

EDUCATOR GUIDE

Pollinator Pit Stop

Grade Levels: 1-5

Duration: 60 min (2 sessions, plus observation time)

Students will explore how design thinking can have a positive effect on the natural world by creating a temporary habitat for a pollinator insect. They will put their habitats outside and observe the results over a few days, then iterate on their design based on their observations.

Concepts/Skills

Habitats, ecology, design thinking

Objectives

Students will:

- Explore the needs of specific pollinators by designing a pollinator pit stop, a temporary habitat made of both natural and maker materials.
- Observe the habitat's condition over time and record their observations.
- Iterate on the design of their pollinator pit stop based on their observations.



The Tech Academies

This activity was developed in partnership with educators from

The Tech Academies Fellowship program, where educators develop leadership skills while designing and testing STEM resources.



This resource provides guidance for leading the [Pollinator Pit Stop](#) activity in an educational setting, virtually or in person.

Materials and Preparation

- Designate a space outside where students will place their pit stops and observe them over several days.
- For a virtual implementation, have students do a [Materials Treasure Hunt](#) to gather items for the challenge. Add bonus items consisting of natural materials, such as bark, dried leaves, or sticks that students can easily find outdoors.

See the [Pollinator Pit Stop Activity Guide](#) for the full materials list.



Sample Outline

Frame the Challenge			15 min total
Define the Problem	Use guiding questions and some of the STEM Story Time suggestions to activate learners' prior knowledge about pollinators and their habitats.	10 min	
Introduce the Challenge	Introduce the design problem and materials. Set criteria and constraints.	5 min	
Design Challenge Part 1			45 min total
Explore	Each team picks a pollinator card. Teams explore the materials while they brainstorm what they will build.	5 min	
Design and Create	Students work in teams to build their designs, testing for stability as they build.	20 min	
Share Solutions	Teams briefly share their habitats and engineering process, including what they would do if they had more time.	15 min	
Debrief	Debrief the experience and concepts with students.	5 min	
Test and Reflect			10 minutes, 3-4 days
With additional time, teams place their pit stops outside. Teams should observe their pit stops and take notes on the habitat's condition and whether they see evidence that wildlife has visited.			 
Design Challenge Part 2			45 min total
Review and Share	Review and share the observations. Students will use what they learned to improve their habitats.	5 min	
Create and Test (Prototype)	Students work in teams to iterate their designs based on their observations. Explore More: Teams that have met the original criteria can test their habitats against extreme weather conditions using a spray bottle of water for rain or a fan for wind.	20 min	
Share Solutions	Teams briefly share their habitats and engineering process, including what they would do if they had more time.	15 min	
Debrief	Debrief the experience and concepts with students.	5 min	

Facilitation Tips

This resource is designed to accompany the [Pollinator Pit Stop Activity Guide](#). See the guide for detailed procedures and additional suggestions.



Introduce the Challenge

- Use criteria and constraints to define the problem. Groups should define additional criteria and constraints to meet the needs of their pollinator.

Criteria 	Design must be stable enough to stay together in an outdoor setting.
Constraints 	<ul style="list-style-type: none">• Include some natural materials in the design.• Schedule: 20-minute time limit.



Design and Create

- Remind students to focus on the process and what they are learning from the experience overall. Encourage them to reflect on key mindsets like empathy and perseverance throughout the challenge.
- Ask open-ended questions to support students throughout the process:
 - *What do your pollinator's nesting spots or habitats look like in the wild?*
 - *What would your pollinator need in order to feel comfortable and safe?*
 - *How can you make sure the pit stop stays dry inside when it rains?*
 - *Is the pit stop sturdy enough? Will it stay up when it is windy?*
 - *Can the pollinator enter and exit easily without predators getting in?*



Share Solutions

- Encourage teams to point out where they used key concepts. *For example:* Identifying which elements in their design accommodate the needs of their pollinator, or showing aspects of their design that protect the pollinator from weather or predators.



Debrief

- Ask students to consider reasons why they might not see their pollinator regardless of their habitat's design. *For example:* Their pollinator may be active only at night, or they may not be active during the current season.
- Have students consider: Besides building pit stops, what are other ways humans can support pollinators?
- *For example:* Growing native plants or not using pesticides.

Standards Connections

Next Generation Science Standards

Grade	Standard	Description
K-2	Engineering Design K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
3-5	Performance Expectation 3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
3-5	Performance Expectation 3-LS4-3	Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
Additional Standards		DCI: LS2.A: Interdependent Relationships in Ecosystems, SEP: Planning and Carrying Out Investigations

Vocabulary

For more tips on vocabulary and common engineering terms see our [Tech Tip: The Language of Engineering](#).

- **Aphid:** Tiny insect that feeds on plants.
- **Bark:** The outer layer of the trunk of a tree.
- **Ecosystem:** Any area where living creatures such as plants and animals interact with nonliving things like soil, water, temperature, and air.
- **Habitat:** A place where an organism makes its home.
- **Insect:** Small animals with six legs and a hard outer shell called an exoskeleton.
- **Leaves:** The flat, usually green, parts of a plant or tree that grow from the stem or branch.
- **Nectar:** A sweet liquid produced by flowers and consumed by pollinators.
- **Petals:** Leaves that surround the reproductive parts of flowers, usually brightly colored or unusually shaped to attract pollinators.
- **Pollinator:** An animal that carries pollen from the male part of one flower to the female part of another flower. This allows the plant to make fruit, nuts, and/or seeds.
- **Predator:** An animal that lives mostly by hunting and eating other animals.
- **Pollen:** Tiny grains that allow the plant to make fruit, nuts, and/or seeds.
- **Species:** A group of animals, plants, or other living things that all share common features.
- **Social behavior:** Interactions between animals of the same species.



Tech Tips

See our [educator guides and videos](#) for more design challenge facilitation techniques. For this lesson check out:

- Prototyping: Test, Reflect, Iterate
- Data Collection: Reflecting on Your Design