

TEACHER'S GUIDE OBJECTIVES

Students should be able to

- » explain the basics of insect behavior.
- » explain different ways to attract insects.
- » design an insect trap that will collect a variety of insects and protect them for display in a collection.
- » conduct a controlled experiment to test their insect trap.
- » explain the performance of their insect trap within the context of other project parameters.

EQUIPMENT (SUGGESTED)

- » Tape (duct, masking, electrical, clear)
- » Scissors
- » String
- » Craft sticks
- » Glass and plastic jars of various sizes
- » Plastic cups & plates, various colors
- » Hand shovel
- » Drinking straws
- » Twist ties
- » Foil
- » Nylon screen material in 12–24 in. squares
- » Wooden dowel or bamboo sticks 12–24 in. long
- » 3–4 ft square of thin cloth such as tulle, muslin, or cotton bedsheet
- » LED puck lights
- » Sugary liquids (sugar water, soda, juice, etc.)
- » Propylene glycol (not ethylene glycol because of danger to mammals)
- » Goggles (if using propylene glycol)
- » Metal cans (coffee, peanut, etc.)
- » Plastic containers (yogurt, margarine, etc.)
- » Floral wire
- » Glue (school glue and hot glue gun)
- » Cotton balls
- » Q-tips
- » Various colors of construction or other paper
- » Plastic bottles (water, soda, milk jugs, etc.)

STUDENT ORIENTATION

The students must design a device that will attract and capture insects. The device must work for a variety of insects and the insects have to remain in good condition for use in an insect collection. The teacher will provide design and test parameters. Once the students have built their devices, they will test them.

PREPARATION

1. If the students will do this project only at school, then gather items in the Equipment list.

2. If this project is done away from school, then determine what limitations for types of materials and equipment, such as the following:
 - a. Use only household materials not designed for trapping insects.
 - b. Any purchased item must cost less than the teacher's determined dollar amount.
 - c. To use any item not on the list, they must get the teacher's approval.
3. Divide students into groups of 2–4.
4. Select a deployment area for all the groups. Ensure you have sufficient space to have no traps within 5 feet of other traps.

PROCEDURE

Note: Students should include all notes, designs, data, calculations, analyses, and conclusions in a project log.

Planning the Design

1. The students should research insect behavior and methods of attracting insects, as well as familiarize themselves with the available materials. Have the teams walk around the planned deployment area to stake out a location for their trap. Don't allow traps to be less than 5 ft apart.
2. Have students collaborate in teams to discuss ideas and then have each student draw designs. Teams should compare designs and come to a consensus on their group design. Traps should be less than 12 in. tall by 12 in. wide by 12 in. long. Review the designs for approval. You may want to ask them questions to guide their thinking, if the design's feasibility is questionable.

Testing the Design

1. Have teams install their traps in the location they selected within the deployment area. Testing should span at least one overnight period. After the testing period, the teams will examine their traps, recording how many and what types of insects have been captured.
2. If necessary, the teams should make adjustments in their designs to improve performance.
3. Have teams retest their modified traps. Retesting should be in the same location within the deployment area. The traps should be deployed at the same time of day as the first trial. Leave the traps for the same length of time as before. After the second testing period, teams should examine their traps, recording how many and what types of insects have been captured.
4. The teams should share their results with each other. Each team should break down the results according to lure, kinds of traps, and types and number of insects. They should also compute the average number of insects and types of insects caught in each type of trap.
5. Allow the teams to discuss their results. Each student will then write conclusions describing and justifying their results. Students will also suggest possible improvements that they could make to their designs.

TEXTBOOK CONNECTIONS

- » Fundamentals of Math—Ch. 10
- » Pre-Algebra—Ch. 10
- » Life Science—Ch. 2 & 12

ASSESSMENT RUBRIC

	4–Mastery	3–Competent	2–Emerging	1–Poor
Analysis	The relationship between variables is discussed. Trends or patterns are described and analyzed. Predictions are made regarding performance of insect trap design.	The relationship between variables is discussed. Trends or patterns are described.	The relationship between variables is discussed. No patterns or trends are mentioned or predictions made.	The relationship between variables is not discussed.
Drawings/Diagrams	Designs show understanding of insect behavior and design criteria, are easy to understand, and are labeled completely.	Designs show understanding of insect behavior and design criteria, are easy to understand, and are partially labeled.	Designs show a fair understanding of insect behavior and design criteria, but are confusing with few if any labels.	No designs present or design is identical to that of another team member with minor tweaks.
Calculations	All calculations are shown, and the results are accurate and correctly labeled.	Some calculations are shown, and the results are accurate and correctly labeled.	Some calculations are shown, and the results are labeled correctly.	No calculations shown or they are inaccurate.
Conclusion	Evidence is cited to support the conclusion drawn from the activity, and possible reasons are given for errors or success.	Evidence is cited that supports the conclusion drawn from the activity.	What was learned from the experiment was stated.	No conclusions recorded; no evidence of reflection.
Organization and Appearance	Almost all entries are organized, neat, and easy to follow. Numbers, bullet points, and spaces are almost always used to separate different items.	Most entries are organized, neat, and easy to follow. Numbers, bullet points, and spaces are usually used to separate different items.	Some entries are organized, neat, and easy to follow. Many are not. Numbers, bullet points, and spaces are sometimes used to separate different items.	Entries are not organized or neat. Order is difficult to follow. Numbers, bullet points, and spaces are rarely used to separate different items.
Collaboration with Peers	Always listened carefully to others and offered detailed, constructive feedback. Participated fully and shared the workload fairly.	Usually listened to others and usually offered constructive feedback. Participated most of the time and usually shared the workload fairly.	Sometimes listened to others, occasionally offered constructive feedback. Participated but sometimes did not share the workload fairly.	Did not listen to others and often interrupted them. Did not offer constructive feedback. Did not participate and relied on others to carry the workload most of the time.