**Adaptation and Behavior**

**Lesson #12:** **Mapping Cricket Behavior**

Parts of this lesson are adapted from an activity called “Mapping Animal Behavior” by Maureen Jenner, The Community School; Sun Valley, Idaho.

**Time Frame:** 60 minutes

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| \***Ask Jen or Molly AT LEAST 1 week ahead of time for the crickets and other materials if you decide to do this lesson.** |

**Learning Standards:**

*Science*

Life Science: Plant (and Animal) Structures and Functions

1. Describe how organisms meet some of their needs in an environment by using behaviors (patterns of activities) in response to information (stimuli) received from the environment. Recognize that some animal behaviors are instinctive (e.g., turtles burying their eggs), and others are learned (e.g., humans building fires for warmth, chimpanzees learning how to use tools).

Skills of Inquiry

1. Ask questions and make predictions that can be tested.
2. Select and use appropriate tools and technology in order to extend observations.
3. Keep accurate records while conducting simple investigations or experiments.
4. Conduct multiple trials to test a prediction. Compare the result of an investigation or experiment with the prediction.
5. Recognize simple patterns in data and use data to create a reasonable explanation for the results of an investigation of experiment.
6. Record data and communicate findings to others using graphs, charts, maps, models, and oral and written reports.

**Student will be able to:**

1. To make predictions, observe, record, map, and analyze the behavior of crickets in response to different stimuli.
2. Design and conduct an experiment relating to cricket behavior and explain the results to the class.

**Resources and Materials:**

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| **Item** | **Amount** |
| Science journals |  |
| Crickets (in bags or containers)\* | 30 (NOT INCLUDED) |
| Cricket food (apple, bran, etc.)\* | 1 bag of each type of food (NOT INCLUDED) |
| Cardboard boxes (approximately 8 x 10 inches with paper on sides to prevent the cricket from jumping out)\*  | (NOT INCLUDED) |
| Mapping paper (8 x 10)\* | (NOT INCLUDED) |
| Round stickers | 600 (in bin) |
| Cricket shelters | 10 (in bin) |
| Saran wrap | 1 (in bin) |
| Stopwatch or clock | (in bin or in classroom) |
| Experimental materials determined by the students |  |

**Focus Activity:** Place a small container with a cricket in it on each desk (or group of desks). Ask students to make a list of observations about the cricket in their science notebooks and then answer (or think about) the following questions. Does the cricket have different behaviors? What are they? What types of stimuli may the cricket respond to?

**Introduction:** Discuss with the students the cricket behaviors that they have noticed (and the corresponding stimuli, if possible). Mention that crickets are very responsive to sound stimuli so class experiments should be conducted in a quiet environment.

**Activity:**

1. Tape up a large piece of paper or draw a box on the board (representing the classroom). Send one child out of the room for a few minutes while you explain to the rest of the class that you are going to map the child's movements when he/she returns.
2. Then, ask the student to return. Map in front of the class on the board or large sheet of paper where the student goes in the room using large stickers numbered from 1 - 20 with eyes on one side. Every 20 seconds place a sticker with eyes pointed in the direction he/she is facing and on the spot on the paper showing his/her position in the room. Tell the class that they will use the same technique to map movements of crickets.
3. Pass out the cricket behavior handout to the students and discuss the protocol for each trial.
4. ***Assign Roles:*** This activity will go more smoothly if each student has a different role for each of the different trials. If the students are in groups of 3-4, each one can perform a different task for each trial. It may be helpful to write the responsibilities for each role on the board so that students may refer to them throughout the activity (they are also on the student cricket behavior handout).

 **Recorder:**

 Number dots from 1-20.

Place eyes on the dots to show which direction the cricket moves.

Listen to the observer and map the cricket movements by sticking the dots on the paper.

At the end of trial describe the cricket's actions.

 **Timekeeper:**

Make sure team members are ready to start.

Tell the Cricket Manager when to place the cricket in the center of box.

Watch the clock and call "Time!" every 15 seconds for 5 minutes.

 **Observer:**

Watch the cricket and its movements closely.

Tell the Recorder in which direction to place the dots.

Remind your team members not to disturb the cricket by touching it or being loud.

**Cricket Manager:**

Hold the cricket or its container until your team members are ready to begin mapping.

Put the cricket in the center of the box when the Timekeeper says to start.

Hold the cricket between trials and keep the cricket from escaping.

1. Explain that each group will conduct 3-4 trials. Write the different trials on the board.
	1. Trial #1: Empty box
	2. Trial #2: Box with shelter
	3. Trial #3: Box with shelter and food (one type)
	4. Trial #4: Group design
2. Ask the students to make predictions about what the cricket will do for each of the first 3 trials. Students should write their predictions in their science notebooks. Discuss the predictions as a class.
3. Break the students up into groups of 3-4 and give them time to get organized and assign roles within their groups. Give the box and the cricket in a bag to each Animal Manager (each group should only receive 1 cricket), give paper (cut to the same shape as the box) and dots (stickers) to the recorder, and give the timekeeper a stopwatch (or use the clock on the wall).
4. Working in groups, students will conduct the cricket behavior experiments. Instructor will assist groups as necessary and ask questions to probe for understanding.
5. Groups that finish collecting all of their data can design and complete another trial on their own (possibly using a different type of food or placing multiple stimuli in the box). Students should get their experiment approved by the instructor and write a prediction about what they think the cricket will do in their science notebooks.
6. Direct all the students to examine and discuss their data and describe their group findings in their lab notebooks. Students may also draw a picture to help clarify their description.
7. Lead a class discussion about cricket behavior. Ask each group to place their cricket behavior maps on the board and describe the basic patterns they observed relating to how the cricket responded to different stimuli. Discuss the similarities and differences that each group noticed.

**Closure:** Discuss the following ideas and questions as a class. How did the cricket respond to the different stimuli? Were your predictions correct or incorrect? How did the cricket respond to the paper shelter? How did the cricket respond to the food? Did all the crickets respond in the same way? Why or why not? How do these behaviors help the cricket to survive? Are they adaptations? Explain. Are these behaviors learned or instinctive? Explain.

**Assessment:** Science notebook responses about cricket behavior and the summaries of the cricket behavior experiments, cricket mapping sheets, class presentations and discussions of the results of the cricket behavior experiments

**Cricket Behavior Experiment**

**Predictions:** Observe the cricket and then make predictions about what the cricket behavior will be for the first 3 trials. Write your predictions in your science notebook.

Trial #1: Empty box

Trial #2: Box with shelter

Trial #3: Box with shelter and food (one type)

Trial #4: Group design (make this prediction later)

**Procedure:**

1. Assign each person in the group a job for each trial. At the end of each trial, switch jobs.

**Recorder:**

 Number dots from 1-20.

Place eyes on the dots to show which direction the cricket moves.

Listen to the observer and map the cricket movements by sticking the dots on the paper.

At the end of trial describe the cricket's actions.

**Timekeeper:**

Make sure team members are ready to start.

Tell the Cricket Manager when to place the cricket in the center of box.

Watch the clock and call "Time!" every 15 seconds for 5 minutes.

**Observer:**

Watch the cricket and its movements closely.

Tell the Recorder in which direction to place the dots.

Remind your team members not to disturb the cricket by touching it or being loud.

**Cricket Manager:**

Hold the cricket or keep its container until your team members are ready to begin mapping.

Put the cricket in the center of the box when the Timekeeper says to start.

Hold the cricket between trials and keep the cricket from escaping.

1. Trial #1: Empty box
	* Place the cricket in the center of the box.
	* Observe its movements every 15 seconds for 20 samples.
	* Record its movements by taking a sticker and placing in on the blank paper (corresponding with its position in the box) with the eyes facing in the correct direction.
	* If the cricket jumps out of the box, put it back where it was and continue.
2. Trial #2: Box with shelter
	* Place a folded piece of paper (shelter) in the box.
	* Repeat the steps of Trial #1.
3. Trial #3: Box with shelter and food: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	* Keeping the shelter in the box, add one piece of food.
	* Repeat the steps of Trial #1.
4. Trial #4:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	* Design an experiment as a group. Describe the stimuli that you will place in the box with the cricket and make a prediction about the cricket behavior in your science notebook.
	* Get your experiment approved by your teacher.
	* Set up the box and then repeat the steps of Trial #1.

**Data Analysis:** Discuss your results as a group. Look for patterns in your cricket behavior maps. Write a 2-3 sentence summary of your results in your science notebook.

**Class Presentation:** Place your cricket behavior maps on the board. Describe and explain the cricket behavior that you observed to the class.