

INSECTS

TAKING A DEEPER LOOK AT THE WORLD OF BUGS

-
- **Build Your Own Insect Trap (Grades 3–6, one 50-minute period)**
 - **Ant Lions (Grades 3–8, two 50-minute periods)**
 - **Insect Pitfall Traps (Grades 3–8, four 50-minute periods)**
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Rural Science Education Program
A partnership between Oregon State University
and rural K-12 schools



OSU
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Extension Service

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Rural Science Education Program

The Rural Science Education Program is a partnership between Oregon State University and local rural K–12 schools for enrichment of the science curriculum with hands-on science activities. The curricula include simple, innovative inquiry- and site-based experiments that encourage critical thinking in K–12 students about the impacts of agriculture on the environment and the implications of advanced scientific research on human lives.

For more information

For more information about the Rural Science Education Program, to order copies of *Insects: Taking a Deeper Look at the World of Bugs*, or to request a loaner kit that includes limited supplies for each activity, contact Sujaya Rao (phone: 541-737-9038; e-mail: sujaya@oregonstate.edu; fax: 541-737-5725).

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CONTENTS

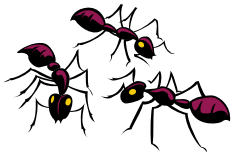


Build Your Own Insect Trap

Introduction

Day 1

Lesson Plan



Ant Lions

Introduction

Day 1

Lesson Plan—Form Hypotheses

Student Worksheet—Mystery Container

Day 2

Lesson Plan—Observe Ant Lion Behavior

Student Worksheet—Mystery Container



Insect Pitfall Traps

Introduction

Day 1

Lesson Plan—Develop Hypothesis/Procedures

Student Worksheet—Pitfall Trap Design and Hypothesis

Day 2

Lesson Plan—Pitfall Trap Setup

Day 3

Lesson Plan—Collect Pitfall Traps

Day 4

Lesson Plan—Classification of Insects

Student Worksheet—Insect Orders

Student Worksheet—Insect Classification (2)

Student Worksheet—Experiment Followup

Student Worksheet—Final Report Guidelines

Look for
these
symbols



Lesson plan



Student worksheet



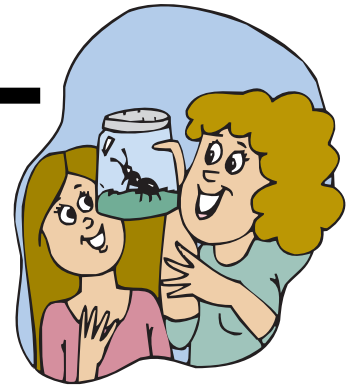
Build Your Own Insect Trap

Introduction

Day 1

Lesson Plan

BUILD YOUR OWN INSECT TRAP



DESCRIPTION

This lesson can be used as an introduction to insects or as an assessment about insects at the end of the unit. Students will design their own insect traps to collect an unknown insect, in the same way that entomologists collect the insects they study.



STUDENT OUTCOMES/OBJECTIVES

- Students will be able to ask a testable question.
- Students will be able to explain the relationship between insect behavior and insect trapping techniques.



STANDARDS

Benchmark 2

- Explain the relationship between animal behavior and species survival.
- Describe the living and nonliving resources in a specific habitat and the adaptations of organisms to that habitat.



TIME ESTIMATE

One 50-minute class period



MATERIALS (FOR 30 STUDENTS)

- White paper (40 sheets)
- Yellow paper (1 ream)
- Construction paper (1 pack, a variety of colors)
- Plastic cups (15 clear, 15 yellow, and 15 white)
- String (1 ball)
- Plastic plates (15 yellow and 15 white)
- Popsicle sticks (1 large box)
- Masking tape (2 rolls)
- Straws (75)
- Scissors—sharp but inexpensive (3 pairs)
- Q-tips (1 box)
- Cotton balls (1 bag)
- Soda pop
- Dry beans (a few ounces)
- Markers (4 packs)



WORKSHEETS

None



VOCABULARY

Entomologist—A scientist who studies insects

Insect trap—An object used to catch insects

Visual cues that attract insects—Colors or shapes of objects that attract insects

Odor cues that attract insects—Smells or scents that attract insects



BACKGROUND INFORMATION

Students should have an understanding of insects if the lesson is being used as an assessment. If the lesson is used as an introduction, a little background knowledge about insects is necessary.



LESSON PLAN

Build Your Own Insect Trap (50-minute period)



EXTENSIONS/RESOURCES

None

LESSON PLAN

BUILD YOUR OWN INSECT TRAP



Preparation

Place supplies on a table at the front or back of the classroom.

Note: Italicized words are potential script for the teacher.

Introduction (2 minutes)

- *A new insect has been sighted in the neighborhood.*
- *Farmers and homeowners are concerned that the insect might be damaging their crops or garden plants.*
- *Very little is known about the biology of this insect, and entomologists would like to catch as many as possible so that they can study them.*
- *Entomologists prefer to have the insect captured alive.*
- *They need your help in catching as many insects as possible.*
- *You will be designing and building a trap to catch this insect alive.*

Questions for brainstorming about insects (3 minutes)

What would you like to know about the insect before you design your trap?

The following questions are likely to be asked by students. The answer follows each question. Write the answers on the board as questions are asked.

If a student asks a question for which the answer is not provided, let him/her know that the answer is not known, and that this would be a good research question.

If students do not ask the questions below, prompt them to make sure these facts are covered.

Does the insect walk or fly?

It flies.

Does the insect fly during the day or night?

It flies during the day.

Is it attracted to any color?

It is attracted to yellow. (This is a visual cue.)

Is it attracted to any scent (odor)?

It is attracted to the scent of beans (protein) and soda pop. (These are odor cues.)

How big is the insect?

It is similar in size to a yellow jacket.



Go over procedures (3 minutes)

A variety of supplies are available for building the trap. (Hold up each item as you go over it.)

- Plastic cups (yellow, white, clear)
- Paper (yellow, white, construction)
- Tape
- String
- Plastic plates (yellow and white)
- Beans (protein)
- Soda pop
- Markers, scissors
- Cotton balls, Q-tips
- Popsicle sticks
- Straws



Steps (write on the board)

1. Plan/Design your trap.
2. Gather supplies.
3. Build the trap.
4. Present the trap to the class and explain features that will help trap the insects.

Divide the class into groups of two or three students (2 minutes)

Plan/Design your trap (5 minutes)

Gather supplies and build the trap (20 minutes)

- *Send one person from your group to collect supplies for the team.*
- *Get only the supplies you need.*

Present the trap (10 minutes)

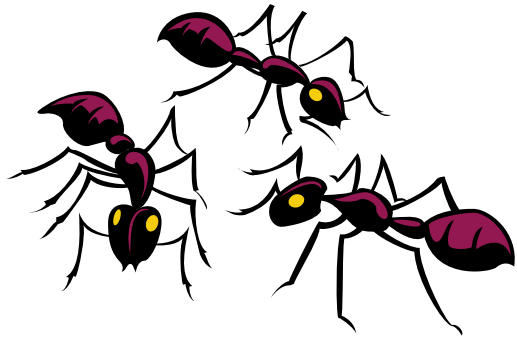
Ask for volunteers (as many as time permits).

Cleanup (5 minutes)

Followup lesson

If students are interested, the traps can be placed outdoors to see what insects are trapped.





Ant Lions

Introduction

Day 1

Lesson Plan—Form

Hypotheses

Student Worksheet—

Mystery Container

Day 2

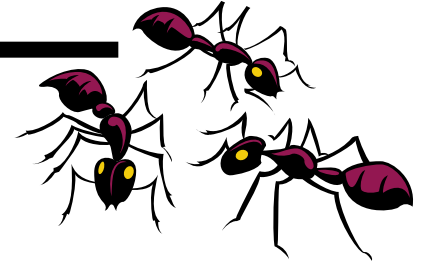
Lesson Plan—Observe Ant

Lion Behavior

Student Worksheet—

Mystery Container

ANT LIONS



DESCRIPTION

This lesson uses ant lions to engage students in developing observation skills. Students will be involved in an inquiry exercise and will discover how ant lions trap their prey.



STUDENT OUTCOMES/OBJECTIVES

- Students will make observations.
- Students will practice asking research questions.
- Students will practice forming a hypothesis.
- Students will learn to test a hypothesis.
- Students will be able to describe how ant lions catch their prey.



STANDARDS

Benchmark 2

Make observations. Ask questions or form hypotheses based on those observations, which can be explored through scientific investigations.

Benchmark 3

Based on observations and scientific concepts, ask questions or form hypotheses that can be explored through scientific investigations.



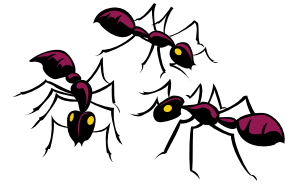
TIME ESTIMATE

Two 50-minute class periods



MATERIALS

- Ant lions, ideally one per group of three students. If ant lions are not available, collect them. (Bring fine mesh, trays, trowels, and small containers with lids.) In Oregon, look for ant lions in central Oregon, around Black Butte, on Highway 20. See “Extensions/Resources” for other sources.
- Fine dirt (enough to fill each ant lion container one-third to one-half full)
- Clear plastic cups (2 per ant lion: 1 to hold ant lion, 1 to sift dirt into on Day 2)
- Petri dishes (any size, 1 per ant lion)
- Wire mesh squares (4-inch square, small holes, 1 per ant lion)
- Ants (1 per ant lion, Day 2)
- Newspaper (to keep ant lion area clean)
- Magnifying glasses (optional)



Warm-up materials

- Treats
- Question word die (Directions for making a question word die are included under “Extensions/Resources” below.)
- Pictures for warm-up game (1 picture per group of 3 students)



WORKSHEETS

Day 1—Mystery Container—Day 1

Day 2—Mystery Container—Day 2



VOCABULARY

Qualitative observations: Observations about objects that are based on shape, size, form, color, odor (The pencil is hard, bright yellow, smooth.)

Quantitative observations: Exact observations about objects that can be counted or measured (The pencil is 6 cm long, weighs 8 grams, and has a 1 mm lead.)

Hypothesis: An educated guess or prediction



BACKGROUND INFORMATION

If possible, introduce steps of the inquiry cycle (see “Extensions/Resources” below) to students before this lesson.



LESSON PLAN

One day before lesson—Set up ant lions in an undisturbed area in the class at least 24 hours before the start of class. Fill each cup half full of dirt and drop one ant lion on the dirt.

Day 1—Form Hypotheses (50-minute period)

Day 2—Observe Ant Lion Behavior (50-minute period)



EXTENSIONS/RESOURCES

<http://www.antlionpit.com/>

<http://lancaster.unl.edu/enviro/pest/Nebline/antlions.htm>

http://www.antlionfarms.com/antlions_for_education (This company sells ant lions for educators to use in the classroom. Ant lions also can be collected locally.)

http://www.activelearningsystems.com/_order/order.htm (for ordering question dice if you do not wish to make your own)

http://www.ket.org/education/guides/pd/cheapthrills_intermediate.pdf
(Page 12 has directions to make question dice from paper.)

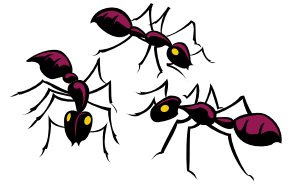
<http://www.inquiry.uiuc.edu/index.php> (Introduces the scientific inquiry cycle.)

LESSON PLAN

ANT LIONS

DAY 1

FORM HYPOTHESES



Note: Italicized words are potential script for the teacher.

Warm-up activity: Brainstorming questions (15 minutes)

Introduction

- *Asking questions is the first step in scientific inquiry. Next, we design experiments in order to answer questions and learn new things about the world around us.*
- *Sometimes it is difficult to think of questions to ask.*
- *One method is to brainstorm as many questions as possible. Then you can rule out the questions you are not going to try to answer at this time.*
- *This game will help you think of questions.*

Divide into teams of three students.

Have students take notes under the heading “Asking questions.”

Give each team a picture.

I have a die with question words. I will ask someone to roll the die. When he/she rolls the die, your team will have 1 minute to write down as many questions as you can, starting with the given question word, about the picture.

Ask a student to role the die.

After 1 minute, teams count up their questions. The team with the most questions gets a treat.

Rotate pictures and repeat as many times as time permits.

Introduction to forming a hypothesis (10 minutes)

Introduce scientific inquiry.

- Write the steps on the board and have students copy the steps in their science notebook.

Scientific inquiry

Ask questions (Ask)

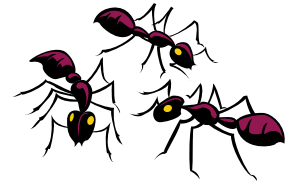
Investigate (Do)

Create (Learn)

Discuss (Write and share)

Reflect (Think and plan again)





Review the definition of hypothesis.

- *We have practiced asking questions; now we will focus on making hypotheses.*
- Write on the board:
Hypothesis (plural hypotheses): A possible explanation for a set of facts/observations
 - Must be able to test it
 - Must be able to falsify it (prove it wrong)
- Example:
Drop paper clips on the floor. Ask the question: *Why did the clips fall down?*
 - Is there a giant magnet in the center of earth?
 - Even though I do not think I applied force while dropping the clips, did I?

Practice forming hypotheses.

- *Why am I wearing _____ pants?*
- Get several hypotheses from students.

The next step is to test the hypothesis. We will talk about that in future lessons.

Introduction to mystery containers (2 minutes)

- *You will observe a mystery container and make hypotheses about what you see.*
- *It is very important that you not bump the table or touch the container.*
- *Answer the questions on the worksheet with as much detail as possible.*
- *Make hypotheses (explanations for what you observe).*

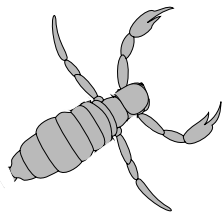
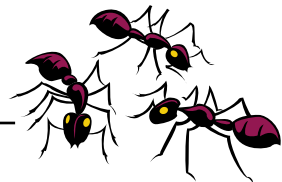
Describe the container (20 minutes)

- Hand out worksheets.
- Have students make observations and come up with a hypothesis.

Cleanup (3 minutes)



Name: _____

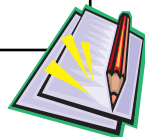


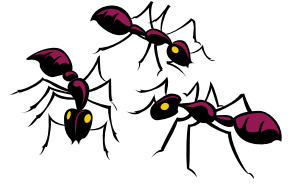
STUDENT WORKSHEET

MYSTERY CONTAINER

DAY 1

1. Look at the container and observe it carefully. Describe it in detail so that someone who reads your paper but has not seen the container will know what kind of container you have described.
2. Make observations and describe what you see inside the container. It is very important that you not touch or bump the container; bumping will destroy the cone/pit.
3. Make two suggestions (hypotheses) about how the cone/pit in the container could have been formed. Use your imagination, but be realistic!
4. Draw the container and what you see inside it.





LESSON PLAN

ANT LIONS

DAY 2

OBSERVE ANT LION BEHAVIOR

Introduction (5 minutes)

- Have students place their papers from Day 1 on their desk.
- Have students work in groups of three (the same groups as on Day 1).

Observe mystery containers/ants (15 minutes)

- Have students place an ant in the container and observe what happens.
- Have students answer questions #1 and #2 on the Day 2 Student Worksheet.

(**Note for teacher:** The ant will disappear into the pit made by the ant lion.)

Investigate the cone/pit (15 minutes)

- Have one student per group pick up a magnifying glass, wire mesh, plastic cup, and petri dish.
- Have students carefully sift the dirt through the wire mesh into the extra cup, and place the organism they find in the petri dish for observation.
- Have students answer question #3 on the Day 2 Student Worksheet.

(**Note for teacher:** The dirt will pass through the mesh, and the students will see the ant lion that remains on the mesh. They should notice its large mouth parts.)

Observe ant lion behavior (10 minutes)

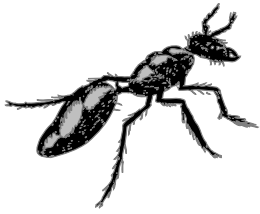
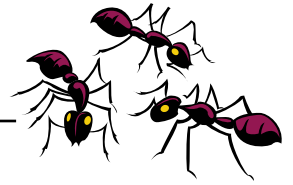
- Have students carefully tip the ant lion back into the container with the dirt and observe what happens.
- Have students answer questions #4 and #5 on the Day 2 Student Worksheet.

(**Note for teacher:** The ant lion will kick the dirt, move backwards, and very quickly disappear into the dirt. The cone will be visible once again.)

Cleanup (5 minutes)

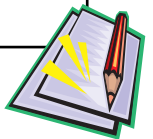


Name: _____



STUDENT WORKSHEET MYSTERY CONTAINER DAY 2

1. Describe what happens when the ant is put into the cone in the mystery container.
2. Make two hypotheses about why/how this happens.
3. Describe or draw what you see when the sand is sifted through a screen.
4. Describe what happens when the mystery organism is placed back in the container.
5. Make a new hypothesis about what happened to the ant when it was placed in the cone.





Insect Pitfall Traps

Introduction

Day 1

Lesson Plan—Develop

Hypothesis/Procedures

Student Worksheet—Pitfall Trap

Design and Hypothesis

Day 2

Lesson Plan—Pitfall Trap Setup

Day 3

Lesson Plan—Collect Pitfall

Traps

Day 4

Lesson Plan—Classification of

Insects

Student Worksheet—Insect

Orders

Student Worksheet—Insect

Classification (2)

Student Worksheet—Experiment

Followup

Student Worksheet—Final Report

Guidelines

INSECT PITFALL TRAPS



DESCRIPTION

This lesson will show students that insects are present everywhere. No matter where your school is located, students can trap insects on school grounds, study them, and build their own insect collection. They also can do simple investigations on habitats and food sources used by various insects.



STUDENT OUTCOMES/OBJECTIVES

- Students will be able to ask testable questions.
- Students will use the inquiry cycle to investigate, gather data, and interpret results.
- Students will study the diversity of insects and other small organisms that live near the school; they can make an inventory/collection of insects in their schoolyard.



STANDARDS

Benchmark 2

- Identify the producers, consumers, and decomposers in a given habitat.
- Describe the relationship between characteristics of species' habitats and the organisms that live there.

Benchmark 3

- Identify populations of organisms within an ecosystem by the function that they serve.



TIME ESTIMATE

Four 50-minute class periods, plus in-class time for writing/presenting report



MATERIALS (ONE TRAP PER PAIR OF STUDENTS)

Day 1

Survey tape (to designate area for trap setup)

Day 2

Small, plastic containers—cups, margarine containers, etc. (1 per trap)

Plastic lids, larger in diameter than the cups (1 per trap)

Permanent markers to decorate/identify traps (1 or 2 per trap, different colors)

Pin flags (to locate traps next time you go out)

Rubbing alcohol or ethyl alcohol

Nails (large, with grip, 3 per trap)

Trowels (1 per group of 4 students)

Day 3

Cheesecloth (6-inch squares, 1 per trap, to drain excess alcohol)

Small cups to drain off excess alcohol

Dissecting trays (small plastic, metal, or styrofoam trays to sort insects)

Popsicle sticks, to sort insects

Day 4

Boxes for collecting insects (4, from Oregon State University)

Insect field guide (1 per group of 4 students)



WORKSHEETS

Day 1—Pitfall Trap Design and Hypothesis

Day 4—Insect Orders

Insect Classification (2)

Experiment Followup

Final Report Guidelines



VOCABULARY

Pitfall trap: A mechanism for trapping insects that walk on the ground

Classification: A system of arranging objects or organisms into groups of the same type



BACKGROUND INFORMATION

- Students should be familiar with the vocabulary in the Insect Orders sheet.
- Students should have had practice with basic classification.



LESSON PLAN

Day 1—Develop Hypothesis/Procedures (50-minute period)

Day 2—Pitfall Trap Setup (50-minute period)

Day 3—Collect Pitfall Traps (50-minute period)

Day 4—Classification of Insects (50-minute period)



EXTENSIONS/RESOURCES

<http://www.stclair.k12.il.us/services/scilit/pitfall.htm>

<http://bugclub.ifas.ufl.edu/Antivities/Pitfalltraps/pitfalltraps.htm>

LESSON PLAN

INSECT PITFALL TRAPS

DAY 1

DEVELOP HYPOTHESIS/PROCEDURES



Note: Italicized words are potential script for the teacher.

Introduction (5 minutes)

- *Today we will begin a longer project—pitfall traps.* (Show a sample pitfall trap—the container, the alcohol in the bottom, and the roof. See illustration on next page.)
- *Pitfall traps are a way to discover what kinds of insects are in a habitat.*
- *What does this trap remind you of? What kind of organism uses a similar device to catch its food? (Ant lions)*
- *What kinds of insects do you expect to be caught in this type of trap? (Ground-crawling)*
- *What kind of trap might you use to catch a flying insect?*
- *Why do we put alcohol in the bottom of the trap? (To kill insects, to prevent predators from eating trapped insects)*
- *Why do we need some type of roof? (To prevent rain from entering the trap and diluting the alcohol, and to prevent mold growth)*

Scientific inquiry review (3 minutes)

- Ask students for the steps of scientific inquiry (write on the board).
 - Question (Ask)
 - Investigate (Do)
 - Create (Learn)
 - Discuss (Write and share)
 - Reflect (Think and plan again)
- *In this project, you will go through the inquiry process.*
- *Today (Day 1) you will decide what your question is, generate a hypothesis, and develop your procedures.*
- *Working in groups of four, each group will set out two traps. This gives each team a chance to compare two sets of data.*
- *Day 2: You will make traps and set them up on the school grounds.*
- *Day 3: You will bring your traps in and separate insects from debris and alcohol.*
- *Day 4: You will classify insects and record results.*
- *Day 5 onwards: You will work on your formal investigation write-up.*

Divide class into groups of four (2 minutes)



Brainstorming questions (5 minutes)

- *You will survey the insects on the school grounds. What kinds of questions might you ask about the insects and their relationships with each other and their habitat/environment?*
- Write student questions on the board.



Writing hypothesis/prediction/procedures (30 minutes)

Write on the board:

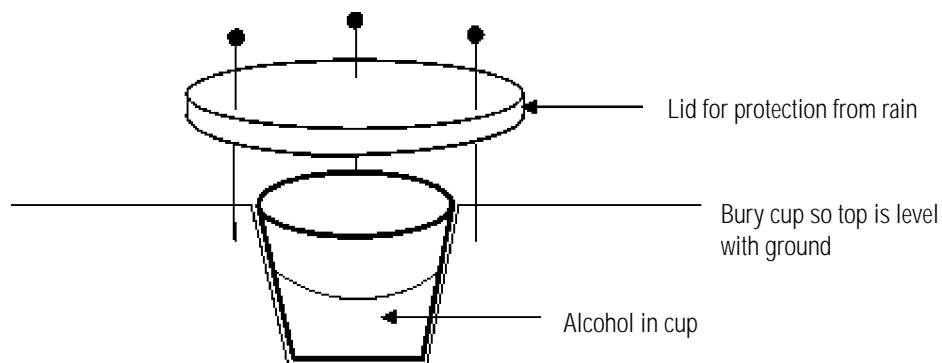
1. Answer questions on page 1 of the Pitfall Trap Design and Hypothesis worksheet.
2. Choose a question (either from those on the board or a different question).
3. Write a hypothesis. (Given what you know about insects, what do you think you are going to see?)
4. Make a prediction: If _____, then _____.
(If the hypothesis is correct, **then** what will you see that shows you the hypothesis is correct?)
5. Develop your procedures.
 - Work in your group, but each person should write the information on his/her own sheet.
 - Use the questions on the front page of the worksheet to help you work out details.
 - Be specific with your procedure!

Wrapup/What's next (5 minutes)

- Have students in each group share their hypothesis and procedure.
- *Put the sheet with your hypothesis/procedure in a safe place.*

Before the next class

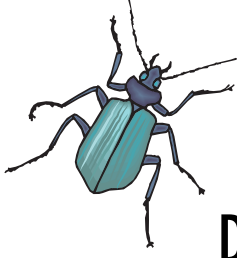
Note to teacher: Each class will need an area on the school grounds where they will place their pitfall traps. Before the next session, mark out an area for the class.



Insect pitfall trap



Name: _____



STUDENT WORKSHEET INSECT PITFALL TRAPS

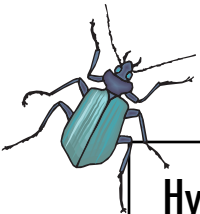


DAY 1—PITFALL TRAP DESIGN AND HYPOTHESIS

Pitfall trap design

1. Where will you place your traps? (Check two, since your team will be putting out two traps.)
 under a bush
 under a small tree
 under a large tree
 in the open grass
 in dry, sandy ground
 other _____
2. Do you expect to find greater numbers of insects in either of the two traps? Why or why not?
3. Do you expect to find different types of insects in each trap? Why or why not?
4. What question do you want to answer with this experiment? (What do you want to learn about insects around the school by setting out your traps?)





Hypothesis

1. Make a hypothesis about the insects that you think you will find in each trap. The hypothesis should be your educated guess relating to your research question. Hypotheses (predictions) are often written as “if, then” statements. Write your hypothesis below.

If _____

(Write your hypothesis here.)

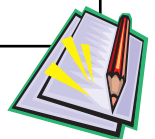
then _____

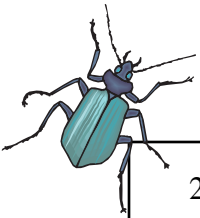
(What will you see in the traps if your hypothesis is correct?)

2. What is something you might see if your hypothesis is false?

Procedure

1. What will your traps look like? (Draw and label or describe—materials, size, etc.)





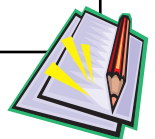
2. How will you dig your hole? (What will you use, how big/deep will it be? etc.)

3. How will you set your traps? (Which part goes in the hole, what goes on top? etc.)

4. What will you put in your traps? (What keeps the insects from getting out?)

5. When will you check and collect your traps?

6. Write a specific procedure for putting the traps out and collecting them. Write the procedure as if you were giving instructions to someone who knows nothing about pitfall traps!



LESSON PLAN

INSECT PITFALL TRAPS

DAY 2

PITFALL TRAP SETUP



Note: Italicized words are potential script for the teacher.

Preclass preparation

Use survey tape to mark the areas where each class will set up traps; use a different color of tape for each class.

Introduction (2 minutes)

On Day 2, you will set up pitfall traps on school grounds. Each group will choose two places to set up their two traps, with or without baits in the trap.

Make traps (8 minutes)

- Assemble students into the same groups as on Day 1.
- Give each group the following supplies:
 - 2 cups
 - 2 permanent markers
 - 2 plastic lids
 - 6 nails
- Show students a sample trap.
- Have students decorate the outside of the plastic lids with names, period number, etc.
- Have students place three nails equidistant around the edge of the lids.
- Have students write their names and class period on the cups.

Go over field procedures (10 minutes)

- Brainstorm appropriate field procedures with the class. (Have students refer to their sheets from Day 1.)
- Write procedures on the board:
 1. Locate sites to put traps (according to your procedures).
 2. Dig a hole so that the top of the cup is level with the ground.
 3. Add about $\frac{1}{4}$ cup of rubbing alcohol (ask the teacher for help).
 4. Place a roof over the trap by pushing the nails in the ground. Make sure there is a space between the top of the cup and the lid covering it so that insects can get into the cup.
 5. Mark the location of the trap with a pin flag.



Put out traps (25 minutes)

- Bring the class to its designated area (marked ahead of time).
- Make sure students carry their traps so that they do not lose nails while walking to the site.
- Give one trowel to each team of four students.
- Instruct each team to set up two traps.
- Add alcohol and ensure that traps are assembled correctly.
- Once a trap is finished, give students a pin flag to mark the location of the trap.



Wrapup (5 minutes)

- Go over hypotheses—what students expect to happen.
- Collect and count the trowels while still in the field.
- Return to class.



LESSON PLAN

INSECT PITFALL TRAPS

DAY 3

COLLECT PITFALL TRAPS



Note: Italicized words are potential script for the teacher.

Introduction (5 minutes)

- *Today you will collect your pitfall traps and do initial sorting and cleaning of collected organisms.*
- *First, locate your trap.*
- *Next, remove the roof and pin flag, and give them to the teacher.*
- *Carefully carry cups with alcohol and insects back to the classroom.*

Collect pitfall traps (20 minutes)

- Have students carefully remove traps from the site.
- Count pin flags to make sure all are returned.
- Bring a bag to collect the lids and the nails from the trap roofs.
- Have each team carefully carry their cups with alcohol and insects back to the classroom.

Initial sorting and cleaning of insects (15 minutes)

- Have students work in the same groups as before.
- Write the main steps on the board:
 1. Get supplies. One student acts as supplies manager and gets:
 - 2 squares of cheesecloth
 - 2 large plastic cups
 - 2 dissecting trays
 - 4 popsicle sticks
 2. Drain alcohol from cups.
 - Carefully hold cheesecloth over the pitfall trap cup.
 - Tilt the cup slowly and strain alcohol through the cheesecloth into a large plastic cup.
 3. Pour insects and debris into the dissecting pan.
 4. Rinse out the pitfall trap cup at the sink.
 5. Separate insects from debris.
 - Use fingers and popsicle sticks.
 6. Put insects back in pitfall trap cup.
 7. Have each group share one insect they found.



Cleanup (10 minutes)

Write on the board:

1. Dump alcohol in the sink, rinse the plastic cup, and return it to the supplies table.
2. Throw away debris in the dissecting tray, rinse the tray, and return it to the supplies table.
3. Throw away dirty cheesecloth and popsicle sticks.
4. Carefully place the cup with insects in the designated area for your class.
5. Wipe off the table with a damp paper towel if necessary.



LESSON PLAN

INSECT PITFALL TRAPS

DAY 4

CLASSIFICATION OF INSECTS



Note: Italicized words are potential script for the teacher.

Introduction (5 minutes)

- *Today you will classify insects you have collected and record the results. You will separate your insects into groups using field guides, and then will fill in an Insect Classification worksheet.*

Distribute supplies (5 minutes)

- One person per pair gets an insect cup.
- One person gets other supplies:
 - 1 dissecting tray
 - 2 popsicle sticks
- Hand out:
 - Field guides (one per table)
 - Insect Orders sheets (one per student)
 - Insect Classification worksheets (one per student)
 - Insect collection boxes (one per table)

Classify insects; record results on Insect Classification worksheet (25 minutes)

- *Carefully place insects in your dissecting tray.*
Note for teacher: If there are many insects, suggest dividing them among two or more trays.
- *Use classification tools to identify insects and other organisms.*
- *Record results in pencil on your Insect Classification worksheet.*

Record your observations and conclusions about your hypothesis and the experiment on the Experiment Followup worksheet (10 minutes)

Cleanup (5 minutes)

- *When finished, place insects gently back in the cup or in an insect collection box, and return them to the designated area.*
- *Rinse the dissecting tray, and put it on the supplies table.*
- *Throw away popsicle sticks.*

Go over report guidelines (5 minutes)

- Hand out report guidelines.
- Briefly go over report guidelines.



STUDENT WORKSHEET

INSECT PITFALL TRAPS

DAY 4—INSECT ORDERS



Scientific name

Anoplura
 Coleoptera
 Collembola
 Dermaptera
 Diptera
 Ephemeroptera
 Hemiptera
 Homoptera
 Hymenoptera
 Isoptera
 Lepidoptera
 Mallophaga
 Mecoptera
 Neuroptera
 Odonata
 Orthoptera
 Plecoptera
 Psocoptera
 Siphonaptera
 Thysanoptera
 Thysanura
 Trichoptera

Common name

sucking lice
 beetles
 springtails
 earwigs
 flies
 mayflies
 true bugs
 aphids, cicadas, and hoppers
 ants, bees, and wasps
 termites
 butterflies and moths
 chewing lice
 scorpionflies
 dobsonflies, fishflies, alderflies, lacewings, and ant lions
 dragonflies and damselflies
 grasshoppers, katydids, and crickets
 stoneflies
 booklice and barklice
 fleas
 thrips
 bristletails
 caddisflies



Name: _____



STUDENT WORKSHEET

INSECT PITFALL TRAPS

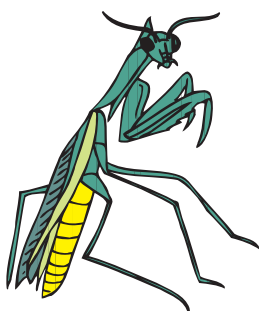
DAY 4—INSECT CLASSIFICATION

1. What did you find in your trap?

Scientific name (order)	Common name (optional)	Number found	Insect or non-insect?
	Beetle		
	Potato bug		
—	Spider		Non-insect
—	Centipede/millipede		Non-insect
—	Non-keyable insects		

Total insects: _____ Total non-insects: _____

2. Draw an insect collected in your trap.



Name: _____



STUDENT WORKSHEET

INSECT PITFALL TRAPS

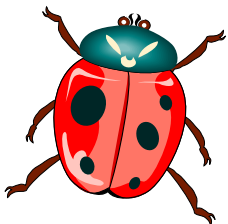
DAY 4—INSECT CLASSIFICATION

1. What did your partners find in their traps?

Scientific name (order)	Common name (optional)	Number found	Insect or non-insect?
	Beetle		
	Potato bug		
—	Spider		Non-insect
—	Centipede/millipede		Non-insect
—	Non-keyable insects		

Total insects: _____

Total non-insects: _____



Name: _____



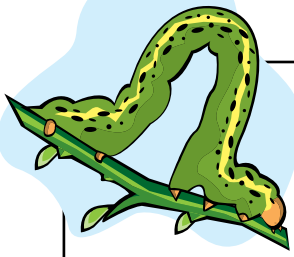
STUDENT WORKSHEET

INSECT PITFALL TRAPS

DAY 4—EXPERIMENT FOLLOWUP

1. Answer your research question.
2. Was your hypothesis right? Explain how you know.
3. What was one thing that you collected (or did not collect) that surprised you?
4. If you were to do this experiment again, knowing what you know now, what would you do differently?
5. Is there any part of the experiment that you feel you could do better? What? How?





STUDENT WORKSHEET

INSECT PITFALL TRAPS

DAY 4—FINAL REPORT GUIDELINES

Your pitfall trap report will need the following sections. Much of the information is already on your experiment design sheet and your results sheet. Be creative! Make your report as nice-looking as possible!

1. Cover page/title

- Separate page
- Title (should tell reader something about your experiment)
- Your name
- Your teacher's name
- Your period number
- Any drawings/decoration you want to add (can be in color)

2. Table of contents

- List each section of your report and what page it is on.

3. Materials and supplies section

- Write heading "Materials and Supplies" at the beginning of this section.
- Record the materials used by your team for your experiment.
- Below is a sample list of materials and supplies needed for this experiment:
 - 2 plastic cups
 - 2 plastic lids
 - 6 3-inch nails
 - 1 trowel
 - 2 pin flags
 - ½ cup rubbing alcohol
 - 2 dissecting trays
 - 8 popsicle sticks
 - 1 6-inch square of cheesecloth
 - 2 large plastic cups

4. Research question section

- Write the heading.
- Write the question that you were trying to answer with your experiment.





5. Hypothesis section

- Write the heading.
- Write down your hypothesis.

6. Prediction section

- Write the heading.
- Write down your prediction.

7. Procedures section

- Write the heading.
- Write procedures, numbering each step.

8. Results section

- Write the heading.
- Make a data table and record your results. (You can use the Insect Classification worksheet as a guideline.)
- Draw pictures of organisms captured in your trap.

9. Discussion section

- Write the heading.
- Discuss results.
- Make sure you answer the following questions in this section (in paragraph format):
 - How many total organisms did you catch in each trap?
 - How many types of organisms did you catch in each trap?
 - Which type of insect was the most common (had the most individuals)?
 - Which type of insect was the least common (had the fewest individuals)?
 - Each insect caught made up what percentage of the total insects?
 - Was there a difference between the insects in the two traps?
 - Where was each trap placed—what type of environment?

10. Conclusion section

- Write the heading.
- Answer the following questions, in paragraph format:
 - Did your results support or falsify your hypothesis? Why?
 - What might be some errors in your experiment?
 - Would you change your procedures if you did this experiment again?
 - What would you change?
 - If we had time to continue doing pitfall trap experiments, what would be the next research question you would investigate?



