What A Response

Overview
This lesson and related activities are designed to give students hands-on experience in identifying responses in organisms and the stimuli that causes them.

Grade: 6

TEKS
Scientific Processes
6.1 A
6.2 A, B, C, D, E
6.4 A

Science Concepts
6.12 A, B, C

Vocabulary
Stimuli
Stimulus
Response
Internal
External

Materials
Sticky notes
Chart paper
1 Shoebox with lid per 2 students
Scissors
Tape
Petri dishes
Forceps
Paper towels
Compressed potting soil wafers

Downloadable Sheets
*A Visit to the Forest Story
*Stimulus/Response Lab Data Collection Sheet

Pre-Eastman Classroom Activities

Before Class Begins:

1. Make one copy of A Visit to the Forest for each student.
2. Write and display the definitions for *stimulus (stimuli), response, internal,* and *external*.
3. Gather chart paper, sticky notes, shoeboxes with lids, scissors, and tape.

Lesson:

1. Give each student a copy of A Visit to the Forest. Students will work with a partner to use words and phrases to fill in the blanks.

2. Discuss students' responses.

3. Define stimulus and response. Relate these definitions to the story.

4. In pairs, students will go through the story and underline all of the stimuli and circle all of the responses.

5. Discuss internal and external stimuli. Find examples of each in the story.

6. Distribute sticky notes to students. Direct them to write their own examples of stimuli and responses in organisms. Post their responses on chart paper at the front of the room.

7. Pairs of students will make a chamber from a shoe box to use in testing animal responses in the forest.

8. Each pair of students needs a shoebox with a lid. Cut the lid in half so that when the lid is on the box, one end of the box is dark and one has light.

9. Use the discarded piece of lid to form a divider down the center of the box. Cut a 2" x 2" square in the divider, making a "doorway" between the two halves of the box.

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In The Field

1. Prior to leaving the school, make sure you have:
    - One Shoebox Chamber for each pair of students
    - Petri dishes
    - Stimulus/Response Data Collection Sheets (1 per group)
    - Forceps
    - First Aid Kit
    - Water and snacks if needed
2. Set behavior expectations and go over safety issues with the students. Include humane treatment of insects. Remind students that some insects will sting and some are very fragile. Repeat that they are not to touch anything without permission, but to use the forceps gently.

ANIMAL RESPONSES

3. Explain to students that we will be testing animals' responses to light and dark.
4. Pairs of students will use forceps to collect 3-5 pill bugs (roly-polies), placing them in the petri dish.
5. Place the pill bugs in the "doorway" of the shoebox chambers. Be sure the half lid is on one end. Observe the bugs for 3 minutes.
6. At the end of 3 minutes, record the number of bugs on each side of the box in the table on the Data Collection Sheet.
7. Repeat the experiment twice more, for a total of three trials. Be sure to return the bugs to the starting point before each trial. Record results.
8. Return the bugs to their habitat.
9. Draw conclusions about stimulus/response in pill bugs.

PLANT RESPONSES

10. Tell students that plants also respond to stimuli in their environments, but tend to do so more slowly than animals. Explain that in the forest, we will observe plant responses.
11. Take students to an area in the forest where trees are thick. Ask why stems and trunks always grow up and why roots always grow down. Guide students to the understanding that plants do not grow upside down because of their response to gravity. Stems grow away from gravity and roots grow towards gravity (geotropism).
12. Direct students' attention to the leaves on trees. Explain that leaves use light to make food for the plant. Plants respond by growing toward the light.
13. Walk to the edge of the forest. Direct students to observe plants growing leaves in response to the light (phototropism).
14. Walk to the edge of a stream. Explain that roots grow in response to water and find examples to observe (hydrotropism).

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Post-Eastman Classroom Activities

Plant Response Activity #1

Before Class Begins:

IMPORTANT NOTE: For best results, place bean seeds in the petri dish to sprout about ten days before visiting Eastman Forest.

1. In groups, students should place a wet paper towel inside of a petri dish. On top of the paper towel, place a row of 3 beans in the center and tape the lid on the dish.

2. Stand the dish on its side so the row of beans is horizontal. Secure the dish to a solid surface with tape.

LESSON

1. After sprouting, observe and draw the roots' and leaves' responses to gravity.

2. Turn the petri dish 180º and secure it again with tape to the solid surface. Remember to leave at least one dish as a control.

3. Observe and draw the plant's growth responses to gravity. The roots should turn and grow towards gravity and leaves should turn and grow away from gravity.

Plant Response Activity #2

Before Class Begins:

IMPORTANT NOTE: For best results, plant bean seeds about ten days before visiting Eastman Forest.

1. Plant beans in cups with compressed potting soil wafers, following package directions.

LESSON

1. When plants are 4"-6" tall, invert the cup.
   NOTE: Compressed potting soil wafers work very well to hold the soil together. Be sure to have the soil fairly dry for best results. An alternative is to use plastic wrap or foil over the soil to keep it from falling out after being turned upside-down. A ring stand works well to hold the inverted cup.

2. Observe and draw the plant before and after the cup is inverted. Record and graph the growth of the plant over several days.