# POLLINATORS

## SECOND GRADE TEACHER GUIDE

Ecology in Classrooms & Outdoors

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# POLLINATORS
# UNIT OVERVIEW

## SUMMARY

What is a pollinator? Bees, butterflies, moths, hummingbirds, bats, and other fascinating animals are important components within an ecosystem. A healthy ecosystem has many parts that work together and pollinators are a perfect example of this phenomena. In this unit, students discover the role of a pollinator in an ecosystem and why pollinators are so important for all life on Earth- including humans! Students will learn all about pollinator species that we are likely to see in the Pacific Northwest and what makes them unique. Through science, art, social studies, math, and English language arts, students are able to fully explore one of the most important ecosystem services on the planet: pollination.

## OVERALL GUIDING QUESTIONS

1. What is a pollinator?
2. How are pollinators important to Pacific Northwest ecosystems?

## OBJECTIVES

**Each student will be able to:**

- Define pollination and describe the ecological benefits of pollinators
- Describe how specific adaptations help pollinators do the work of pollinating plants
- Identify common species of pollinators found in the Pacific Northwest

## USING THIS GUIDE

The ECO Pollinators unit incorporates four interdisciplinary lessons to fully explore pollinators and engage students across science, math, English language arts, social studies, and art. It is necessary to present the science lesson before the additional lessons to lay the foundation of understanding. ECO has created a recommended order beyond the science lesson, but teachers are free to modify the sequence.

Each lesson offers suggestions for a closing circle, discussions, or journal prompts. These suggestions may be used anytime throughout the unit as an assessment to monitor student progress.

Each Place-Based Unit has been intentionally designed to consider Diversity, Equity, and Inclusion in every classroom.


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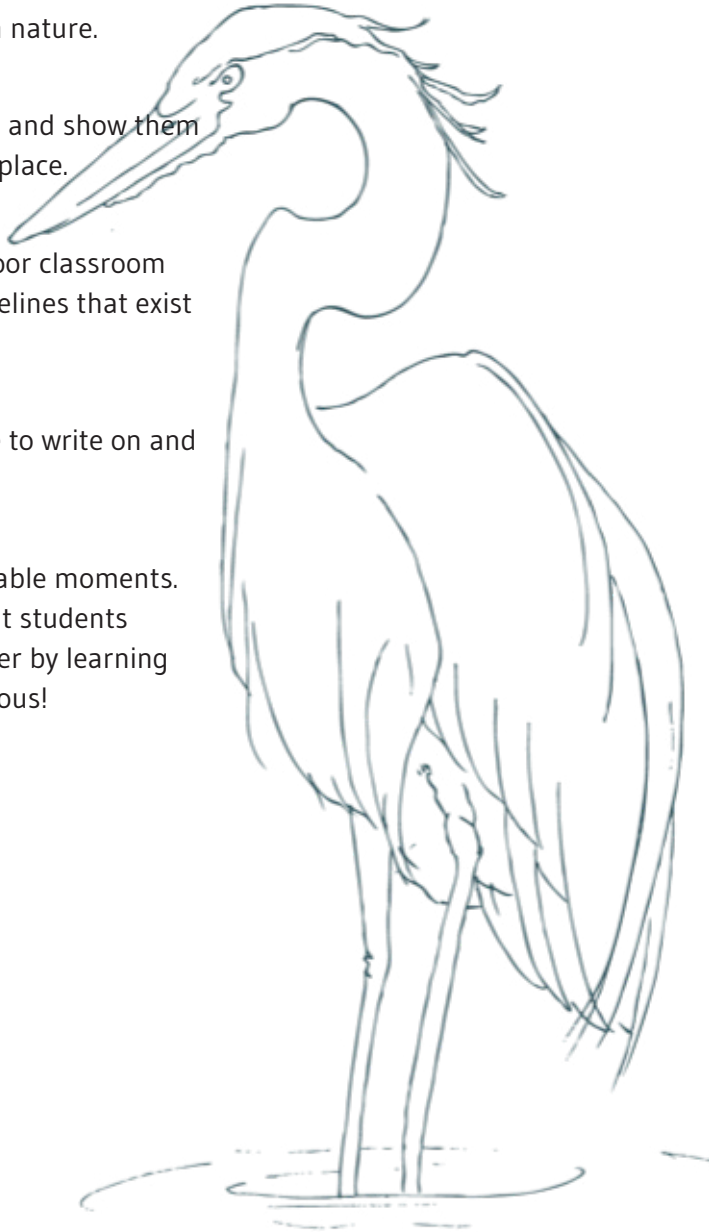
POLLINATORS

# UNIT OVERVIEW

## WANT TO TAKE THE LEARNING OUTSIDE?

This unit is designed to be delivered indoors or outdoors! We encourage teachers to find spaces in the schoolyard where students are able to learn and interact directly with nature.

- Take students on a walk around the schoolyard and show them the outdoor classroom before the lesson takes place.
- List expectations and boundaries for your outdoor classroom so that students remember that the same guidelines that exist inside, exist outdoors.
- Make sure to bring clipboards or a hard surface to write on and have students wear appropriate clothing.
- Remember, outdoor learning is all about teachable moments. Encourage curiosity, pause for observations that students are excited about, and nurture a sense of wonder by learning alongside your students. Enthusiasm is contagious!



## SUPPORT

Please contact **support@ecologyoutdoors.org** with any questions or concerns.

## TRAINING

Videos of ECO educators delivering select sections of the lessons are available. Contact **support@ecologyoutdoors.org** for access.

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POLLINATORS

# STANDARDS OVERVIEW

## SCIENCE (NGSS)

- 2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
- 2-ETS1-2: Engineering Design: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

## MATH

- 2.G 1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.
- 2.G 5. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

## ELA

- 2.W.3 Write narratives in which they recount a well-elaborated event or short sequence of events, include details to describe actions, thoughts, and feelings, use temporal words to signal event order, and provide a sense of closure.

## ART

- VA.1.CR1.2 Make art or design with various materials and tools to explore personal interests, questions, and curiosity.
- VA.2.CR2.2 Repurpose objects to make something new.

## SOCIAL STUDIES

- 2.25 Evaluate information relating to an issue or problem.
- 2.26 Use listening, consensus-building, and voting procedures to decide on and take informed action.


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# POLLINATORS BACKGROUND

Animals are responsible for 80% of pollination in the United States. **Pollination** is what bees and other insects, birds, and some mammals do when they spread the pollen from one flower to another flower, aiding in the plant's reproductive cycle. **Pollen** is the male component of flowering plants that helps create seeds, and it needs to be spread to or interact with the female part of the plant's flower in order for the plant to produce seeds. Pollen is created and found on a flower's **stamen** and is spread to the female flower part, called the **pistil**. See diagram for a closer look at the reproductive parts of a flower.

When the process of pollination occurs, there exists a **symbiotic relationship** between the insect or other animal and the plant, meaning that they both benefit in some way. For example, bees need **nectar** from flowers in order to make honey for their young and to use as a food supply during the winter. When they collect nectar and pollen from flowers, some of the pollen will transfer from their body onto other flowers, beginning the reproductive process. Bees, other insects, and animals that pollinate plants have many observable **adaptations**, or characteristics passed down from generation to generation.

These adaptations help bees to pollinate flowering plants more easily, which works both in the bee's favor (more flowers leads to more nectar for their primary food source) and the plant's favor (reproduction). Examples of adaptations in pollinators include but are not limited to: furry or fuzzy body parts, sticky body parts, wings for locomotion, beak or mouth shape, and acute senses of sight or smell to find flowers.

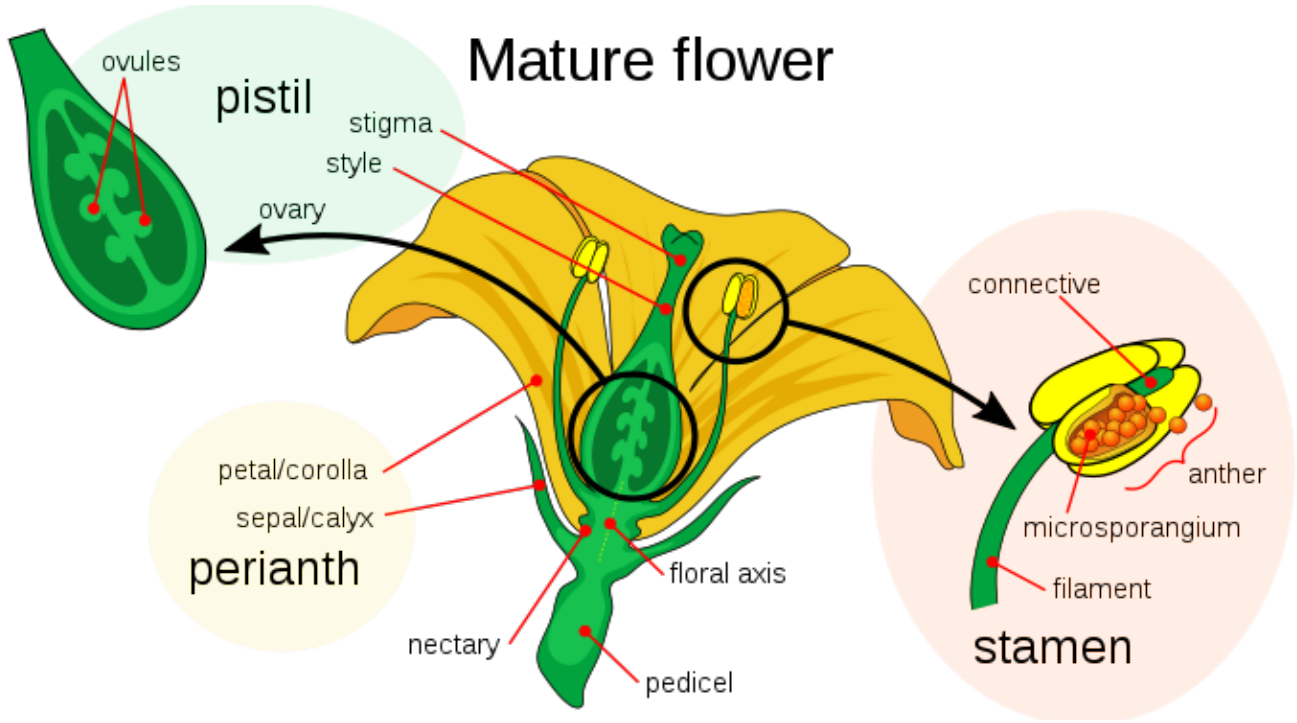
## WHY STUDY POLLINATORS?

Pollinators provide a service for their own species as well as many other species within a system. Humans are no exception: our agricultural crops all utilize the power of pollinators in nature.

Students can connect with the idea that pollination is important for our own food consumption, as well as the health of the ecosystem and all of its organisms. Unfortunately, bees and other wild animals' populations are decreasing due to habitat loss and other human activities. It is important that future generations protect and conserve these species to ensure a stable planet.

Pollinators in the Pacific Northwest are abundant and there are many that have interesting adaptations and behaviors. For this reason, it is also useful for students to study them and gain familiarity or connection with different species that they are likely to observe outdoors.

https://www.fs.fed.us/wildflowers/pollinators/Plant_Strategies/index.shtml

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SCIENCE LESSON

# POLLINATORS OF THE PNW

## SUMMARY

In this lesson, students learn about the process of pollination by bees, butterflies, beetles and other insects, and birds. Then they participate in a hands-on activity to create a Super Pollinator that explores the structure and function of pollinators' specialized bodies, illustrating their vital place in many ecosystems. This unit includes the booklet Common Bee Pollinators of Oregon Crops created by the Oregon Department of Agriculture for students to use to further study local bee species.

## OBJECTIVES

**By the end of the lesson, students will be able to:**

- Define pollination and describe how pollination helps plants produce seeds
- Describe how specific adaptations allow pollinators to move pollen from plant to plant
- Identify common species of pollinators found in the Pacific Northwest

## GUIDING QUESTIONS

1. How do animals in an ecosystem interact with plant parts to pollinate plants?
2. How do animal adaptations help with the function of pollination?

## LESSON-AT-A-GLANCE

**GRADE LEVEL** 2

**INTEGRATED LEARNING FOCUS** Science

**LESSON PREP** 5 minutes to set up flowers with pollen, presentation

**LESSON DURATION** 45 minutes

**CLASS SIZE** Any

**ACTIVITY TEAMS** 4-5

**MATERIALS**

- Presentation *Pollinators of the PNW*
- 4 flowers with velcro and "pollen" pieces inside
- "Super Pollinator" costume items:
- Antenna
- Goggles
- Party blower
- Fuzzy jacket
- Wings
- Long black satin gloves

## SCIENCE

- 2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

## ACADEMIC VOCABULARY

**pollination**
**nectar**
**larvae**
**coevolution**
**adaptation**
**proboscis**
**compound eyes**


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## ACTIVITY PROCEDURE

### 1. POLLINATORS PRESENTATION

Set up presentation *Pollinators of the PNW*. Prepare flower props (used during the activity) by putting the velcro pollen pieces inside of each.

To begin the lesson, show slide 2 and ask students to talk with their neighbors to answer the question on the slide, "what is pollination?" After about 30 seconds, have students share what they discussed with the class.

**Pollination** is defined as the process by which pollen is moved from one plant to another, making it possible for the plant to make seeds.

Begin going through the slideshow, discussing each image with students.

### 2. POLLINATION OF A FLOWER

**Slides 3-7 Show a bee visiting an apple blossom and carrying pollen from one flower to the next**

**Ask**: **What is the reason the bee is attracted to the flower?**
The bee is attracted to the flower because it has **nectar** inside for them to eat. Honey bees bring both pollen and nectar back to their hive to feed their babies, called **larvae**.

Explain to students that plants produce fragrant, interesting, colorful flowers to attract pollinators and spread their pollen. Once they have been pollinated, the blossoms will turn into fruit with seeds inside. The seeds will grow into a new plant.

**Slides 8-9 Shows the blossom falling away and the fruit, in this case an apple, growing in its place. This can only happen if the blossom is pollinated!**

### 3. PLANTS NEED POLLINATORS, POLLINATORS NEED PLANTS

**Slide 10 asks students to discuss this statement with their neighbor.**
Invite students to turn to a partner and discuss this statement. What does it mean to them? Then, have students share what they and their partner discussed.

Pollinators and plants need each other because they each have something the other needs to survive. Pollinators spread pollen from one plant to another, which helps it to create seeds. Plants have flowers with pollen and nectar inside, which feed pollinators. In ecology, we call this **coevolution**.

### 4. TYPES OF POLLINATORS

Explain to students that you will be looking at some of the most common pollinators in the Pacific Northwest. Be sure to point out ways that each pollinator has adapted or changed over time to be excellent at their job of pollinating. For the sake of time, select a few fun facts from the bulleted lists to share.

**Slide 11: Bees**
Explain that a bee's body has **adaptations**, which are special parts that help them survive in their habitat. When a bee enters a flower to drink a sweet substance called nectar, pollen sticks to their fuzzy body and legs, and gets rubbed off on the next flower they visit for nectar.

- Bees have fuzzy legs and bodies, aiding in the carrying of pollen.
- They use a "bee dance" to communicate to fellow bees about the location of flowers.
- Bees make honey using the nectar they collect from flowers.
- There are over 4,000 types of bees in the United States, alone. Many gardeners and farmers raise bees to increase their food production.
- Bees can taste with their feet and antenna.
- The bees that are in the most danger of decline that pollinate native plants belong to the bumblebee (bombus) group, although honey bees, which are not endangered, also pollinate a high percent of crops due to their sheer numbers. *To find out more about the different bee species found in Oregon, hand out Common Bee Pollinators of Oregon Crops, included in this unit*.

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**Slide 12: Butterflies**
Butterflies are the second most common pollinators, after bees. Butterflies have a **proboscis**, a long, tongue-like part near their mouth to reach far into flowers to get nectar.

- Butterflies have a fuzzy head and sticky proboscis to encourage carrying of pollen.
- Butterflies have wings that help them move from flower to flower with ease.
- Butterflies have **compound eyes** (eyes with many different light sensors) that help them to find flowers.
- The Pacific Northwest is home to hundreds of species of butterflies, which pollinate different plants depending on their habitat range.
- Many species of butterflies are threatened or endangered due to habitat loss. The Oregon Silverspot in the slideshow is one butterfly that is endangered.

**Slide 13: Beetles, ants, flies, wasps, and moths… Oh my!**
Many other insects pollinate plants, and are important to the ecosystem for this reason.

- Beetles are very fond of white flowers and use their sensitive antennae to smell their way to very fragrant flowers.
- Beetles are some of the oldest flower pollinators and pollinate large flowers like magnolia. They are nicknamed "mess and soil" pollinators because they poop (leaving pollen behind) in the flowers while they are munching on the flower parts.
- Moths are fuzzy like butterflies, but are nocturnal, so may pollinate different plant species than butterflies do.

**Slide 14: Hummingbirds**
Pictured are two common species of hummingbirds that you may see in the Pacific Northwest, either visiting native plants for nectar or drinking from your garden feeder! They are the Rufous hummingbird and Anna's hummingbird.

**Ask: What do you notice about the hummingbird's body that may be an adaptation that helps it to pollinate plants?**
Long beak for getting deep into flowers, fast-moving wings to help them move from flower to flower, feathers that pollen sticks to.

- Hummingbirds are very intelligent: they memorize how long it takes for a flower to fill up with nectar after they've drank from it, and come back exactly when it's time to feed again. They can do this with more than 2,000 flowers at a time. That's like having 2,000 timers built into your brain!
- Fast moving wings also create wind around the flower, which helps spread pollen in the air.

## 5. SHOW THE VIDEO

**Slide 15: Pollinators in action video**
Click on the image in the presentation to watch the YouTube video[1] of pollinators titled *The Beauty of Pollination - Moving Art*. Stop video after 1:50 minutes, before the bats come into the show.

## 6. WHY ARE POLLINATORS IMPORTANT?

**Slide 16: Why do people need pollinators?**
Ask students the question before showing the images, then have students think about where their food comes from.

**Slide 17: What do we grow here?**
Farms in the Pacific Northwest grow much of the apples, cherries, blueberries, grapes, and other fruits for the whole country! It is a region that relies heavily on agriculture and pollinators help a lot with this system.

**Ask: What do you think our region would be like without enough of and the right kinds of pollinators?**

## 7. CREATE A SUPER POLLINATOR ACTIVITY

Now it is time for students to work together to use their knowledge of pollinator adaptations to build a Super Pollinator. Invite students to help you create a Super Pollinator using your teaching assistant or another adult volunteer as your model. The Super Pollinator will have as many adaptations as they can

[1] https://www.youtube.com/watch?v=MQiszdkOwuU&feature=youtu.be


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to be the ultimate pollinator of plants.

Use the props in the unit box to dress them up, and talk about these adaptations as you do so:

- Antenna - help insects smell flowers
- Compound eyes - help insects see flowers
- Proboscis - help insects suck up nectar
- Fuzzy body - helps pollen stick to insect for better pollination of flowers
- Fuzzy/sticky legs - helps pollen stick to insect for better pollination of flowers
- Wings - helps insects travel to plants, move long distances

Distribute flowers to students, making sure each flower has a different color of "pollen" (velcro) inside of it.

Have the Super Pollinator look for flowers, and invite students to do a "bee dance" to help them find their way.

As the Super Pollinator goes from flower to flower, pollen will be transferred, and the flowers will be "pollinated".

Have students show one another their flowers and discuss what happened to the pollen (each flower should have a different color of pollen inside).

**Ask**: **Now that the super pollinator has pollinated the flowers, what can these plants do?**
Plants that have been pollinated can make seeds, and seeds are spread to grow new plants.

**Ask**: **What do you think the super pollinator got out of their adventure?**
The pollinator got to eat their food (nectar) and find food sources for their friends.

## CLOSING CIRCLE

Why do we, as humans, need pollinators to survive?

- If students are unsure, get ideas going in a large group before individual journaling.
- Encourage students to think about where our food comes from, and other ways that plants benefit our lives.
- Have students have small group discussions, share with the larger group, or draw/write it down on paper individually.

## FURTHER READING

*Common Bee Pollinators of Oregon Crops* by Sarah Kincaid:

This booklet was created by a bee specialist with the Oregon Department of Agriculture. This booklet shows detailed photographs of common bee species found here in Oregon and the crops they commonly pollinate. This information is especially useful for linking the concept of pollination to the real life human and ecosystem services that we experience in Oregon.

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MATH LESSON

# BEE-OMETRY

## SUMMARY

In this lesson, students work in teams to develop a honeycomb model that illustrates the advantage of the hexagonal shape created by honey bees. Students will test multiple shapes to build their own honeycomb and explore geometry concepts. In the reflection, the class will come together to demonstrate their knowledge and describe why and how a hexagon is the optimal geometric shape for the cells of honey bees.

## OBJECTIVES

**By the end of the lesson, students will be able to:**

- Describe how honey bees create their honeycombs using wax
- Explain why honey bees use the hexagon as a natural shape when building their honeycombs

## GUIDING QUESTION

1. Why do honey bees use a hexagonal shape to build a honeycomb?

## LESSON-AT-A-GLANCE

**GRADE LEVEL** 2

**INTEGRATED LEARNING FOCUS** Math

**DURATION** 45 minutes

**CLASS SIZE** Any

**ACTIVITY TEAMS** Groups of 3-4

**MATERIALS**

- Presentation titled *Bee-ometry*
- 8 tracing circles
- 8 tracing triangles
- 8 tracing hexagons
- 8.5″x11″ paper
- Pencils

## MATH

- NGSS : 2-ETS1-2: Engineering Design: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- Math: 2.G 1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

## ACADEMIC VOCABULARY

**wax**
**honeycomb**
**cell**
**geometry**
**hexagon**


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# ACTIVITY PROCEDURE

## 1. PREPARE THE ACTIVITY

Set up work stations for groups of 3-4 students to use for the activity after the lesson. Work stations should include two or three pieces of 8.5"x11" paper, pencils, a tracing circle, and a tracing triangle. Keep tracing hexagons with you until you need to pass them out later.

Determine groups of 3-4 students that will be working together on their honeycombs activity.

Open presentation titled *Bee-ometry*.

## 2. PRESENT THE PROBLEM

Through a guided conversation using the presentation slides, tell students that they will be investigating why honey bees use a specific shape to build their hives.

**Slide 2: What do honey bees use to build a honeycomb?**
Honey bees create **wax** to build a **honeycomb**, which is a structure that provides a space to store honey, and for the queen to lay eggs that will grow into larvae (babies).

**Ask: Why do you think a honey bee might need to maximize or make the most of their space?**
It takes a lot of energy to make wax to build a honeycomb, and their energy is precious. Honey bees try to be resourceful when building their honeycomb to use as little energy as possible, while providing enough room for their larvae in each **cell** (space).

**Slide 3: Why conserve energy?**

**Ask: Can you think of an example of how other animals or humans try to conserve their energy and resources?**
Have students brainstorm some examples, such as bears hibernating through the winter when food is scarce, or humans taking a bus to travel instead of driving in a car by themselves.

## 3. BEES AS PROBLEM SOLVERS

**Slide 4: Geometry: using shapes to solve problems**

**Ask: What type of math involves using shapes, lines, or measurements of space to solve a problem?**
**Geometry**. Students may have already been introduced to the subject, or this lesson may be used as an introduction to the subject.

**Ask: Did you know that humans are not the only animals that can do math?**
Honey bees have to use math -- geometry -- to solve the problem of trying to save energy while creating enough space to store their honey, eggs, and larvae. Explain to students that they will be getting in small groups to do an experiment and test out honey bee geometry.

Break students up into small groups of 3-4 for the hands-on investigation to test what shapes are the most efficient for building honeycomb. Direct small groups to designated work stations in the classroom, where they will have two tracing shapes, pencils, and blank paper to work with.

## 4. INVESTIGATE CIRCLES

**Slide 5: Circles**
Instruct teams to select the circle shape and have one group member at a time trace as many circles on the paper as possible without overlapping the shape. Students can take turns tracing on their paper. Have students make sure that every circle is touching two or more circles.

**Ask: students what they notice about the space the circles create.**
There will be empty space in between circles, much too small for a honey bee to fit its body into - that's wasted space.

**Ask: students to count how many circles they were able to fit on the page (full circles only).**
Have a student in each group record the number of circles that they were able to fit on their honeycomb.

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## 5. INVESTIGATE TRIANGLES

**Slide 6: Triangles**
Instruct teams to flip their paper over and select the triangle shape. Ask students to repeat the process and trace as many triangles on their poster board as possible without overlapping. Have students make sure that every triangle is touching two or more triangles

Count how many triangles were able to fit in the honeycomb space and have a different student in each group record the number. Then, have them compare the numbers of circles and triangles drawn.

**Ask: students what differences they observe between the honeycomb made out of triangles versus the honeycomb made out of circles. Which wasted more space? Which seems easier for bees to move in and out of?**
Students may conclude that the triangles are better, because they don't waste space between each cell like the circles do. However, more triangles fit inside the 8.5"x11" paper, which means the bees would have to work extra hard to make enough cells to build their honeycomb. In addition, the circles are more open and are easier for bees to move through.

## 6. INVESTIGATE HEXAGONS

**Slide 7: Hexagons**
Emphasize that even though triangles are a better shape for building honeycombs than circles because there is no wasted space, honey bees would have to make so many triangles to build their honeycomb and that would take lots of energy. Remember, honey bees are very good at saving energy!

Instruct one student from each group to come up and get their hexagon tracing shape. Have groups prepare a new blank piece of paper to trace on.

Ask students to repeat the process a third time, and trace as many **hexagons** on the poster board as possible without overlapping. Remind students to arrange the hexagons as close together as possible on their honeycomb poster; sides can and should touch.

Have the students count how many hexagons they used to build their honeycomb.

**Ask: Is this number bigger, smaller, or equal to the number of triangles? What else do they notice about the hexagon honeycomb?**
Students should conclude that the hexagons cover the 8.5"x11" paper with the fewest shapes while not wasting space. This allows honey bees to use their wax efficiently. Additionally, hexagons also have the largest internal angles of any of the polygons that tessellate (or able to cover an area without gaps or overlapping). This means that even though a triangle and a hexagon might have the same area and can both tessellate, the hexagon will feel and look more open. Thus, the hexagons provide a better opening for bees to go in and out of than triangles.

## 7. GROUP REFLECTION
Bring the students together for a group discussion of their findings. Ask students to describe the process they went through in this activity, taking turns explaining the steps.

Conclude that even though triangles may seem like a better option than circles, they require more wax than hexagons, and the area inside them is much smaller... therefore, hexagons are the honey bees' optimal shape!

## CLOSING CIRCLE

Take students outdoors to walk around the schoolyard or on a nature trail to search for other geometric patterns in nature. When students discover an interesting shape or pattern, invite other students to join and observe. Asking open-ended questions, try to draw conclusions about why the shape or pattern is the way it is.

Discuss ways that we can be more observant of the shapes that plants, other animals, and humans use to build their homes. Encourage students to look around when they leave school and notice the structures that people, other animals, and plants create to see if they notice any patterns!

## ASSESSMENT OPTIONS

Invite students to do further research on another animal in nature that uses geometry to solve a problem.solve a problem.


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ELA LESSON

# A DAY IN THE LIFE

## SUMMARY

In this lesson, students use "a day in the life" prompt to tell the story of a Pacific Northwest pollinator of their choosing. Students will listen to the book "Flowers are Calling", and use what they learned from the text to write their own narratives about how a pollinating animal pollinates the plants in the environment. Then, students have the opportunity to share their stories by reading their writing out loud.

## OBJECTIVES

**By the end of the lesson, students will be able to:**

- Write a short story with a beginning, middle, and end.
- Describe how native pollinators interact with the ecosystem and provide an important service.
- Practice storytelling by sharing a unique story from their own imagination.

## GUIDING QUESTION

1. From the perspective of a pollinator living in our local area, what would a day in your life look like?

## LESSON-AT-A-GLANCE

**GRADE LEVEL** 2

**INTEGRATED LEARNING FOCUS** ELA

**LESSON DURATION** 45-60 minutes

**CLASS SIZE** Any

**MATERIALS**

- Book: *Flowers are Calling* by Rita Gray
- Pencils
- Journals or writing paper
- Crayons, markers, or colored pencils for illustration
- Drawing paper, if desired

## SOCIAL SCIENCE

- 2.W.3 Write narratives in which they recount a well-elaborated event or short sequence of events, include details to describe actions, thoughts, and feelings, use temporal words to signal event order, and provide a sense of closure.

## ACADEMIC VOCABULARY

| | |
|---|---|
| **narrative** | **verb** |
| **story** | **paragraph** |
| **1st person** | **complete sentence** |
| **3rd person** | **punctuation** |
| **adjective** | **illustration** |
| **noun** | |

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## ACTIVITY PROCEDURE

### 1. READ THE STORY

Gather the class and read the story "Flowers are Calling" by Rita Gray to the class. Throughout the book, remember to emphasize the parts of a flower, the processes describing pollination, and the importance of pollinators in an ecosystem.

### 2. CLASS DISCUSSION

While you are reading,encourage students' curiosity by asking questions. Then, try to get students thinking about the way the story helped them to learn more about pollination.

**Ask: Does this book remind you of a place that you know? Do you notice pollinators around town, on the school playground or field, or home gardens?**

Make the story relevant by providing local examples of your schoolyard, town, or other places students have visited before outdoors.

**Ask: How does telling a story like the one we just read help to teach people about the science of pollination?**

It provides examples through using a story and can help the reader make connections between the events in the book and events in real life.

### 3. DESCRIBE THE WRITING PROMPT

Explain to students that they will be authors writing a short story, or **narrative**, following a "day in the life" of a local pollinator. Remind students that a story has a beginning, middle, and end.

Create a list of pollinators to choose from as a class. It may be helpful to bring out the images used in the science lesson. Some examples include:

- Honey bee, or other types of native bees like bumble bees
- Butterfly
- Beetle
- Moth
- Hummingbird
- Bat

Students may choose to write their story as a journal entry (first person), from the perspective of the pollinator (first person), or from the perspective of an observer (third person).

Create a list of words with your students that can be used to describe the beginning, middle, and end of the story (one day/morning/afternoon, then, suddenly, after that, finally, etc.)

It may be useful to encourage students to think about where their pollinator is living. What type of habitat does it live in? Does it have to travel to find food? How is it moving pollen from plant to plant?


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**4. TIME TO WRITE**

Pass out paper or journals, pencils, drawing paper, and coloring tools if necessary.

While students are writing their short stories, move around the classroom to help with spelling and make sure students are able to advance their storyline.

As students finish, encourage them to add more details and illustrations. Illustrations may be in the margins, as a border, or add blank paper to make a booklet. Invite students to get creative-- they are the authors of their story!

## CLOSING CIRCLE

Bring students back together to share their writing. Remind students that sharing personal writing is an important part of the writing process. By sharing work, students are allowing others to join in the storytelling process and teach one another something they know. To do this, choose an option for sharing:

Option 1: Small group sharing. Put students in groups of 3-4 and give them 5-10 minutes to share their stories with their small group.

Option 2: Large group sharing. Gather all students in a sharing circle and encourage students to share their stories around the circle. Let students say "pass" if they don't feel comfortable, but kindly encourage them to share which pollinator they decided to write about or one of their illustrations.

## ASSESSMENT OPTIONS

Collect and assess stories after they are complete. For a longer-term project, have students edit their drafts once or twice and type or neatly write a final draft to be turned into a book

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ART LESSON

# MIXING IT UP

## SUMMARY

In this lesson, students create a visual art piece using collage or mixed-media to portray a Pacific Northwest pollinator of their choosing. Students may choose from any of the pollinators they learned about in the science lesson, or do research on their own to select a local animal that they would like to create an image of. In utilizing mixed-media and collage, students pay special attention to the unique and interesting adaptations that pollinators have that make them such an important part of the ecosystem.

## OBJECTIVES

**By the end of the lesson, students will be able to:**

- Complete a unique art piece to celebrate a PNW pollinator
- Explore creativity through mixed-media art

## GUIDING QUESTION

1. What is mixed-media art and how can it be used to portray an idea or theme?

## LESSON-AT-A-GLANCE

**GRADE LEVEL** 2

**INTEGRATED LEARNING FOCUS** Art

**PREPARATION** Gather materials

**LESSON DURATION** 45 minutes

**CLASS SIZE** Any

**MATERIALS**

- Presentation from science lesson
- Cardstock or other heavy paper
- Collaging materials: magazines, paper scraps, fabric, tissue paper, ribbon, buttons, natural materials collected from outdoors
- Paint (teacher's choice)
- Paintbrushes
- Glue
- Scissors

## ART

- VA.1.CR1.2 Make art or design with various materials and tools to explore personal interests, questions, and curiosity.
- VA.2.CR2.2 Repurpose objects to make something new.

## ACADEMIC VOCABULARY

**mixed-media**
**collage**


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## ACTIVITY PROCEDURE

### 1. PREPARE THE MATERIALS

Put out recycled material, collaging materials, and natural materials as well as glue, crayons, colored pencils, markers, pastels, etc. at stations or at table groups. Make sure each station or table group has a mixture of all kinds of materials.

### 2. REVIEW EXAMPLES OF POLLINATORS

Invite the class together and go through images in the presentation or using the paper copies, leading a discussion on what kinds of pollinating animals live in the Pacific Northwest.

**Ask: What are examples of adaptations that a pollinator might have that helps to move pollen from flower to flower?**

- Different bee species have specific parts of their bodies covered in small hairs making them fuzzy, so they pick up pollen and transport it from flower to flower.
- Butterflies also have small hairs on their torso and head that make them fuzzy, picking up pollen and transporting it from flower to flower. Butterflies have wings to help them move quickly and their bright colors and patterns help to warn or scare predators.
- Hummingbirds use their long, narrow beaks to reach deep into flowers to drink their nectar. While doing this, pollen may fall out of the flower to be carried in the wind to the next flower. Pollen also may stick to the bird's head and beak, to be transferred quickly to the next.
- Beetles are some of the oldest pollinators and pollinate very large flowers like magnolias. They are nicknamed "mess and soil" pollinators because they poop (leaving pollen behind) in the flowers while they are munching on the flower parts.

### 3. WHAT IS MIXED-MEDIA?

Show students some examples using the projector and the images provided in this lesson, or use the Internet to search for inspiration.

Explain that **mixed-media** is a style of art that uses more than one type of material to portray the subject. **Collage** is another artistic style that uses scraps of materials (paper, magazine cut-outs, natural materials such as leaves or twigs, tissue paper, fabric) layered on the page to portray the subject.

In this case, students' subjects will be pollinators and they will get to choose from many types of materials to create a unique piece of art.

### 4. CREATE A POLLINATOR

Have students find a space to work and give them ample time to create their pollinator.

Assist students by asking guiding questions around how they will portray the pollinator they chose, making sure they are thinking about the adaptations the pollinator has that makes them look and behave the way they do.

For example, the wings on a butterfly may be represented using lightweight fabric or tissue, because they are delicate and help the butterfly to move gracefully from flower to flower. Invite students to get creative and think about a material's texture or shape.

## CLOSING CIRCLE

Create a gallery in your classroom displaying students' artwork. Invite students to walk through the gallery to see how their classmates have represented their pollinator. If time allows, have students present their piece to the class, explaining their artistic choices.

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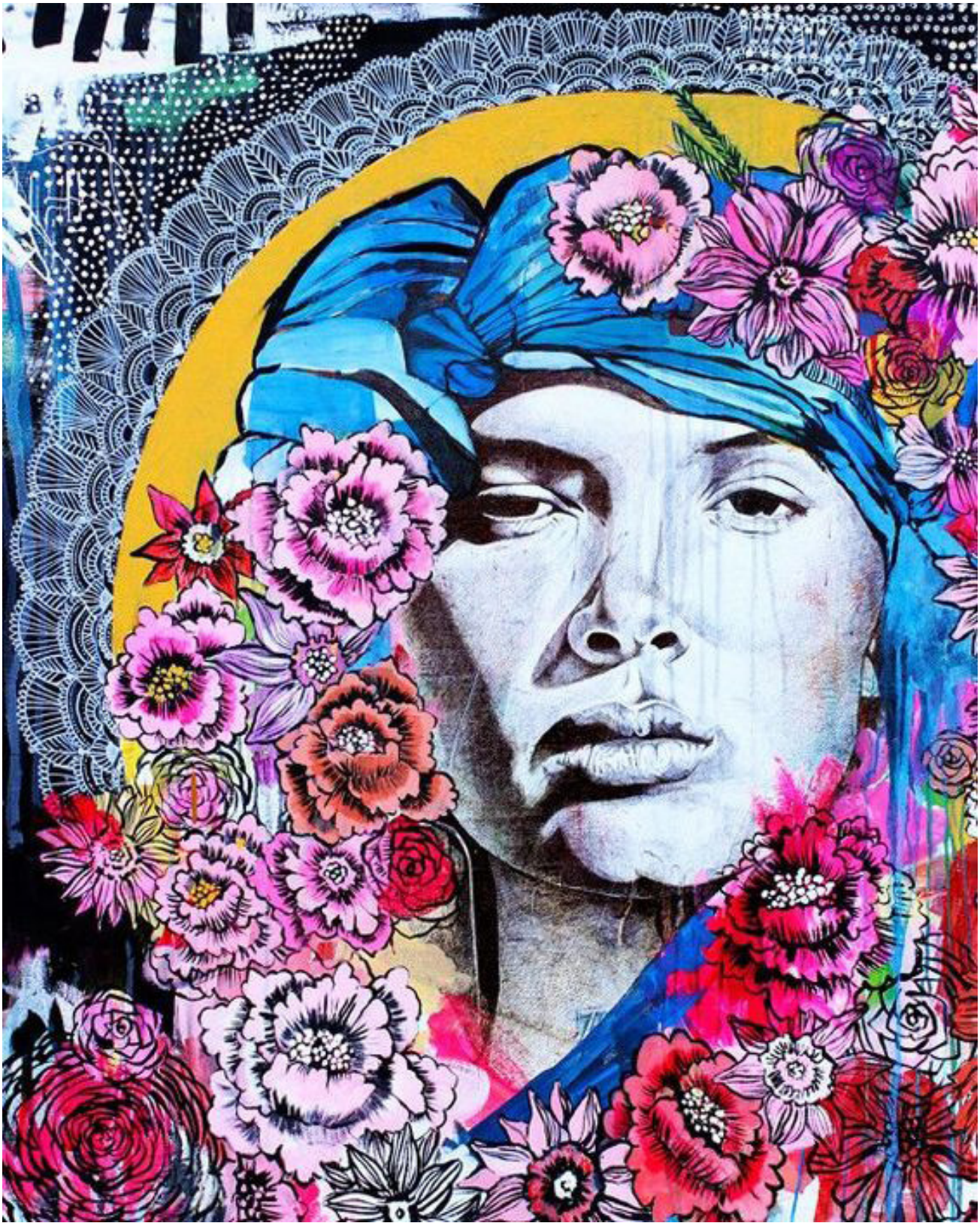

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SOCIAL SCIENCE LESSON

# WHAT IF THERE WERE NO BEES?

## SUMMARY

In this lesson, students are encouraged to collaborate, evaluate, and problem solve by studying the decline in pollinator populations around the world and collectively coming up with action-based solutions. This activity gives students the opportunity to engage in consensus decision-making as well as voting procedures.

## OBJECTIVES

**By the end of the lesson, students will be able to:**

- Generate solutions to problems related to the decline in pollinators
- Demonstrate engagement in consensus-based and voting-based action

## GUIDING QUESTIONS

1. What does the word endangered mean and how does it relate to the pollinator populations?
2. Why are pollinator populations declining? What are some ways we can help to increase the population of pollinators?
3. Why is it important to try to help increase our pollinator populations?

## LESSON-AT-A-GLANCE

**GRADE LEVEL** 2

**INTEGRATED LEARNING FOCUS** Social Science

**LESSON PREP** 10 minutes

**LESSON DURATION** 30 minutes

**CLASS SIZE** Any

**ACTIVITY TEAMS** 4-5

**MATERIALS**

- Large poster paper for each group
- Flip chart markers
- Book *What if There Were No Bees?* By Suzanne Slade

## SOCIAL SCIENCE

- 2.25 Evaluate information relating to an issue or problem.
- 2.26 Use listening, consensus-building, and voting procedures to decide on and take informed action

## ACADEMIC VOCABULARY

**grasslands**
**endangered/threatened populations**
**extinct**
**decline**

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## ACTIVITY PROCEDURE

### 1. WHAT IF?

Read the book *What if There Were No Bees?* by Suzanne Slade to the class.

After you have finished, discuss the grassland ecosystem the book describes with students.

**Ask: What kinds of plants live in the grasslands? Did you know we have grassland ecosystems throughout Oregon with native plants pollinated by bees?**

**Grasslands** can be found in the Blue Mountains region, the Coast Range, the Willamette Valley, the Klamath Mountains, the West Cascades, and the Columbia Plateau. Grasslands are often used by humans for other uses we find important, such as cities, housing developments, growing trees for timber, or other activities.

Introduce the fact that certain pollinator species (especially species of bees) are an **endangered** or **threatened population**. This means that their numbers are becoming smaller, they are harder to find, and they require us to take action to ensure they don't go extinct. Explain that once an animal species goes **extinct**, it cannot be brought back — it's gone for good.

### 2. DISCUSS

Prompt students with questions such as:

- What do you think has caused a **decline** or falling population of bees over time?
- What can people do to address this issue?
- What are some ways we, in this classroom, can help pollinators?

Students will generate their own ideas. Ensure they think about the main reasons why a species might be threatened, endangered, or go extinct. These include habitat loss, the use of chemical pesticides, poaching, and other ways humans have interfered with ecosystems.

## FURTHER READING

*http://climate.org/7-species-of-bees-added-to-endangered-list/*

*https://www.fws.gov/pollinators/pollinatorpages/aboutpollinators.html*

Instead of making students feel sad, inspire them by telling them there are ways for us to help pollinators and increase their numbers so they survive!

### 3. BRAINSTORM SOLUTIONS

Divide the class into small groups of 4-5 students. Explain that they have 10 minutes to brainstorm at least three ways to help pollinators and then share those with the class.

To get started, prompt students to think about what an "ideal" habitat would look like for a pollinator.

**Ask: How can we try to either protect existing habitat or create new habitat for pollinators?**

Provide each group with a large piece of poster paper. Instruct students to use both illustrations and words to express their ideas. Remember, they are calling others to action!

After giving groups a 5-minute warning, bring the class together. Invite each group to either present together or designate a student to share their posters with the entire class. Remind students to appreciate speakers when they are finished with snaps, spirit fingers, or applause.

## CLOSING CIRCLE

Once all posters are shared ask the class to reflect on which ideas they prefer. Have students vote on their favorite idea, or the idea they think is the most possible. It may be useful to remind students that voting is a way to make decisions in a group, even though all ideas are valuable and should be shared.

**Ask: Is this idea feasible? Is there a way we can help to make this idea a reality on school grounds or in the community? What kind of actions would need to be taken to make this possible?**

Creating pollinator habitat is a great way to help increase their populations. It is common that schools, businesses, homes, and farmers/gardeners will plant native plants that attract pollinators to help keep their numbers growing.

To take the learning outdoors, take students into the schoolyard to rate how well the school is doing at maintaining habitat for pollinators. Is there more that could be done?


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# APPENDIX
## IMAGE ATTRIBUTIONS

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