

# APS Learning Cycle/Inquiry Activity for Elementary School Science

## EXPLORING MEALWORMS

### Purpose

To learn the life cycle and behavior of a common insect and develop skills in classification, experimental design, and data analysis.

**Objectives:** Students will be able to...

- Develop a classification scheme for a set of animals.
- Describe the structure and life cycle of a mealbug.
- Describe the habitat components needed by a mealbug population.
- Develop an “explorable” question concerning insect behavior.
- Execute an experiment on insect behavior.
- Analyze and present their findings on insect behavior.

**Materials:** mealworms, buckets, bran flakes, apple slices, wooden craft sticks, pictures of insects and spiders, posterboard, glue, magnifying glasses, colored pencils, clear plastic shoe boxes, aluminum foil, construction paper, waxed paper, small plastic bags, flashlight, syrup, different types of cereal (optional)

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### ENGAGE

To engage students in their exploration of mealworm development and behavior, divide students into small groups and give each group a copy of the 8 insect/arachnid cards (attached). Cards can be precut or students can cut them up. Students should group the cards into 2 or 3 groups (non-overlapping). They can use whatever criteria they choose, but the criteria must fit the groupings. They should glue their cards onto three sheets of paper and write on each sheet why the animals belong in that group. In the closure for this activity, you can point out the key features of insects and arachnids.

### EXPLORE

In this activity, students will begin to explore mealworms. The focal question here is, “What is a mealworm?” Students should get a mealworm from the bucket and put it into a plastic shoe box (one box per group of students). Wooden craft sticks can be used gently with the mealworms or they can be handled carefully. Students should draw a picture of the mealworm and/or describe it. They should also take a look at the bucket -- the mealworm’s habitat. What do they see there? Every creature needs four things in its habitat - food, water, shelter, and space. How does the bucket environment provide these for the mealworm? Are there other creatures in the bucket. Students can draw these or describe them as well. Finally, as a group, have students list their questions about mealworms, the bucket, or the other creatures they found there. List these on the chalkboard or an overhead transparency.



## EXPLAIN

Review with students the structure of mealworms and the life cycle of a mealworm. Go through the habitat requirements and ask students how the bucket environment provides food (the bran flakes), water (the apple), shelter (the bucket and the flakes) and space (the bucket and the flakes). Try to avoid a didactic presentation; rather focus on asking students what they learned through their exploration and correct any misconceptions. Answer some of the questions students raised in the explore activity.

## ELABORATE

In this activity, students engage in developing their own inquiry-based exploration. First, ask students to think of what questions they would like to ask a mealworm (For example, "What's your favorite thing to eat?" "Why are you always under the bran flakes instead of crawling around on top?" Point out that, even though mealworms can't talk to us, we may be able to find out the answer to our question by observing what mealworms DO in different situations. For example, if we wanted to know whether students like chocolate or vanilla ice cream best, we could ask them OR we could set out dishes of each and see which one they choose.

Divide students into groups. Each group will pick ONE question and design an experiment to try to answer it. BEFORE DOING THEIR EXPERIMENT, THE TEACHER MUST APPROVE THEIR PLAN! Encourage students to respect the animal that they are working with. Like research scientists, their treatment of their experimental animal should follow the ABC rule: Appropriate, Beneficial, and Caring. Students should have paper ready to record their observations. They can write or draw what they see. They may want to repeat their experiment several times (as time allows). If their experiment does not work, encourage them to think about why ("Maybe he wasn't hungry!") and write down their ideas.

## EVALUATE

- Use student responses to questions in the engage and explore activities;
- Use the experimental design, data collection, and conclusions drawn in the elaborate activity (not the success of the experiment but the process skills used);
- For older students, have groups create a poster or overhead transparency and/or a presentation on their findings (Note: This is how it's done at scientific research meetings!)
- Ask students to write a story about "My day (or my life) as a mealworm."
- Ask student to describe how they would create a habitat to take a mealworm home.

## Related books:

- *Charlotte's Web*
- *The Unhuggables*
- Other books on insects
- *Creepy Crawlies and the Scientific Method*
- *Classroom Creature Culture: Algae to Anoles*. (1994). National Science Teachers Association, Arlington, VA.

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