

## Lesson 1. Inquiry Lesson Plan

**Title:** Now You See It! Now You Don't: The Purpose and Benefit of Camouflage in the Insect World.

**Suggested Grade Level:** 3-5

**Science Topic/Purpose of Lesson:** To determine the benefit(s) and purpose(s) of camouflage for insects through observation and investigation.

**Time:** Approximately 2 forty-five minute sessions

### Materials:

- Various colors of tempera paint or spray paint (green, brown, black, blue, purple, orange, yellow, etc.)
- Magic markers (water soluble)
- 20 ping pong balls
- Access to 2 different environments (i.e., one indoors and one outdoors)
- Garbage bags or newspapers
- 10-15 paint brushes of various sizes
- 2 hair dryers (for drying paint)

### Scientific Literacy:

- **Using Knowledge:** The students will use their perceptual knowledge to aid in understanding the concept of camouflage and benefits it holds in the insect world.
- **Creating Knowledge:** The students will create knowledge about the importance and significance of camouflage through the inquiry activity.
- **Reflecting on Knowledge:** Students will reflect their knowledge through their observations and investigations, as well as their participation throughout the inquiry process.

**Science Concepts/Conceptual Understanding:** Many animals, including some insects are camouflaged as a means of making themselves appear to be part of their natural surroundings. The purpose of camouflage is to be protected from natural enemies that may be lurking in the particular environment. An environment consists of the surroundings in which an individual lives. For example, the environment of a catfish would be that of fresh water. Two good examples of camouflage in the insect world are walking sticks and hawk moths.

### Science Process/Inquiry Skills

- Students will use critical thinking when determining the role that camouflage plays in the environment.
- Students will experiment with tempera paints and ping-pong balls, in order to camouflage the ping-pong balls in the specified environment.
- Students will use inquiry skills to determine why camouflaged insects are difficult to see in their appropriate environment.

- Students will compare and contrast the ping-pong balls in the environment without color and the ping-pong balls in the environment with the color specific to the environment.
- Students will use problem solving, in order to determine the proper color and location of the ping-pong balls in their environment.

**Safety Precautions:**

In this activity, the students will experiment with painting ping-pong balls and then placing them in the environment (i.e., either in the classroom or outside). Therefore, the students must be careful with the paints, as to avoid spilling it or coming in contact with one's eyes, nose or mouth. Also, a note to teachers is to be aware of any allergies that students may have to the tempera paint or to the outdoors. When the students are working either inside or outside, they should be advised to stay on task, and not to leave the supervision of an adult.

**Indiana State Standards:**

**Grade 3**

3.4.1: Demonstrate that a great variety of living things can be sorted into groups in many ways using various features, such as how they look, where they live, and how they act, to decide which things belong to which group.

**Grade 4**

4.2.5: Write descriptions of investigations, using observations and other evidence as support for explanations.

4.6.4: Observe and describe that some features of things may stay the same even when other features change.

**Grade 5**

5.4.4: Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all.

5.4.5: Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful.

**Cooperative Learning:**

The students will work together in groups of 10-15 (depending on class size). Within these groups the students will be assigned roles. These roles will consist of 4-6 naturalists, 3-5 environmentalists, and 3-4 landscape engineers. The naturalists will be in charge of painting the ping-pong balls (representing insects) the color that has been specified by the environmentalists and the landscape engineers. The environmentalists will check out the environment of either the classroom or the outdoors and decide where to place the insects (i.e., ping pong balls). The landscape engineers will work together with the environmentalists to determine where to place the ping-pong balls, as well as the color that the insects should be painted. After the three cooperative learning groups have finished their jobs (day 1), they will switch environments with the other half of the classroom, and they will search for the other group's ping-pong balls. All members of the

three cooperative learning groups will be in charge of helping to set up for this activity, as well as helping to clean up from the activity.

### **Overview of the Activity:**

In order to conduct these observations and investigations, the class will be split into two equal groups. One group is going to stay inside and work in the classroom environment, and then the other group will go outside and work in that environment. Within each group there will be environmentalists, naturalists, and landscape engineers (See cooperative learning section for job description of each particular group). Each group will be given 10 ping-pong balls (representing insects) and through the coordination of the environmentalists and the landscape engineers, the students will determine in what environment they should place the insects (**where in the classroom/outside?**) and how they should camouflage the insects (**what color?**). After each environment (inside and outside) have completed their camouflaging of the insects and have placed them in the proper locations, the two groups will switch environments. Once the two groups have switched environments, the students will search for the insects in their “unknown” environments.

### **Instructional Phases**

***Setting the Stage (Day 1):*** How many of you have ever seen a walking stick? Can anyone tell me why it is difficult to see a walking stick if it is on a tree? How does this help the walking stick? Do we have the same abilities as the walking stick to appear like our surroundings? If so, how is that possible? Well, over the next couple of days, we are going to observe and investigate the very important and fascinating concept of camouflage, and the role it plays for many individuals within different environments.

***Planning the Investigation (Day 1):*** Ask the class the following questions, in order to prepare them for the observation and investigation that they will be conducting.

- Can you think of anything else in our environment that has the ability to look like its surroundings?
- What are some potential benefits of camouflage?
- What will happen if a camouflaged insect is on a tree, and an animal is looking for it?

Call on students to give their thoughts and ideas regarding the above questions. The question session will take place before conducting the investigation, and it can be implemented as a means of preparing the students for their activity.

### ***Conducting the Investigation (Day 1):***

1. Have the students' materials and workstations ready before the students begin their activity.
2. Introduce the topic and activity to the students and address any safety precautions.
3. Split the class into two equal groups. The two groups will conduct their investigations in two different environments; one group will stay in the classroom, while the other group will go outdoors.

4. Assign the students within each group the predetermined roles (i.e., environmentalists, naturalists, and landscape engineers).
5. Each group will be given 10 ping-pong balls and through the coordination of the environmentalists and the landscape engineers, the students will determine in what environment they should place their ping-pong balls, and how they should be camouflaged.
6. After the environmentalists and the landscape engineers have determined the location and the color of each ping-pong ball, the naturalists will paint them. (\*Note: the ping pong balls can either be dried overnight, or with a hair dryer)
7. The students should be guided throughout this investigation and observation, in order to ensure an understanding of the topic of camouflage.

***Interpreting and Explaining the Investigation (Day 2):***

1. After the groups have completed camouflaging their ping-pong balls, and have placed them in their proper locations, the two groups must switch environments.
2. Once the groups have switched environments, the students will search for the ping-pong balls in their “unknown” environments.
3. After the two groups have uncovered all of the ping-pong balls in their particular environment, they will return to the room for a class discussion.

***Communicating the Findings (Day 2):***

Now that you have all had the opportunity to witness camouflage first hand, we are going to discuss the importance and significance that camouflage plays in the lives of many insects.

- What role does camouflage play in the lives of insects?
- Why is it important for some insects to be camouflaged?
- Do you think these insects could survive if they were not camouflaged?
- How well were you able to camouflage your ping pong balls?
- Was it difficult to locate the ping-pong balls in your “unknown” environments?
- Which ping-pong balls were the easiest to locate? Why?
- Which ping-pong balls were the most difficult to locate? Why?
- Can you think of any way you could have changed this activity?

***Assessment:*** The students will be informally assessed throughout the lesson, as the teacher(s) walk around the room and observe the students’ participation in the investigation. After the activity has been completed the students will write a reflection concerning their experiences, such as: what they liked/disliked, what they learned about camouflage, and the importance that camouflage plays with respect to insects. The latter activity could serve as a formal assessment if so desired.

***Modifications:***

This lesson can also be modified to address mimicry, as well as camouflage. For instance, instead of painting only ping-pong balls, the students could also paint other objects that resemble ping-pong balls. This represents mimicry, because the other objects would be the same size and color as the ping-pong balls. An excellent example of mimicry among the insect world is that of monarch and viceroy butterflies. The viceroy butterfly mimics

the appearance of the monarch, because the monarch tastes bitter to predators, and as a result they do not want to eat the butterfly. Therefore, if the viceroy resembles the monarch, then predators will most likely not attempt to eat the viceroy because of their bad experiences with a monarch.

**Adaptations for Younger Grades:**

In order to make this lesson more meaningful and productive for younger students, the teacher(s) or adult volunteers would need to help the students paint the ping-pong balls. By helping the students paint the ping pong balls while also deciding what color to paint them, the lesson would potentially be more meaningful, so that there is less time devoted to painting, and more time devoted to discussion of the activity. Also, teachers of younger students may want to scaffold the class discussions by using more basic and introductory questions and concepts.

**Teacher Resources:**

The following “Insects on Six Legs” articles written by Dr. Tom Turpin can serve as additional resources for teaching the issues of camouflage and mimicry in the insect world: **Insect Actors Play Charades (10/22/1992)** and **Leaf Look-alikes: Not a Fashion Statement (7/22/1993)**

These articles can be found at the following website:

<<http://www.entm.purdue.edu/entomology/ext/outreach/teacher.html>>

Then click *On Six Legs* in order access the “Insects on Six Legs” articles.

**\*\*Teacher’s Note:** This activity would need to be completed with the help of either one or two parent volunteers, or a teacher’s aid, in order to manage the two groups more effectively.