hard to do because other grains can substitute for wheat. Most people with a wheat allergy can eat, corn, rice, and tapioca.

## Weeds



**Weed** allergies cause stuffy heads, runny noses, and itchy eyes.

Many flowering plants, like ragweed release pollen into the air. People who are allergic to weed pollen are said to have "hay fever." People also call grass pollen allergies hay fever. There are many kinds of weeds that produce irritating pollen.

## Grass



**Grass** tends to start growing in the spring. By late spring, grass starts releasing pollen into the air. The pollen gets into our lungs.

People allergic to grass have stuffy noses, itchy eyes, and coughs.

There are hundreds of varieties of grass. Even if you are not near any grass, wind can carry pollen for miles and bring the pollen to you.

## Milk



**Milk** allergy is the most common allergy affecting young children. How strong the reaction is to cow's milk varies person to person. Most children outgrow their milk allergies.

As with other food allergies, the best thing to do is to carefully read ingredient labels on foods. Avoid anything that has milk as an ingredient. That means white or chocolate milk in a glass, cheeses, ice cream, butter, pudding, sour cream, and even some chocolates.



## Fish



**Fish** can cause severe allergic reactions in people. Salmon, tuna, and halibut are the most common fish that people are allergic to.

If someone is allergic to one type of fish, it is likely that that person is allergic to other kinds of fish.

People with a fish allergy should avoid all types of finned fish (fish with fins).

## Shellfish



**Shellfish** are a different kind of fish from the finned varieties such as salmon.

Shellfish include shrimp, crabs, lobsters, octopus, squid, clams, scallops, and oysters. If you are allergic to shellfish, you may not be allergic to finned fish.

Most people allergic to shellfish have their first reaction as an adult.

## Insect Stings



**Insect Stings** can be very serious for persons allergic to them. All stings hurt but people allergic to bee and wasp stings will have itching, swelling, dizziness, and difficulty breathing.

Every year in the US, about one half million people have to go to the emergency room because of insect stings.

## Soybeans



**Soybeans** are a good source of protein, but they cause allergic reactions in about one in every 25 young children. Most outgrow the allergy by the time they reach 10.

Soybean reactions are usually mild such as tingling in the mouth, wheezing, itchy skin, and a runny nose.

Soybeans are used in many foods. If you are allergic, avoid soy milk, edamame beans, soy sauce, soy nuts, and tofu.



## 8. Your Story

### *Using Information*

**Objectives:** Students will use the information they have learned about allergies to write and illustrate their own stories about allergies.

**Time Needed:** 3-4 class period

### **BACKGROUND**

Understanding allergies can be considered a life skill. Most people will experience an allergic reaction at some time during their lives. These reactions occur when the body's immune system over responds to a particular substance. Some allergies are temporary, or disappear, as a child grows older, while other allergies are life-long.

The effects of allergies are widespread. Here are a few facts and figures about the extent to to which allergies affect children and adults in the United States (Statistics from: <http://www.webmd.com/allergies/allergy-statistics>).

- One in five people in the United States have symptoms of allergies or asthma.
- Fifty-five percent of the US population tests positive for one or more allergens.
- Allergies are the fifth most important class of chronic diseases in the U.S. (Chronic diseases are conditions that persist over time.)
- Allergies cost the health care system and businesses about \$7.9 billion per year.
- Four million workdays are lost each year as a result of hay fever.
- A child with one allergic parent has about a one in three chance of developing allergies. This likelihood doubles to more than two in three chances, if a child has two parents with various allergies.
- Food allergies lead to about 30,000 emergency room visits per year.
- All (100%) of US households have detectable levels of dog and cat dander.

### **MATERIALS NEEDED**

#### **Teacher**

- One or more cereal boxes
- Pair of scissors or utility knife

#### **Per Student Team of 2**

- 3 sheets of 8.5-in. x 11-in. copier paper
- 1 sheet of 8.5-in. x 11-in. cardstock
- 1-in. x 8.5-in. strip of colored duct tape
- Colored pencils or markers
- Stapler

#### **SETUP**

Cut one or more cereal boxes diagonally to use as holders for all of the students' books. Decorate the boxes and reinforce the edges and bottom with duct tape.



## **PROCEDURE**

1. Begin with a class discussion. Have students summarize the information they have learned about allergies.
2. Explain that each student, along with a partner, will be creating a story to illustrate one of the allergies they have learned about.
3. Have teams select their story topic by having them draw one of the Allergen Information Cards from Activity 7. If a group is interested in an allergy that is not included on the cards, they may choose to write about that allergy instead.
4. Tell student teams to begin their story by brainstorming possible story lines and noting their ideas. The story can be factual or fictional. Then, have them pick the story line they like best and assemble the information they need for the story. If needed, teams can search for more information about the allergy online.
5. Remind students that if the story is fictional, like *Cockroach School and the Big Foot Monsters*, they will need an engaging opening sentence, be able to introduce the characters and setting, and develop a plot that involves an experience with an allergy.
6. Explain that they have 2–3 class periods to write their rough draft of the story. This can be an integrated project with the language art class, if possible.
7. Next, give student teams three sheets of white copier paper and one sheet of cardstock. To create the inside of the book, have students make a half-fold of each 8.5-in. x 11-in. sheet to make a folded sheet that is 8.5-in. x 5.5-in. in size. This is called a “hamburger fold.” Students also should fold the cardstock to the same size for use as the cover. Do not let them bind the book yet.
8. Have students write their stories on the copier paper. Because of the fold, teams have 12 pages to use for stories and illustrations.
9. When stories are complete, have students assemble the pages inside the cover. Three staples should be placed about 1/4 inch in from the folded edge to bind the cover and pages together.
10. For safety, fold a 1-in. x 5.5-in. strip of duct tape over the staples on the binding edge of each book.
11. Have teams write the title and author names on the book cover, then decorate it.

## **ELABORATE AND EXTEND**

Place the book collection on a shelf in the classroom. Let students check out the collections to take home and share with their families.