

Grade Level: Grade 6

Science Concept: This lesson is aimed at having students do independent research in order to justify why arthropods such as tarantulas cannot exist in gigantic proportions as they do in cinema.

Relationship to California Science Content Standards:

7. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
- d. Communicate the steps and results from an investigation in written reports and oral presentations.

Learning Objective:

1. Students will turn in a one-page written report about the results of their research, which will explain why arthropods cannot grow up to 50 feet tall as they do in horror films.

Evaluation Ideas:

1. formative:

- a) Before the report is due, I can check in with students one-on-one and assess the progress of their research.
- b) Before the report is due, I can have students turn in a rough draft of the report. I can give feedback on it so that students can make improvements before turning in their final draft.
- c) Before the report is due, I can have students turn in their annotated bibliography for me to assess. In addition, this will ensure that students have at least 3 sources ready by a certain date.

2. summative:

- a) Students will be assessed by the content of their report, which should give evidence justifying why arthropods cannot exist in gigantic proportions.
- b) Students will do an oral report which summarizes the contents of their written report.

Conceptual Background:

Arthropods cannot exist in gigantic proportions because of their exoskeleton. Having an exoskeleton restricts their movement because it is dense and heavy. The larger that arthropods are, the larger their exoskeleton will be, and the more difficult it will be to mobilize. Larger arthropods, such as lobsters, live underwater because they need water to support their weight and aid in their movement.

Many arthropods, such as ants, have thin legs because they do not have much weight to support. If arthropods such as ants existed in giant proportions, their legs would not be proportionally strong enough to support their excessive weight. They would be crushed under their own weight like a beached whale.

Arthropods have an open circulatory system rather than a closed one. This means that their blood flows directly from the heart to the peripheral organs and then finally to the body cavity. They lack a system of veins to transport blood back to the heart. Arthropods can survive without a complex system of veins because they are small enough for their open system to be efficient. If they existed in giant proportions, their open system would no longer be able to transport blood and nutrients to the entire body efficiently enough to keep them alive.

Lesson Implementation Plan: This lesson is designed as an individual research assignment. Students will do independent research in order to find evidence to support the valid assertion that arthropods cannot exist in gigantic proportions as they do in cinema.

This lesson will be assigned after students have already read and studied arthropods, so they will have a bit of a conceptual background to guide their research process.

ENGAGE- I will show students a brief scene from the film *Them!* In this scene, two men fire their guns at a large monster ant. I will tell students that arthropods cannot exist in such gigantic proportions in real life, and I will ask them why they think that is. I will allow them to give possible explanations and then I will write those explanations on the board. I will tell them that in order to find out if their reasons are correct or not, they will have to do research on their own using legitimate sources (at least 3) such as scholarly books and articles.

EXPLORE- Each student will do independent research in order to explain why arthropods cannot exist in gigantic proportions. They will summarize their results in a one-page written report.

EXPLAIN- On the day the reports are due, I will facilitate a discussion about why arthropods cannot exist in gigantic proportions. I will encourage students to share some of the results from their report. I will ask questions to steer students towards some of the reasons that they may have missed.

ELABORATE- I will ask students if they think that non-arthropods such as rhinoceroses could exist in giant proportions. I will ask followup questions in order to get students to elaborate on their answers and support their assertions. I could use this discussion to transition into a new assignment on non-arthropods.

In future assignments, students could do independent research on a topic in which the answer is not given to them in advance. Students would not have a given answer to guide their research, and the results of their investigations could be more creative and diverse as a result.

EVALUATE-

1. formative: Before the assignment is due, I can check in with students one-on-one to assess the progress of their research.

2. summative: Students will be assessed by the content of their report, which should give evidence justifying why arthropods cannot exist in gigantic proportions.

Differentiation Plans:

Behavioral for Student A: Students with disciplinary issues may be seated at the front of the class while the teacher explains the assignment.

Cognitive for Student B: Students with low concentration ability may receive extra scaffolding from the teacher through additional check-ins to assess progress.

Cognitive for Student C: Students with low attention span may receive extra scaffolding from the teacher in the form of extra attention and explanation regarding the parameters of the assignment.

Affective for Student D: Students with anxiety related to frightening images may be excluded from viewing the scene from the film *Them!*, which contains potentially disturbing images of giant ants.

Language Demands for Student E: English learners may receive the parameters of the assignment written in their native language.

Language Demands for Student F: English learners may receive extra scaffolding from the teacher in the form of additional attention and explicit instruction regarding the parameters of the assignment.

Language Demands for Student G: The teacher may write down key words on the board in the native language of English learners and reference the translated words when appropriate in the lesson. Key words to translate include: arthropods, ants, lobsters, and gigantic.