

Madagascar Hissing Cockroaches in the Classroom

Entry: Small Animals 2016 Lesson Plan Contest

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7th grade science

Students use Madagascar Hissing Cockroaches to practice making observations and to design and conduct a controlled experiment. Making observations is a fundamental skill in conducting scientific research – both quantitative and qualitative. Students make both these types of observations using the Hissers on day one. On the second day, students learn fundamental issues in research design by planning, safety, making and recording observations, and drawing conclusions. Students design their own experiments with the Hissers and are introduced to the four components of a scientific research report: introduction, methods, results and discussion. On the third day, students construct their experiments based on their designs, practice and make adjustments to procedures if needed. On the fourth day, students carry out the Hisser experiments according to experimental methods written the previous day. Students follow their original plan, noting any changes that must be made. Each group makes a least one type of quantitative observation. Once students finish their experiment, they write up their results and discussion. On the fifth day, students present findings and discuss sources of errors and opportunities for further study. On the sixth day, students have other pairs of students conduct their experiments using the procedures they wrote as an assessment for writing a procedure. On the last and final day, students turn in revised procedures and then ask questions they still have about Madagascar Hissing Cockroaches. Students are then asked to look through various classroom materials and online for the answers to the questions they posed to learn more about these invertebrates. Through this process, students become familiar with the structure of scientific report writing as well as interact with an invertebrate to learn more about these amazing insects. At the start of this lesson, some students are hesitant to touch the Hissers but by the end they are naming them and handling them with some even asking to take one home for a pet! The appreciation of these animals as the lesson progresses is wonderful to watch develop – one of the favorite labs of the year.

Objectives

- Students will be able to make and record qualitative and quantitative observations.
- Students will be able to ask questions that can be answered by doing a small experiment.
- Students will be able to write procedures for their experiment.
- Students will be able to describe the type of information in each of the four parts of a scientific report: introduction, methods, results, and discussion.
- Students will be able to follow their proposed experimental design.
- Students will be able to make observations and draw conclusions from them.

Day 1

1. Introduction – ask students what is an invertebrate. Ask why anyone would study these animals/what kinds of information can be gained from studying an invertebrate? Give some cool facts/Nearpod presentation on invertebrates to get students intrigued about the world of invertebrates.
2. Have students make observations about a classroom item to generate a list. Discuss some of the similarities and differences in the listed items. Introduce the terms qualitative and quantitative observations. Let them know they will be making both these types of observations with the Hissers.
3. Students divided into pairs to make five qualitative and five quantitative observations about the Hissers. Have some tools on hand to help with the quantitative observations such as rulers or stopwatches.
4. After 15 minutes, have students share their observations and make a class list of both qualitative and quantitative observations.

Day 2

1. Start off the day with a review of qualitative/quantitative observations.
2. Have students brainstorm the steps scientist consider when conducting scientific research. Help students conclude that research is used to answer a question, that research is planned, that details must be specified in advance, research is made up of a series of observations, observations are recorded and observations are used to draw conclusion about the original question.
3. In pairs, have students brainstorm a list of questions about the Hissers. Have students imagine experiments the might help answer the questions posed. Let students know that they will be handling the Hissers so it is crucial that students pair up with at least one partner that is comfortable handling the invertebrates. Go over how to safely handle the Hissers.
4. Have students pick one of their ideas/experiments and let them know they will be designing their own experiment using the Hissers to learn more about them. The only requirements are that (1) the experiment includes quantitative observations and (2) the Hissers come to no harm. The rest of the class period is devoted to designing the experiment including materials needed to complete experiment (either materials available in the classroom or brought in from home) and that the experiment can be conducted in one classroom period.

Day 3

1. Design and build experiment. Time permitting, students may practice with Hissers and make adjustments as needed. If students have completed the set up and are ready to run the experiment, they are to write up procedures for their experiments.

- Depending on complexity of experiments and how much time you want to devote to building mazes and testing design, this may take one or two days.
2. Pass out a rough draft of a lab report for students to fill in according to classroom protocol – question to be answered, materials list, procedures, observations and conclusion.
 3. Remind students to bring in any materials needed to run experiments.

Day 4

1. Have students carry out research plan. If they need to make changes to their methods, they must note that in their rough draft.
2. Remind students that no harm is to come to Hissers.
3. As each group finishes, have groups clean up their area.
4. Each student should make a final draft of their lab write up including the results and discussion and if they made any adjustments to the procedures, this must be reflected in the final write up of the lab. Students will present findings the following day.

Day 5

1. Students present findings – was their question answered? What did they learn?
2. Students share written labs with their partners and give constructive criticism.
3. Homework is to type procedures. Materials are to remain in the classroom for one more trial of their experiments.

Day 6

1. Students are to set up their experiments and leave typed procedures. This is a surprise that they will be having other students run their experiment using the procedures they wrote.
2. Students rotate to a new table and conduct someone else's experiment using left procedures.
3. Students to write comments and constructive criticism on procedures – could student follow procedures? Were procedures easy to follow? What were the difficulties? What was done well?
4. Students rotate one more time to a different station, run experiment and make suggestions on those procedures.
5. Students return to their station, look over suggestions and clean up. Homework is to make any final adjustments to procedures due the next day for a grade.

Day 7

1. Turn in revised procedures and completed labs.
2. Students ask questions they still have about Madagascar Hissing Cockroaches. Using a large piece of butcher paper students can add questions to it as a whole class activity.

3. Students are then directed to use classroom materials and iPads to look up the answers to those questions.
4. Students share answers or can write them on the butcher paper once the answers have been located.
5. Video/reading on how Hissers are being used in earthquake recovery by attaching electrodes to antennae.

Attached are a few photos from student experiments.









