



EXHIBIT EXPLORATION GUIDE



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Dear Educator,

Thank you for welcoming the fascinating topics of pollination and the plant-pollinator relationships that make it possible into your classroom!

This activity guide is designed to help educators facilitate exploration of the *Pollinator Playground* exhibition in a way that complements classroom curriculum. Activities in this guide are divided into two parts including 1) an anticipatory warm up and 2) suggested tasks to be completed during exploration.

Additionally, each on-site activity corresponds with a standards-aligned, classroom-based lesson plan that can be completed before or after visiting *Pollinator Playground*, at the discretion of individual educators.

Some **key content** objectives covered by this exhibition include:

- Plant and animal life cycles
- Mutualistic relationships
- Animal adaptations
- Environmental and human threats to plants and animals

A note on facilitating your field trip:

Pollinator Playground is a hands-on, minds-on, immersive experience with lots of full-body activities as well as question-and-answer challenges.

For best engagement and enjoyment, **we recommend:**

- ✿ Planning these visits to last **45-60 minutes**
- ✿ Preparing students with **expectations** ahead of time
- ✿ Letting students **explore in partners or small groups**, with a chaperone if possible.
- ✿ **Keeping hands free** by not requiring students to carry pencils and paper into the exhibit, or ask chaperones to help with this instead.
- ✿ **Debrief the experience** after exploration with the suggested discussion questions.
- ✿ Completing a **corresponding lesson plan** before or after your visit

As teachers ourselves, we know how needs vary from student to student and from class to class. We encourage making adjustments to these lessons and activities and/or adding your own creative flair. We would love to hear what worked for your kids! Send your questions or feedback to: education@minotaurmazes.com.

Again, we appreciate your joining us in exploring the world of pollinators. You and your students are in for an a-MAZE-ing pollination experience!

Enjoy!

Leah Ritz

Educator

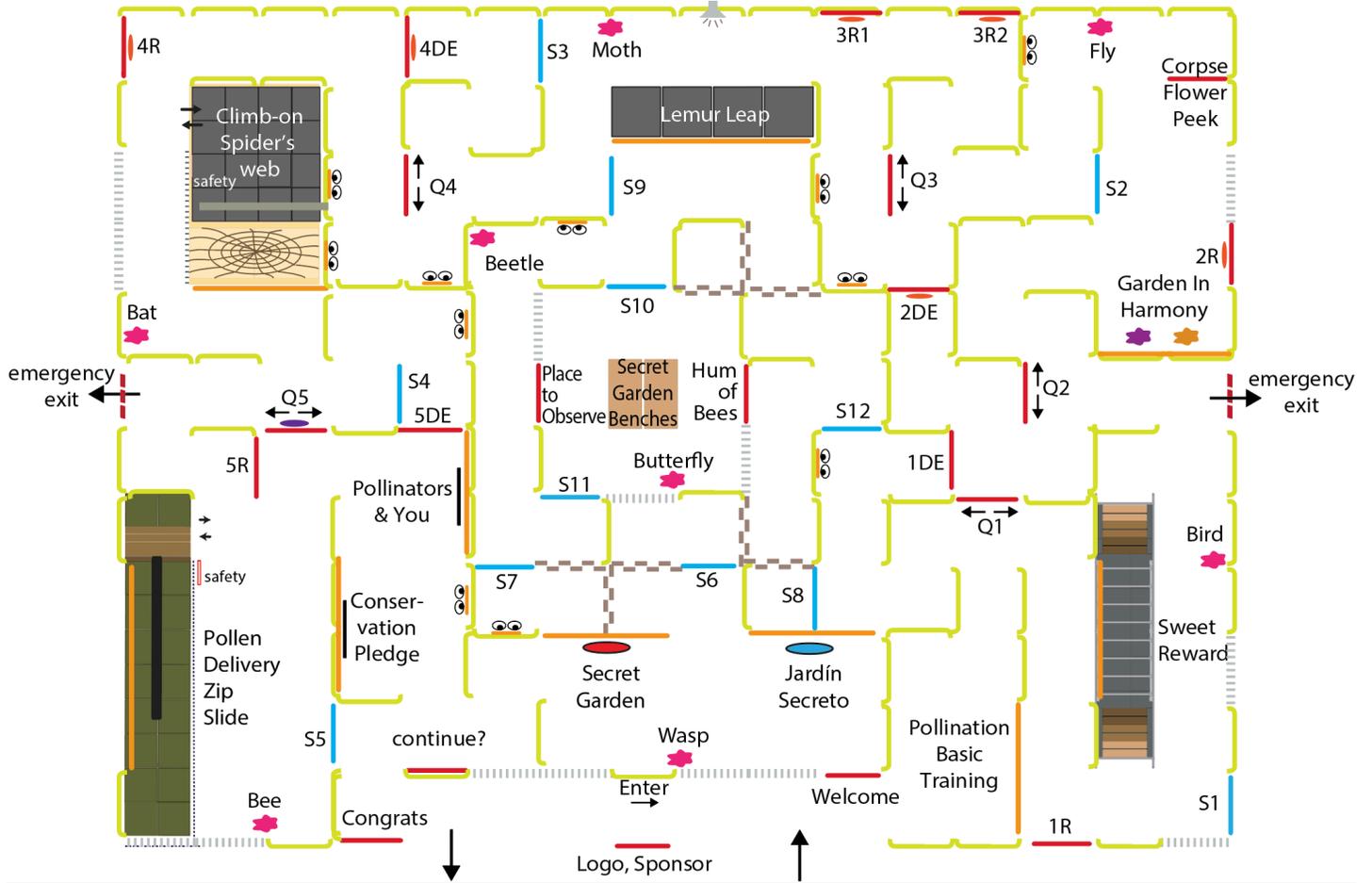
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Pollinator Playground Standard Exhibit Layout



Key:

Question & Answer Program: red lines labeled Q1, 1DE (dead end), 1R (right answer), etc.

Featured Species Panels: blue lines (S1, S2, S3, etc.)

Meet the Pollinators Fact Flips: pink flowers labeled Bird, Fly, Moth, etc.

General Exhibit Rules

- Walk, don't run
- Complete the maze, don't crawl under walls
- Take turns on interactives
- Follow instructions on any posted safety signs
- Only use Emergency Exits in case of emergency

Annotated Exhibit Components

- **Pollination Basic Training** – An infographic introduction to the process of pollination, the role pollinators play, and the outcomes of pollination
- **Question & Answer Program** – Designed as a survival challenge that encourage visitors to answer questions from the perspective a pollinator. Dead ends and correct answers share ways that the human and natural worlds can impact the chances of pollinator survival and success.
- **Full body interactives** – Gross motor skills activities relate to the movement and feeding habits of pollinators. Activities include swinging from bar to bar to simulate hovering like a hummingbird, climbing a spider web, leaping like a lemur, and gliding a monorail like a buzzing bee.
- **Musical Flowers** – Make music on playable flowers and learn what a garden in harmony looks and sounds like.
- **Photo Op** – Hold your nose and pose with a Corpse Flower, the world's largest (and smelliest) flower, while you learn about their pollinators.
- **Secret Garden Seek-and-Find** – Spin the wheel to go on a scavenger hunt through the hidden inner part of the maze. Find the featured species, learn its story, and answer the question from the wheel. Strategically placed peek holes let you glimpse some pollinators from afar.
- **Featured Species** – A dozen animals from 8 different pollinator groups spread around the maze share information about their unique abilities and pollination preferences.
- **Meet the Pollinators fact flips** – Flower flip doors around the maze provide general information about 8 different types of pollinators: bats, bees, beetles, birds, butterflies, flies, moths, and wasps.
- **Pollination & You** – Featuring a medicine cabinet and a refrigerator, learn how pollinators provide humans with some obvious and unfamiliar everyday necessities.
- **Conservation Pledge** – Move the checkmarks to indicate your commitment to doing things both inside and outside the home that make a difference for pollinators.
- **Environment Graphics** – The images printed behind each informational panel depict different environments where pollinators are active. Some of these environments include: landscaped garden, farm, greenhouse, orchard, temperate forest, tropical rainforest, roadside meadow, prairie grassland, desert, tundra, alpine, seaside, wetlands

Pollinator Types and Diversity

Grades: K-6th

Content Connection:

Life Science

NGSS.LS1.A: Structure and Function

NGSS.LS4.C: Adaptation

Objective: Students will use the Pollinator Playground exhibit to explore the great diversity of animal pollinators.

Materials:

- One of the following books:
 - K-2nd – Meet the Pollinators: A Night and Day Adventure by Barbara Ciletti
 - K-2nd – Protect the Pollinators by Rachael Rose Zoller
 - 3rd-6th – Flower Talk: How Plants Use Color to Communicate by Sara C. Levine, illustrated by Masha D'yans.
 - 3rd-6th – Flowers Are Calling by Rita Gray, illustrated by Kenard Pak

Key exhibit components:

- Q&A 1 – Which animals are pollinators?
- Meet the Pollinator fact flips
- Secret Garden Seek-and-Find

Before exploring:

- Begin with a few warm up questions to engage prior knowledge.
 - Ask students to think about any flowers they've seen. Have they ever seen any animals visit a flower? What was that visitor doing? And why do you think it was doing that? Does the flower need visitors? Why?
- Read one of the following books:
 - K-2nd – Meet the Pollinators: A Night and Day Adventure book
 - K-2nd – Protect the Pollinators book
 - 3rd-6th – Flower Talk: How Plants Use Color to Communicate book
 - 3rd-6th – Flowers Are Calling book
- Reflect on the book and ask students to recall what types of pollinators are listed. What familiar and unfamiliar pollinators were described?

In the exhibition:

- As students explore the exhibit, ask them to pay attention to the types of pollinators they see and what groups of animals they belong to. Challenge students to find all the groups of pollinators discussed in the books, and any more.
- Key exhibit components to encourage students to focus on:
 - Q&A 1 – Asks visitors to guess how many of these animals are pollinators: wolf, butterfly, lizard, mouse, ant, bat. Answer: all of them!
 - Meet the Pollinator fact flips – 8 flower flip doors located throughout the maze provide an overview of 8 primary pollinator groups (bees, wasps, bats, birds, butterflies, moths, beetles, and flies)
 - Secret Garden seek-and-find – send students on a scavenger hunt to answer a question relating to one of 12 featured species.
- Following free exploration, debrief the experience with a discussion around the following questions:
 - How many types of pollinators are in the exhibit? (Answer: 8 types)
 - Which group do you think has the most pollinators? (Answer: beetles)
 - Which group has the most effective type of pollinator? (Answer: bees)
 - One type of pollinator that surprised you?

Corresponding Classroom Resources:

Unusual Pollinators Card Game

Students may be surprised to learn that all sorts of animals can be pollinators, not just butterflies and bees! In this activity, students will learn about some unusual pollinators!

Backyard Phenology

In this lesson, students will observe and record seasonal weather, plants and wildlife in the familiar surroundings of their schoolyard. Through observation and data collection students will increase their awareness of nature.

What is Pollination?

Grades: K-5th

Content Connection:

Life Science

NGSS.LS1.A: Structure and Function

NGSS.LS1.B: Growth and Development of Organisms

NGSS.LS1.C: Organization for Matter and Energy Flow in Organisms

NGSS.LS2.A: Interdependent Relationships in Ecosystems

Objective: Students will review the process of pollination and the different ways that pollination can be achieved. Students will use the Pollinator Playground exhibit to become familiar with different types of pollinators.

Materials:

- One of the following books:
 - Before the Seed: How Pollen Moves by Susannah Buhrman-Deever, illustrated by Gina Triplett and Matt Curtius
 - What's Inside a Flower by Rachel Ignotofsky

Key exhibit components:

- Pollination Basic Training
- Featured Species panels

Before exploring:

- Introduce or reinforce the concept of pollination by reading one of the following books. Reading can also be assigned and shared.
 - K-2nd - Before the Seed book
 - 3rd-5th - What's Inside a Flower book
- Ask students to summarize the process of pollination. Make sure to highlight how it happens, who (if anyone) does it, and why it is important.

In the Exhibition:

- Before sending students to free explore the exhibition, review the content of the Pollination Basic Training panel as a group.
 - Step 1. Flowers produce nectar, a sweet liquid, and pollen, the sticky grains they need to reproduce. Both attract hungry pollinators.
 - Step 2. You visit flowers to feed on nectar, pollen, or small insects and pick up pollen on your body.

- Step 3. As you travel between flowers in search of food, some pollen falls off.
- Step 4. Pollen that lands on the female part of a flower (stigma) causes pollination. The flower produces fruits and seeds that become new flowers.
- Step 5. You need flowers for food, and most of the world’s flowering plants need pollinators to reproduce. Other animals, including humans, need the fruits, nuts, and seeds produced by flowering plants, so this mutual relationship benefits people, too!
- Ask students to compare and/or contrast this description of pollination and pollinators to that from the book, or other prior knowledge. What would they add or change about either description.
- While students explore the exhibition, instruct them to complete several of the Secret Garden seek-and-find missions. Pre-reading age students can find and match images or answer the questions with the help of an adult. Reading age students should find the correct animal and answer its question.
- Following free exploration, debrief the experience by asking the following questions:
 - How many types of pollinators did you find?
 - Were any of the pollinators surprising?
 - Which featured species...
 - ...pollinates by accident? (Answer: Indian White-eye bird)
 - ...is favored by farmers? (Answer: Mason Bee)
 - ...visits the most flowers? (Answer: Hoverfly)
 - ...pollinates at night? (Answer: Lesser Long-nosed bat)
 - Anything else interesting?

Corresponding Classroom Lesson:

Let’s Pollinate (with Cheetos)

In this lesson, students learn how pollination works by using Cheetos and bee finger puppets to simulate pollen transfer from flower to flower.

Pollination Syndromes

Grades: 2nd-5th

Content Connection:

Life Science

NGSS.LS1.C: Organization for Matter and Energy Flow in Organisms

NGSS.LS2.A: Interdependent Relationships in Ecosystems

Objective: Students will use a scavenger hunt activity to help develop an enhanced understanding of pollination and the unique relationship between plants and their pollinators.

Materials:

- One of the following books:
 - Flower Talk: How Plants Use Color to Communicate by Sara C. Levine and illustrated by Masha D'yans.
 - Flowers Are Calling by Rita Gray and illustrated by Kenard Pak
- Sticky notes and a pen (optional)

Key exhibit components:

- Featured Species Panels

Before Exploring:

- Ask students to consider their favorite foods. If they were to go into the kitchen looking for a snack, would they pick a certain food? Allow students to share what they would seek out.
- Instead of going to a fridge or a cupboard to grab a snack, pollinators visit flowers to eat nectar, pollen, or sometimes insects. Just like humans have favorite foods, so do animals. A lot of times the flowers they like best are the ones that are the right size or shape just for them.
- Read one of the following books
 - Flower Talk: How Plants Use Color to Communicate book
 - Flowers Are Calling book
- After reading the book, ask students to summarize what flowers are preferred by what types of pollinators. These preferences are known as “syndromes.”
- The goal of the day is to learn more about pollinators and what flowers they prefer.

In the Exhibition:

- Before letting students explore the exhibit, divide them into partners and assign them one of the following Featured Species panels to review. If desired, send students into the maze with a sticky note containing the name of their pollinator.
 - Sword-billed Hummingbird, visiting a red-orange, tubular flower
 - Pipevine Swallowtail, visiting a broad pink flower
 - Mason Bee, visiting blue bell-shaped flowers
 - Clearwing Moth, visiting light-colored phlox
 - Potter Wasp, visiting a small yellow flower
 - Lesser Long-nosed Bat, visiting a night-blooming cactus flower
 - Corpse Flower, visited by a carrion fly in search of rotting meat (note, this information is in the written content and is not visible in the image)
- After exploring the exhibition, ask students to reflect on whether the pictures of the pollinator on their flowers represent the preferred pollination syndrome.
- Debrief the exhibition experience by asking students to share what they learned about their featured species.

Corresponding Classroom Lesson:

Pollination Syndromes

In this lesson, students will use observation skills to complete a matching game that demonstrates an understanding of pollination syndromes.

Flowers: Structure & Function

Grades: 3rd-8th

Content Connection:

Life Science

NGSS.LS1.A: Structure and Function

NGSS.LS1.B: Growth and Development of Organisms

Objective: Students will use the *Pollinator Playground* exhibit to enhance understanding of the function of flower adaptations within different environments.

Materials:

- What's Inside a Flower by Rachel Ignotofsky
- *Optional:* Before the Seed: How Pollen Moves by Susannah Buhrman-Deever, illustrated by Gina Triplett and Matt Curtius
- Images of flowers from different types of environments

Key exhibit components:

- Pollination Basic Training
- Environment Graphics

Before Exploring:

- Introduce flowers and pollination as the big ideas for the day. Explain that flowers can be found on every continent (even Antarctica!), and pollinators are needed in every type of environment. The goal of visiting this exhibition is to learn more about process and importance of pollination.
- For 3rd-5th grade, read - What's Inside a Flower book
 - For older students, omit reading if desired
- After reading, ask students to draw or summarize the life cycle of a flower
- Include a discussion about the role of a pollinator in a flower's life cycle
- *Optional:* Provide pairs or small groups of students with photocopied anecdotes of plant-pollinator interactions from Before the Seed book. Ask students to read and share with the class.
- Share images of flowers with obvious male and female parts as well as the environments in which they live. Compare/contrast the flower parts and discuss why they might look the way they do. Flowers with obvious male and female parts include:
 - Mallow family (Malvaceae): Hollyhock, Hibiscus, Rose Mallow
 - Buttercup family (Ranunculaceae): Swamp buttercup, Pasque flower, Hepatica

- Lily family (Liliaceae): Day Lily, Sand Lily, Tiger Lily
- Nightshade family (Solanaceae): Angel's Trumpet, Okra, Moonflower, Tomato, Eggplant
- Squash family (Cucurbitaceae): Zucchini, Pumpkin, Cucumber, Melon
- Asparagus family (Asparagaceae): Yucca, Artichoke, Bluebells
- Cactuses including: Hedgehog Cactus, Prickly Pear, Ocotillo
- Add to this list with any locally relevant flowers

In the Exhibition:

- Before sending students to free explore the exhibition, review the content of the Pollination Basic Training panel as a group, noting specific parts of the flower highlighted on the panel. Compare this pollination description to that in the book, or other prior knowledge.
 - Step 1. Flowers produce nectar, a sweet liquid, and pollen, the sticky grains they need to reproduce. Both attract hungry pollinators.
 - Step 2. You visit flowers to feed on nectar, pollen, or small insects and pick up pollen on your body.
 - Step 3. As you travel between flowers in search of food, some pollen falls off.
 - Step 4. Pollen that lands on the female part of a flower (stigma) causes pollination. The flower produces fruits and seeds that become new flowers.
 - Step 5. You need flowers for food, and most of the world's flowering plants need pollinators to reproduce. Other animals, including humans, need the fruits, nuts, and seeds produced by flowering plants, so this mutual relationship benefits people, too!
- As students explore the exhibit, ask them to pay attention to the different types of environments and flowers represented in the graphics. These indicate places that pollinators are active and flowers need pollination.
- While debriefing, ask students to share what environments they noticed and any differences between flowers and plants in each environment.
 - Environments include: landscaped garden, farm, greenhouse, orchard, temperate forest, tropical rainforest, roadside meadow, prairie grassland, desert, tundra, alpine, seaside, wetlands
- Ask students to reflect on 5W's of Flowers:
 - Where can you find flowers? (Answer: worldwide!)
 - What are the parts of a flower? (See What's Inside a Flower book)
 - Why do flowers look the way they do? (Answer: to attract pollinators)
 - When do flowers bloom? (Answer: all times of the year)
 - Who needs flowers? (Answer: pollinators and other animals including humans)

Corresponding Classroom Lesson:

Flower Structure

In this lesson, students will dissect and identify parts of the flowers. They will learn about plant anatomy and be able to demonstrate the mechanism of pollination by examining several types of flowers.

Mutualisms: Plant + Pollinator Relationships

Grades: Grades 3rd-8th

Content Connection:

Life Science

NGSS.LS1.A: Structure and Function

NGSS.LS4.B: Natural Selection

NGSS.LS4.C: Adaptation

Objective: Students will learn about physical adaptations that help pollinators gather food by studying analogous models. Then they will apply their knowledge to help them play an interactive role-play game that mimics pollinator food gathering behavior.

Materials:

- Plant-pollinator mutualism photos
- POLLEN: Darwin's 130-Year Prediction by Darcy Pattison, illustrated by Peter Willis
- *Optional:* Before the Seed: How Pollen Moves by Susannah Buhrman-Deever, illustrated by Gina Triplett and Matt Curtius

Key Exhibit components:

- Featured species panels
- Corpse Flower photo op

Before Exploring:

- Show students a picture of a pollinator and a few flowers.
 - Ruby-throated Hummingbird and set of flowers – Magnolia, Daisy, Trumpet Vine, Milkweed
- Ask students to guess which flower the pollinator is most likely to pollinate and why they think that.
- Read the following book
 - 2nd -5th - POLLEN: Darwin's 130-Year Prediction book
 - *Optional:* Before the Seed book has lots of interesting anecdotes about mutualisms
- Ask students to reflect on Darwin's hypothesis and the discoveries that were discussed in the book.
- Explain that plants and pollinators evolved together. Over time, some flowers attract certain pollinators and some pollinators changed shape to match the plants they pollinate.

In the exhibition:

- As students explore the exhibition, ask them to pay attention to the plants and pollinators in the Featured Species Panels and the graphics behind the interactives to find examples of coevolution.
- Encourage students to complete a few Secret Garden missions to find Featured Species Panels.
- After free exploration, review the content relating to the following plant-pollinator pairs and the evolution of these unique relationships. Discuss: In what ways have flowers evolved to attract specific pollinators? And how have some pollinators become the best pollinators for these flowers?
- Flowers have evolved the following traits:
 - **Smell** – Corpse Flower + carrion flies – Flowers evolved the smell and appearance of rotting flesh, which is where these flies lay their eggs
 - **Shape** – Sword-billed hummingbird + tube-shaped flowers – Is it just a coincidence that the flower and bird bill are similarly shaped?
 - **Shape** – Lemur Leap – The pointy snout of the black and white ruffed lemur is just the right shape for opening the flowers on traveler’s palm trees.
 - **Timing** – Lesser long-nosed bat + cactus flower – These cactus flowers only bloom at night, which is the time of day that bats are active.
 - Rose Chafer beetle – This and other beetles are some of the oldest known pollinators. Beetles are also the most abundant insect group on Earth.

Corresponding Classroom Lesson:

Mutualism Mouthpart Engineering

In this lesson, students will model and discuss animal adaptations and how adaptations impact plant-pollinator relationships.

Adaptations: Mimicry & Warning Colors

Grades: 3rd-8th

Content Connection:

Life Science

NGSS.LS1.A: Structure and Function

NGSS.LS1.B: Growth and Development of Organisms

NGSS.LS4.C: Adaptation

Objective: Students will strengthen their understanding of the importance of physical adaptations, specifically mimicry, as a survival strategy for animals.

Materials:

- Model & Mimic photo resources

Key Exhibit components:

- Q&A 3 panel set, relating to camouflage and coloration
- Featured Species Panels

Before Exploring:

- Show students a set of model and mimic animal species and sort the cards into their appropriate piles. Discuss any visible differences between models and mimics. Then let students explain how and why they think mimicry could be a useful survival adaptation.
 - Model: 1) Monarch butterfly, 2) Coral snake, 3) Paper wasp, 4) Hornet, 5) Green snake, 6) Pygmy owl, 7) Mason bee,
 - Mimics: 1) Viceroy butterfly, 2) King snake, 3) Long-horned beetle, 4) Wasp moth, 5) Spicebush swallowtail caterpillar, 6) Owl butterfly, 7) Hoverfly
- Explain that mimicry can come in different varieties: mimicking your surroundings, known as cryptic coloration, and mimicking other animals which might display warning colors. What function do these traits serve?
- Explain to students that a goal for visiting this exhibit is to learn how the adaptation of coloration can help plants and animals survive.

In the Exhibition:

- As students explore the exhibition, ask them to pay attention to any survival coloration adaptations. Make sure all students complete Q&A 3, which features survival adaptations.

- Before students exit the exhibition, ask them to search for one or both of the following pairs of featured species and make note of any special coloration or adaptations.
 - Pipevine Swallowtail vs. Painted Lady – bright warning colors vs. drab camouflage
 - Bumblebee vs. Hoverfly – warning colors and mimicry
- Debrief the exhibit with the following discussion prompts:
 - Reflect on Q&A 3. Did students choose to avoid predators by blending in with camouflage, or standing out with bright warning colors?
 - What were the results?
 - Did they find one solution to be better than the other? If so, why?
 - Was there anything surprising on the answer panels?
 - Review the content of the featured species panels listed above and discuss them as examples of the survival adaptations that were highlighted in the Q3 answer panels.
 - Pipevine Swallowtail – Other species mimic the color patterns of these poisonous butterflies
 - Painted Lady Butterfly – Wings are mutated colors and browns, which are better for camouflage
 - Bumblebee – Yellow and black bands are examples of warning colors
 - Hoverfly – Looks like a stinging bee but is harmless

Classroom Extension Lesson:

Candy Camouflage

In this lesson, students will use candy to model a predator-prey relationship that demonstrates the advantage of mimicry for animal survival.

Why Pollination Matters

Grades: 2nd-8th

Content Connection:

Life Science

NGSS.LS4.D: Biodiversity and Humans

Earth & Space Science

NGSS.ESS3.A: Natural Resources

Objective: Students will explore human dependence on the environment, specifically pollinators, by looking at several important human food sources produced by animal pollination.

Key exhibit components:

- Meet the Pollinator Flips
- Featured species panels
- Pollination & You

Before Exploring:

- Have students stand and participate in a “walking vote,” where students use movement to select between two options. Designate two locations for students to go to in response to each question below. move to either side to indicate which option they choose.
 - Vanilla or strawberry ice cream?
 - Chocolate chip or Oatmeal raisin cookies?
 - Apples or oranges?
 - French fries or potato chips?
 - Spicy or not spicy food?
 - Guacamole or salsa?
 - Are tomatoes a: fruit or vegetable?
- Debrief the voting. Explain that whatever side a student chose relied on something that came from a pollinated plant. Ask students to reflect on the impact of pollinators on their preferences.
- (Note that potatoes are primarily self-pollinated, but also rely on bees.)

In the Exhibition:

- As students explore the exhibition, they should pay attention for any information and graphics that demonstrate how important pollinators are for humans and the world.

- Challenge students to the Secret Garden mission for the Mason Bee (featured species)
- Before students leave the exhibition, ask them to spend time at the Pollination & You panel to review familiar fruits, vegetables, nuts, and plant-based toiletries and medicines
- While debriefing the exhibit, ask students to share what evidence they found of how important pollinators are.
 - 3 human-made environments (farm, greenhouse, and backyard yard)
 - What is the big deal with Mason Bees? And did they find any other commercially important pollinator species
 - Reflect on the Pollination & You interactive

Corresponding Classroom Lesson:

- 2nd-3rd grade
 - Read the book The Reason for a Flower: A Book About Flowers, Pollen, and Seeds (Explore!) by Ruth Heller
 - As a class, create a list of foods and everyday items from pollinated plants that were identified in the book. Discuss whether there was anything missing or anything surprising? Like rubber or medicine?
 - Ask students to illustrate a comic strip of their daily routine that highlights items they use that come from pollinated plants.
- 4th-8th grade - Pollination is Big Business lesson plan
 - In this lesson, students will be able to describe the economic importance of pollinators after solving word problems containing actual chocolate making statistics.

Pollinator Threats & Opportunities

Grades: 3rd-8th

Content Connection:

Life Science

NGSS.LS4.D: Biodiversity and Humans

Earth & Space Science

NGSS.ESS3.A: Natural Resources

NGSS.ESS3.C: Human Impacts on Earth Systems

Objective: Students will complete Q&A challenge to learn more about potential threats and successes for pollinators.

Materials:

- What if there were no bees? A book about the grassland ecosystem by Suzanne Slade, illustrated by Carol Schwartz

Key Exhibit Components:

- Q&A challenges
- Conservation pledge

Before exploring:

- Read: What if there were no bees? A book about the grassland ecosystem
- Ask students to reflect on what a world without bees (and other pollinators) would be like.
- As a class, identify a list of challenges that pollinators could face. Prompt them with examples if necessary.
- Divide students into small groups and assign them a type of pollinator (bees, butterflies, birds, flies, etc.) and ask them to brainstorm one challenge for their specific pollinator group as well as one way to help solve that challenge. Discuss as a group.
- The goal of the day is to learn about pollinators and come up with solutions that will ensure they survive and we benefit from all the goods they provide!

In the exhibition:

- Send students into the maze and ask them to pay special attention to the path they take through the maze. There are lots of threats and opportunities discussed at each Q&A panel.
- While debriefing the visit, remind students of the content in the following Q&A panels:

- Q&A 2 (threats & success in a *Garden*)
 - What are the threats & successes related to: Vehicles, Parking Lots, Windows, Exhaust, Light Pollution
- Q&A 4 (threats & success in a *City*)
 - What are the threats & successes related to: Pesticides, Wrong Plants, Lawns, House Cats, Competition
- Q&A 5 (human impacts on future pollinator populations)
 - What are the threats & successes related to: Single-use plastic, package delivery, fast fashion, urban development, clearcutting and monoculture
- Discuss whether there was anything different or surprising that they discovered about the threats or ways to help pollinators.
- Take the conservation pledge as a class.

Corresponding Classroom lesson:

- As an engineering design extension, build [bee](#) or [butterfly](#) hotels.

Pollinator Friendly Gardening

Grades: K-6th

Content Connection:

Life Science

NGSS.LS1.A: Structure and Function (4-LS1-1)

NGSS.LS1.B: Growth and Development of Organisms (MS-LS1-4)

NGSS.LS4.C: Adaptation (3-LS4-3) (MS-LS4-6) (HS-LS4-2)

Objective: Students will explore the flowers and pollinators that can be found in different habitats and use simple graphs to help chart flower abundance. Students can then use this information to design a pollinator garden.

Materials:

- The Garden Next Door by Collin Pine, illustrated by Tiffany Everett
- Paper
- Pencils, crayons, colored pencils, or markers

Key Exhibit Components:

- Musical Flowers
- Environment Graphics
- Conservation Pledge

Before exploring:

- Explain to students that the goal of the day is to think about the importance of pollinators and how to provide safe havens for them in our backyards or neighborhoods. After visiting the exhibit, students will be tasked with designing a pollinator-friendly garden.
- Read The Garden Next Door book

In the Exhibition:

- Remind students to explore the exhibit with the goal of finding out how to design a pollinator garden.
- Students should pay attention to the following aspects of these key exhibit components:
 - Musical Flowers – What advice does this panel give for designing a pollinator garden, or a “Garden in Harmony”?
 - Environment Graphics – What environments are represented?
 - Conservation Pledge – What can you do “Outside” that would benefit a pollinator garden?

- Debrief the experience by refreshing students on the big ideas highlighted by these Key Exhibit Components and using the following discussion prompts.
 - Musical Flowers
 - Review the content at the Garden in Harmony musical flowers activity. Reflect on what the text means and how they would design a “garden in harmony”?
 - Environment Graphics
 - What environments did they see on the graphics? Did any of the environments look like where they live? How do the graphics influence what type of garden you would design for pollinators?
 - Conservation Pledge
 - What things on the Conservation Pledge could you make sure to do in your pollinator garden?
- As a summative activity, provide students with paper and drawing utensils. Ask them to draw a garden and use callouts or text boxes to describe the pollinator-friendly features they will include. Younger students may simply draw in flowers on a map, older students may use graph paper to chart out the area required for plants.

Corresponding Classroom Lesson:

Design a Pollinator Garden

Students will use graph paper to map out a garden plot according to the space requirements of different plants and flower preferences of different types of pollinators.

Bibliography & Suggested Reading

Before the Seed: How Pollen Moves by Susannah Buhrman-Deever, illustrated by Gina Triplett and Matt Curtius

Flowers Are Calling by Rita Gray, illustrated by Kenard Pak

Flower Talk: How Plants Use Color to Communicate by Sara C. Levine, illustrated by Masha D'yans.

The Garden Next Door by Collin Pine, illustrated by Tiffany Everett

Meet the Pollinators: A Night and Day Adventure by Barbara Ciletti

Protect the Pollinators by Rachael Rose Zoller

POLLEN: Darwin's 130-Year Prediction by Darcy Pattison and illustrated by Peter Willis

The Reason for a Flower: A Book About Flowers, Pollen, and Seeds (Explore!) by Ruth Heller

What Is Pollination? by Bobbie Kalman

What if there were no bees? A book about the grassland ecosystem by Suzanne Slade, illustrated by Carol Schwartz

What's Inside a Flower by Rachel Ignotofsky

Additional:

Know Your Pollinators: 40 Common Pollinating Insects including Bees, Wasps, Flower Flies, Butterflies, Moths, & Beetles, with Appearance, Behavior, & How to Attract Them to Your Garden by Tim Harris