



Aliens: We Come in Peace

Experimental Design & Claim, Evidence, and Reasoning



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Grade Level	9th – 12th Grade	Time Frame	2-3 class period(s)
Subject	Science	Duration	150 minutes
Course	Biology I		

Essential Question

How do scientists obtain evidence to back their claim and reasoning?

Summary

Students will participate in a set of observational experiments, designed to help them come up with "good" evidence to back a claim they present. Students will learn about how to overcome flawed predictions with evidence and design good reasonable explanations.

Snapshot

Engage

Students will begin by observing different aliens around the room.

Explore

Students will collaboratively hypothesize a possible explanation of the aliens' behavior.

Explain

Students will design a list of good ways to collect evidence to support claim and reasoning.

Extend

Students will investigate roly poly's behavior making a claim backed by evidence and reasoning.

Evaluate

Students will prepare a poster with their claim, evidence, and reasoning and participate in a Gallery Walk.

Standards

Next Generation Science Standards (Grades 9, 10, 11, 12)

- : Apply scientific reasoning to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.
- : Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

Attachments

- [Alien Invasion—Aliens, We Come in Peace.docx](#)
- [Alien Invasion—Aliens, We Come in Peace.pdf](#)
- [Aliens—Aliens, We Come in Peace.docx](#)
- [Aliens—Aliens, We Come in Peace.pdf](#)
- [Observation Sheet—Aliens, We Come in Peace.docx](#)
- [Observation Sheet—Aliens, We Come in Peace.pdf](#)
- [Roly Poly Lab—Aliens, We Come in Peace.docx](#)
- [Roly Poly Lab—Aliens, We Come in Peace.pdf](#)

Materials

- A dozen variations of four different types of aliens (48 aliens in total)
- "Alien Invasion" script
- Alien Observation Sheet
- Roly Poly Lab handout
- Choice Chambers (or petri dishes cut and pieced together)
- Material of choice for roly poly
- Poster paper

Engage

Begin by using the "Alien" and the "Alien Invasion" documents to set the aliens up around the room. Once the aliens are ready, students will enter the room. Make sure to tell them not to disturb the aliens. Students will need to take a sheet of paper to record observations they make.

Keep It Quick

Only allow about 5 minutes for this activity, and make sure students are doing their own observations. They will likely congregate and talk amongst themselves while observing, so you will just need to remind them that they'll get time a bit later to discuss.

Explore

Once they have finished observing, have students go back to their desks and do an [I Think, We Think](#) individually. Using their observation notes, students write down what patterns/trends they believe the aliens were showing and why.

When I Think Happens

Students will want to fill out the individual claims while they're collecting evidence. However, the color and evidence is what is written during the Engage, and the individual claim is written at their seats, which requires them to use their documented evidence to draw conclusions.

Then pair them up and, together, have them discuss and come up with a group trend for each alien, writing their group claim on the observation sheet.

Explain

As a class, reveal the groupings to the students and see how many got them right and how many got them wrong.

Then, do a modified [4-2-1](#), where each pair of students comes up with two things they did "well" and two things they got wrong. Have the pairs then join with another pair, forming groups of four, and have them come up with the thing they all did mostly well and the thing many of them got wrong. Once finished, have students individually write on what makes a good observation and what makes a bad observation. Once finished have them share with the class their thoughts.

Looking For Breadcrumbs

If the conversation goes there, you may also address observational bias and drawing incorrect conclusions because of bias. Try not to force it on them, though, if they didn't catch it. There will be other opportunities to address bias, and if they don't "see" it to begin with, it's a difficult concept to internalize.

Extend

Students will each receive a copy of the "Roly Poly Lab." Students will then observe normal roly poly behavior and will make a claim, which they then will have to design an experiment to research. Students will then need to gather evidence and decide whether their observations/evidence support their claim or not and, if not, then make a new claim.

Supplies

You can have the students collect roly polies over the weekend before doing this experiment and house them in a breathable container (this way you won't have to purchase roly polies). Roly polies like to eat cabbage and for water, just leave a damp paper towel in the container. However, if you can't or don't want to have students collect them, the following link will lead you to one location from which you can purchase them: https://www.carolina.com/isopods/terrestrial-isopods-pill-bugs-sow-bugs/FAM_143060.pr

Evaluate

Give each group of students a sheet of poster or oversized paper. Have students prepare a [Research Poster](#) over their roly poly experiment. Stress that they need to include information about their claim/hypothesis on their roly poly using their evidence and reasoning. When they are done, have them hang the posters around the room. Then have students participate in a [Gallery Walk](#) where, as they look over their classmates' posters, they put sticky notes on the poster that say whether they agree with their classmates' claims based on the evidence or disagree and why. Once they have completed the circuit and returned to their own posters, students can then read the feedback that was left for them on the sticky notes.

Resources

- K20 Center. (n.d.). 4-2-1. Retrieved from <https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f506663d>
- K20 Center. (n.d.). Gallery walk / carousel. Strategies. Retrieved from <https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f505a54d>
- K20 Center. (n.d.). I think / we think. Strategies. Retrieved from <https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f5065bfd>
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- McCormic. (n.d.) Alien invasion. Miss McCormic's Website [Web log]. Retrieved from http://missmccormic.weebly.com/uploads/1/0/1/2/10125307/alien_invasion.pdf
- Where to purchase roly polies: https://www.carolina.com/isopods/terrestrial-isopods-pill-bugs-sow-bugs/FAM_143060.pr