

Unit 4: The Power of Pollinators

WEEK 6 Lesson 2

Science and Engineering
Properties of Materials for Designing Hand Pollinators

Big Idea	Pollination is a result of animal behavior.
Guiding Question	How does pollination happen?
Content Objective	I can use a model of a flower to show how a material can pick up and deposit pollen from one flower to another. (2-PS1-2, Practice 2)
Language Objective	I can discuss and record how much pollen is picked up and deposited by different materials. (SL.1.2)
Vocabulary	agricultural engineer: someone who develops tools and systems for farming deposit: to place or put down; to drop off (*Unit 2, Week 4) effective: producing a good or positive result (*Week 4) model: a small copy of something reproduce: to have young or offspring; to make again scarce: in short supply, low in number
Materials and Preparation	On the whiteboard, write these questions: What properties of materials are most important for picking up and depositing pollen? Would this material be effective for picking up and depositing pollen? ● chart paper and markers Create the following chart. Note that the Observations column will be left blank here and used in Lesson 3.

Evaluating Materials for Hand Pollinators

What properties of materials are most important for picking up and depositing pollen?

Object	Material	Properties	Observations
marble	glass		
tape	adhesive tape		
eraser	imitation rubber		
aluminum foil	aluminum		
pompom	imitation wool		
pipe cleaners	chenille		
<i>Leave blank for other</i>			

- one real flower with male and female parts, such as a lily, tulip, or daffodil, or image
- Flowers for Testing sheets, one for each child
- Parts of a Flower poster, for reference
- sticky notes, a few for each pair of children
- writing tools

For each pair of children, plus an extra set for demonstration, gather:

- eraser, 1 piece (one third of the provided eraser sticks)
- marble, 1
- aluminum foil or wax paper, 1 2-inch square
- pompom, 1
- pipe cleaner, 1 2-inch piece
- tape, 1 piece about 2 inches long
- small plastic cups, 2
Cut the bottom out of one of each pair of cups.
- baking soda, ½ teaspoon

Note: Materials will be used continuously in Weeks 6-8. Devise an

	<p>organization system that children can manage for accessing their sets of materials as needed.</p>
<p>Opening 15 minutes</p>	<p><i>This week we will begin our Engineering project. We now know that flowers need to be pollinated to reproduce, or to form seeds.</i></p> <p>Think, Pair, Share. <i>What might cause pollination to <u>not</u> happen?</i></p> <p>As children share their thinking in the whole group, highlight or surface these ideas:</p> <ul style="list-style-type: none"> ● In some places pollinators are scarce—there are not many of them. ● Sometimes, such as when plants grow in greenhouses, it’s difficult for pollinators to get to plants. <p><i>In these cases, farmers and gardeners might use hand pollinators—a tool to pollinate flowers by hand instead of leaving the job to animal and insect pollinators.</i></p> <p><i>You are about to become agricultural engineers. Agricultural engineers design and improve technology for farmers to help with their work. To support pollination, you will design and build tools that farmers or gardeners could use to pollinate flowers by hand.</i></p> <p><i>What materials will you use to build such a tool? The first thing to find out is this: What properties of materials are most important for picking up and depositing—dropping off—pollen?</i></p> <p><i>We considered the properties of materials when making chairs, way back in the fall. We thought about what properties were important to build specific kinds of chairs.</i></p> <p><i>Here are the materials we will be working with for this design challenge: making a hand pollinator.</i></p> <p>Refer to the Evaluating Materials for Hand Pollinators chart. Name and show each material and ask children to name a few properties of each one. Record their ideas on the chart.</p> <p><i>This time, you will be considering whether a material’s properties make it effective for picking up and depositing pollen.</i></p> <p>Read the first question on the board.</p> <p><i>A hand pollinator must be able to both pick up and deposit pollen to be effective—to work well—in pollinating a flower. What would happen if a material could pick up pollen from one flower, but not deposit it on another flower?</i></p>

Harvest children's responses. [The new flower will not be pollinated and then it will not be able to make new seeds.]

You and your partner will have a collection of materials. First, talk together to make predictions. For each material, ask [refer to the second question on the board]: Would this material be effective for picking up and depositing pollen?

*After you consider the materials and make predictions, test them! Agricultural engineers work with models. A **model** represents the parts of a real object. Let's take a look at a real flower and the model of the flower you will use.*

Show the flower. Review the parts of the flower and how pollination happens in nature.

Show the Flowers for Testing sheet.

Next to each flower on this page is the name of an object. These are the objects you will test to find out how effectively they work for picking up and depositing pollen.

Demonstrate the setup of the investigation.

Let's set up our investigation. These plastic cups will be our models of flowers.

Place the intact cup upside down and spread the baking soda across the flat surface (the bottom of the cup).

In our model, the flat part of this cup is the stamen—the male part of the flower—and the baking soda is the pollen.

Place the cup with the bottom removed upside down on top of a Flowers for Testing sheet.

In our model, this cup is the stigma—the female part of the flower.

Refer to the Parts of a Flower poster and to the real flower.

Demonstrate the method of the investigation.

To test how a material picks up pollen, you will touch the baking soda—the "pollen" on the "stamen"—with the object you are testing. Use a light touch. It's important that you use the same kind of light touch with each test.

To deposit pollen, tap the object with the pollen gently three times on the edge of the cup—the "stigma." We call this the Three Tap Method, and we'll do it the same way each time.

Answer children's clarifying questions about the method.

	<p><i>Why do you think it's important to pick up and deposit the pollen the same way for each material we test? [to compare the results for each material]</i></p> <p><i>We'll discuss what you discover during our next Science and Engineering lesson.</i></p>
<p>Investigation 15 minutes</p>	<p>As children work, encourage them to talk with their partners about the various materials, describing the materials' properties and sharing their observations about which are effective at picking up and depositing the "pollen."</p> <p>Encourage children to be very careful in controlling conditions—use of the Three Tap Method—noting that differences in conditions may yield differences in results.</p> <p>Listen for and note insightful observations and connections. For example, materials that are slippery don't pick up pollen well; materials with a fuzzy texture—similar to insects' legs or bodies—pick up and deposit pollen effectively. If children name additional properties of the materials, have them write each one on a sticky note and add it to the chart, in the appropriate row of the Properties column.</p> <p>Assure children that they will have more time in the next lesson to test materials.</p>
<p>Closing</p>	<p>Guide children to clean up and organize materials.</p> <p>Leave the questions on the board for the next lesson, or write them on chart paper. The investigation will continue at the beginning of Lesson 3; in addition, allow children to explore the materials during Studios.</p>
<p>Standards and Practices</p>	<p>SL.1.2 Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.</p> <p>2-LS2-1 Plan and conduct an investigation to determine if plants need sunlight and water to grow.</p> <p>2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.</p>
<p>Ongoing assessment</p>	<p>Review observational notes from the investigation.</p> <p>How do children approach and go about conducting their investigation?</p> <p>What aspects of their observations do they discuss?</p> <p>What conclusions do children draw, and how do they use evidence</p>

	from their observations and data to do so?
--	--

Notes: