

Grade Level: 6

Science Concept: This lesson allows students to make inferences based on observable evidence and communicate those inferences aloud and on paper.

Relationship to California science content standards:

7.d. Communicate the steps and results from an investigation in written reports and oral presentations.

Learning objective:

1. Teams of students will infer the traits of arthropods by viewing images of arthropods alongside images of non-arthropods and sharing their observations through writing and discussion.

Evaluation ideas:

1. formative:

a) The teacher will walk around the stations, asking thought provoking questions and facilitating discussions.

b) The teacher will walk to each station and check on the progress of the students' written observations.

2. summative:

a) Students will get into groups and present their observations and inferences about the arthropod images to the class.

b) Students will write a one page essay about their experiences with scientific observation and the inferences they reached.

Conceptual Background:

Scientific inferences are made through close observation and questioning. They are based on observable evidence and can be shared with other scientists to enhance existing research.

Arthropods are the largest phylum on earth and include various types of animals including crustaceans and arachnids. They are distinct from other phyla because of a variety of physical traits: they have jointed appendages, segmented bodies, and an external skeleton.

Arthropods are prevalent in nearly every ecosystem due to their large numbers, diversity, and adaptive abilities. They can thrive in various environments including the ocean floor and the rain forest.

Lesson Implementation Plan:

This lesson is designed as a group observation activity with groups of about four students. Students will make inferences about the traits of arthropods by examining contrasting photographs and discussing their thoughts aloud and on paper. Images will be labeled with the name of the animal and whether or not it is an arthropod.

Engage- I will start by showing students a live Chilean Rose tarantula. I will ask them what makes a tarantula a tarantula; in other words, what features separate tarantulas from other animals? I will transition the discussion into one about arthropods by telling them that arthropods are the largest phylum in existence and asking them what traits are prevalent in the majority of organisms on earth. Students can make educated guesses in response.

I will then tell the students that they are going to assume the role of scientific researchers for this activity. I will ask them what traits will be expected of them, steering them towards the idea that researchers should be observant and inquisitive and that they should record their ideas.

Explore- Each group (four students) will rotate through the six stations. They will have 5 minutes to think and talk about what sets the arthropod images apart from the rest. They will write their ideas down. I will walk from station to station, asking students thought provoking questions to facilitate discussion and checking in on their progress.

Explain- After the class is done observing at all of the stations, each group will present their findings to the entire class. They will share their ideas about what separates arthropods from other phylums.

Elaborate- After each group presents, I will ask questions to get the students to elaborate on and justify their responses. After every group has presented, we will try to reach a class agreement on 5 universal arthropod traits (if the agreed upon traits are not entirely correct, that is fine).

The class will be assigned a reading on arthropods for homework that day. The next day, I will facilitate a discussion about how scientific inferences, such as the ones made by the students, may not always be correct at first. However, it is still important to record one's observations and theories to set up further research.

Evaluate-

(a) formative- During the activity I will walk to different stations to check on the oral and written progress of the students. I will ask them questions about their thoughts on arthropod traits.

(b) summative- I will evaluate students by the content of their written observations. Written observations should discuss and question the images at each station.

Differentiation Plans:

Behavioral for Student A: Students with disciplinary issues may be partnered with the teacher, who can help that student while also formatively assessing other students.

Cognitive for Student B: Students with low attention span can be grouped with more mature students that can keep them on task.

Cognitive for Student C: Students with problems making observations and inferences can be scaffolded with extra attention and guiding questions from the teacher.

Affective for Student D: Students with public speaking anxiety may be excluded from the presenting portion of the assignment. They may discuss the concepts with the teacher at a later time.

Language Demands for Student E: Second language learners with trouble writing can be given extra time to record observations at each station.

Language Demands for Student F: Images can be labeled in the native language of second language learners (in addition to English) in order to aid their observation.

Language Demands for Student G: Second language learners may be seated in the front row while the teaching is explaining the parameters of the assignment.

List of Materials (Per Group)

1. Paper to write on

2. Writing utensil

3. Set of photos to observe (groups will rotate through different photo sets)

Details about Activity:

Each station has two photographs. The photographs must include one arthropod and one non-arthropod.

Images are set up to create an obvious contrast between the arthropod and the non-arthropod, highlighting certain traits that arthropods have. For example, to draw attention to the fact that arthropods have jointed appendages, an image of a tarantula is placed next to an image of a snake.

Images should showcase a wide variety of arthropods in different environments to show that arthropods are very diverse and can thrive in almost every type of environment.