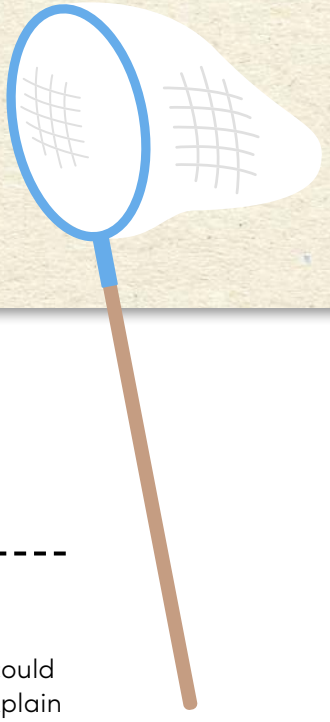
INSECT TRAP MATERIALS LAB



THEME

- ○ Forest Health
- ☑ Ecology
- ○ Plant Conservation

TYPE OF LESSON

- ○ Instructor-Led
- ☑ Hands-On
- ○ Garden Exploration

POSSIBLE WAYS TO LEAD LESSON

- ☑ Outdoors
- ○ Virtual
  For a virtual lesson version, visit our website: www.plantheroes.org
- ☑ Classroom
- ○ Other:

TEACHING STRATEGY

- ○ Place-Based Learning
- ○ Storytelling
- ○ Nature Play
- ○ Art / Movement
- ☑ Other: Group work; design thinking

STANDARDS

- NGSS, 3-5-ETS1-1. Engineering Design. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- NGSS, 3-5-ETS1-2. Engineering Design. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

GRADES 3–5

DURATION 30 minutes

LESSON GOAL

Learners analyze common materials that could be used to capture insects for study and explain their thinking to the group.

LESSON SUMMARY

Learners will analyze materials and then write about and draw ideas for building traps to capture insects. They will discuss their ideas with the group and read about existing traps scientists use to capture insects.

PRINTED MATERIALS

- **Trap Design Worksheet** (1 per group)
- **Insect Information Sheet** (1 per group)
- **Trap Information Sheet** (1 per group)

OTHER MATERIALS

- Pencils with erasers (1 per learner)
- Straw (1 per group)
- Masking tape (1 per group)
- Funnel (1 per group)
- Working flashlight (1 per group)
- Insect net, small fish net, or something similar (1 per group)

WORD BANK

decomposer
pollinators
prey
predator
pest
diurnal
nocturnal
biodiversity

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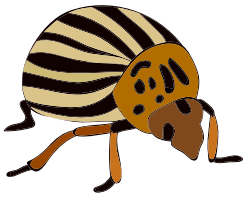
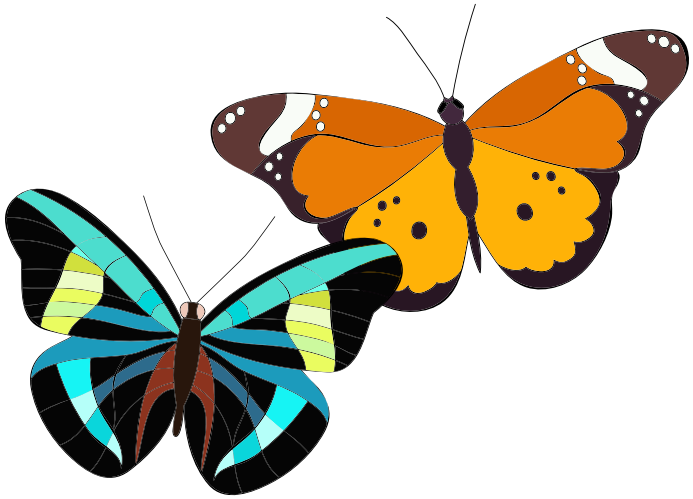
SETUP

1. Review the **lesson procedure**.
2. Review and consider the optional **pre-** and **post-lesson explorations** and the **extensions**.
3. Make copies of the **printed materials** to distribute.
4. Gather the **other materials** on the list. Prepare at least one set of materials per group.

LESSON PROCEDURE

1. Optional: Complete one or more of the **pre-lesson explorations**.
2. Split learners into work groups (3 learners per group is ideal).
3. Share the **lesson opener**.
4. Hand out the **Trap Design Worksheet** and the **Insect Information Sheet** to each group.
5. Give the group time to answer the worksheet questions.
6. During brainstorming and the following steps, circulate among the groups to clarify the procedure and promote inquiry.
7. End group work and ask the **lesson questions**.
8. After discussing the groups' ideas and their recommendations, share the **Trap Information Sheet** showing what scientists currently use as traps.
9. Optional: Complete one or more of the **post-lesson explorations**.





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LESSON OPENER

Share the following with learners to orient them to the topic:

- Insects are some of the most important and misunderstood animals on the planet. They do very essential work! They turn flowers into fruit through pollination, eat dead animals and plants to help keep environments clean and cycle nutrients, and are an essential food source for many animals like birds and bats.
- Some scientists believe there are millions of insect species yet to be discovered.
- Scientists can sometimes use simple observation to study insects. But it is often necessary to trap insects to really understand them. It is important to remember that scientists use traps with a purpose and always treat this process very seriously.
- Today you will be asked questions and work as a group to recommend materials that could be used to trap an insect to study. We will provide a worksheet that will lead you through the design process.
- At the end of your work time, you will recommend which materials you think are best for designing a trap and describe how the traps would be used. You will also draw and share your ideas.

LESSON QUESTIONS

As time allows, encourage each group to debrief their thinking and their design with the whole group:

- Which insect type did you select? Why?
- Which types of material do you think would be most effective at catching your insect type?
- What did you imagine your trap design would look like?
- How are the traps scientists use different from the ones you were imagining?

PRE-LESSON EXPLORATIONS

Have learners complete any of these prompts:

- **"Think like an insect" journal entry**: Pretend you are an insect, and write a journal entry as if you were that insect. Imagine where you might live, what you would do, where you would travel in a day, how you would get there, and the food you would eat.
- **Natural traps**: Identify traps that insects or spiders make in nature (such as spiderwebs) and traps that nature makes for insects (such as Venus flytraps, pitcher plants).

POST-LESSON EXPLORATIONS

Have learners complete any of these prompts:

- **Make a trap:** Now that you know what traps are and what materials they are built out of, build your own using the materials provided.
- **Community science:** If you have access to an outdoor space, use iNaturalist's app Seek (find link in Additional Resources) to explore a small area for 5 minutes and see how many insects you can find. You can use the **Insect Information Sheet** to find information on where insects might be. If you can't go outside, remember our houses are full of insects too! See if you can find some in your own house.
- **Ask an entomologist:** Do you have questions only an expert could answer? Make a list and send it to your local extension office or public garden.
- **Class Venus flytrap:** How do *plants* trap insects? Consider getting a Venus flytrap for your class. Hypothesize which insects will come to it and what to feed it.

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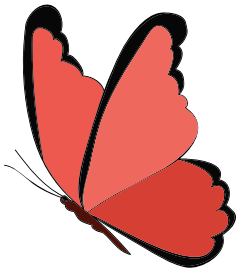
ADDITIONAL RESOURCES



- Seek by iNaturalist—an app to help identify insects: bit.ly/PH-Seek
- Plant Heroes insect field guides: bit.ly/PH-EdC-FG
- How to make an insect pitfall trap (for kids): bit.ly/PH-pitfall
- Information about natural traps:
    - Venus flytrap video: bit.ly/PH-venusflytrap
    - Venus flytrap information from National Wildlife Federation: bit.ly/PH-NWF-flytrap
    - Yellow garden spider information from National Wildlife Federation: bit.ly/PH-NWF-gardenspider

ADAPTATIONS

If you have additional time and a willing group of students, try building the traps using the materials you have at hand.

WORD BANK DEFINITIONS

decomposer: **an organism that breaks down dead organisms and wastes into other materials**

pollinators: **animals that help flowering plants reproduce by moving pollen around, often while the animals are feeding**

prey: **an organism that is killed and eaten by another organism called a predator**

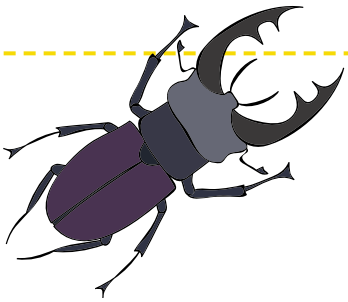
predator: **an organism that kills and eats other organisms called prey**

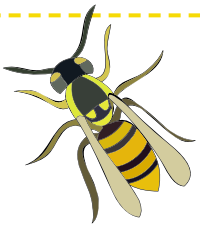
pest: **an organism that exists where it is not wanted; often harmful to people**

diurnal: **active mostly during the day**

nocturnal: **active mostly at night**

biodiversity: **the variety of living organisms that exist in an environment**





Trap Design Worksheet

1) What type of insect are you trying to capture? What size is it? How does it move? Is it active at night or during the day? Refer to the Insect Information Sheet to find what you need to know.

2) BRAINSTORM. Look at these materials:

STRAW **TAPE** **FUNNEL** **FLASHLIGHT** **NET**





Select which material would be best for trapping your insect. Explain why.

3) Can you think of other materials not on this list that could work for trapping insects?

4) Imagine what a trap design for your insect would look like. Draw it in the space provided.

Trap Information Sheet

Different types of traps are used to capture insects based on how they move and when they are active. An insect that crawls on the ground might be captured by falling into a hole it did not expect, while a flying insect might be captured when it lands on a sticky surface.

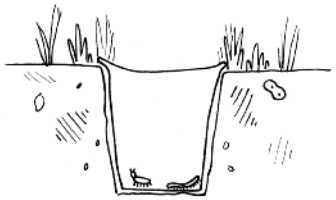
There are many types and variations of traps used by people who study insects.

Here are some examples.

MALAISE TRAP

HOW IT WORKS: Insects fly into the net and move toward the tent's top. As they crawl to the edge, they find an opening at the side that leads to a liquid trap.

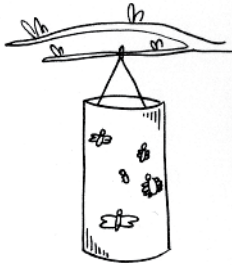
TYPES OF INSECTS: Flying insects (flies, wasps, butterflies)



PITFALL TRAP

HOW IT WORKS: Insects fall into a container while walking on top of the surface of the soil.

TYPES OF INSECTS: Insects walking on soil (beetles, ants, crickets)



STICKY TRAP

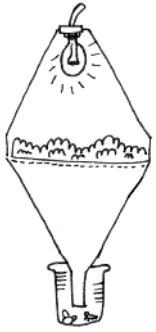
HOW IT WORKS: Insects get caught in a sticky substance as they land on the trap's surface. These traps are hung above the ground to avoid collecting dirt, which can make them less sticky.

TYPES OF INSECTS: Flying insects (moths, beetles, flies)

PAN TRAP

HOW IT WORKS: Small containers filled with liquid are painted to mimic flowers (yellow, blue, white). Insects land in the pan thinking they are landing on a flower.

TYPES OF INSECTS: Flying insects that visit flowers (bees, flies, wasps)



BERLESE FUNNEL

(not technically a trap, but a device to remove insects from soil)

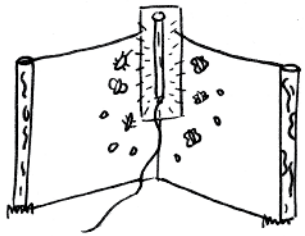
HOW IT WORKS: A sample of soil is taken to a Berlese funnel. Soil is placed into the funnel and over a jar with liquid. A heat lamp is placed over the soil, causing the insects to drop out of the funnel and into the jar.

TYPES OF INSECTS: Soil-dwelling insects (centipedes, millipedes, nematodes)

BUCKET TRAP WITH FUNNEL

HOW IT WORKS: Insects enter a bucket through the large opening of a funnel. They cannot get back out through the small hole of the funnel. Often a scent is added that attracts a certain type of insect.

TYPES OF INSECTS: Flying insects (fruit flies, beetles, wasps)



LIGHT TRAP

HOW IT WORKS: A sheet is hung up tautly with a light shining on it at night. The light attracts insects who become dazed and do not fly away.

TYPES OF INSECTS: Flying insects that are active at night (moths, beetles)

Insect Information Sheet

INSECT: BUTTERFLY

ORDER: Lepidoptera

 # OF KNOWN SPECIES: 17,500

PHYSICAL DESCRIPTION:

- Have scales in their wings
- Colors vary (solid to patterned)
- Size range: Wingspan 0.5" to 12"

HOW THEY MOVE:

- They fly from flower to flower
- Active in the day (diurnal)

INSECT: MOTH

ORDER: Lepidoptera

 # OF KNOWN SPECIES: 180,000

PHYSICAL DESCRIPTION:

- Light in color (white to green)
- Size range: Wingspan 0.1" to 9.4"

HOW THEY MOVE:

- They fly from flower to flower
- Most are active at night (nocturnal)

INSECT: BEETLE

ORDER: Coleoptera

 # OF KNOWN SPECIES: 350,000

PHYSICAL DESCRIPTION:

- Colors vary (solid to patterned)
- Size range: 0.12" to 6.6"

HOW THEY MOVE:

- They crawl; some can fly
- Can be active in the day or night

INSECT: ANT

ORDER: Hymenoptera

 # OF KNOWN SPECIES: 150,000

PHYSICAL DESCRIPTION:

- Mostly red or black; some are green
- Size range: Length 0.05" to 1.2"

HOW THEY MOVE:

- They crawl; some can fly
- Can be active in the day or night

INSECT: PLANT HOPPER

ORDER: Hemiptera

 # OF KNOWN SPECIES: 12,500

PHYSICAL DESCRIPTION:

- Various colors and shapes
- Size range: 0.4" to 2"

HOW THEY MOVE:

- They jump between plants
- Most are active during the day (diurnal)

INSECT: FLY

ORDER: Diptera

 # OF KNOWN SPECIES: 1,000,000

PHYSICAL DESCRIPTION:

- Colors vary
- Size range: Length 0.01" to 2.5"

HOW THEY MOVE:

- They fly and walk on surfaces
- Active during the day (diurnal)

INSECT: BEE

ORDER: Hymenoptera

 # OF KNOWN SPECIES: 150,000

PHYSICAL DESCRIPTION:

- Colors vary; some are very hairy
- Size range: Wingspan 0.07" to 2.5"

HOW THEY MOVE:

- They fly and walk on flowers
- Most are active during the day (diurnal)

INSECT: CICADA

ORDER: Hemiptera

 # OF KNOWN SPECIES: 3,000

PHYSICAL DESCRIPTION:

- Colors vary
- Size range: 0.7" to 2"

HOW THEY MOVE:

- They fly and crawl on the ground and trees
- Can be active in the day or night

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