Camouflage!: Collecting Data and Concealing Color

Description
In this two-part lesson, students explore the phenomena of camouflage kinesthetically while collecting and analyzing data. They then compare three types of camouflage and apply visual arts skills to demonstrate the different characteristics. Preparation for the lesson involves placing colored yarn pieces (or other comparable materials) in an outdoor space, copying the handout, and gathering the necessary art materials.

The lesson begins with a brief discussion of the game hide-and-seek, drawing on students' experiences to introduce the concept of camouflage. The class then ventures outside to pretend to be hungry birds searching for worms represented by different colored yarns to eat. Charting and graphing the data (how many pieces of each color were “eaten”) stimulates discussion about why some colors were easier to find and how camouflage can help animals hide from predators or prey.

The second part of the lesson allows students to go into more depth regarding three types of camouflage—disruptive coloration, disguise, and concealing coloration—and how they came about. Students can easily distinguish among the types of camouflage and then brainstorm names of animals that rely on these adaptations.

For a science extension to this lesson, students can play a predator/prey game to experience the relationship between predators and their prey, as well as initiate discussion about protective adaptations.

Objectives
- Investigate how color, shape, and/or patterns can camouflage animals.
- Experience the relationship between predators and prey.
- Distinguish among disruptive coloration, disguise, and concealing coloration.
- Use a variety of materials to produce different visual effects.
- Collect and analyze data.
Background Information

One of the most common and varied adaptations is camouflage, the ability to blend into the environment to avoid being seen by predators or prey. The art of concealment relies on three basic methods: concealing coloration, disguise, and disruptive coloration. When animals are the same color as their natural surroundings, they are using concealing coloration, for example, a brown deer in brown grass. Some animals use color and shape to disguise themselves to look like part of their environment. Walking stick insects, for example, have the color and shape of a twig on a tree. With disruptive coloration, animals use stripes, spots, speckles, and bold patterns to break up the outline of their bodies. The most obvious examples of disruptive coloration are zebras, leopards, and other non-native animals.

Some fish and tree dwellers such as raccoons exhibit a specialized type of concealing camouflage called countershading. These animals have a light underside to blend with the light sky, when seen from below, and a dark upper side to blend with the dark ground, when seen from above. Animal coloration can do more than conceal. Some animals, like the skunk and red eft, are brightly colored, or aposematic, to attract attention and warn would-be predators they should be avoided. Others, such as the warblers, use bright coloration to attract mates. Many Berkshire mammals are brown or beige to match the hues of the forest, field, and pond. These colors may help the animals to hide from predators, and dark colors can also aid in heat absorption.

These adaptations have taken millions of years to develop. They did not happen overnight. Many, many generations of these animals changed over a long period of time to make them look as they do today. If an animal eludes a predator because it is well camouflaged, that animal can survive and pass on its genes to future generations, providing an advantage over other animals. And it works both ways! If an animal uses camouflage to sneak up on its prey, it has a better survival rate and a better chance to have offspring.

In addition to camouflage, each animal—whether insect, reptile, amphibian, or mammal—has additional adaptations that allow it to capture prey or hide from predators. Some animals have both kinds of adaptations. Predators have characteristics that help them capture prey: sharp claws, fast speed, flight, and sharp teeth or beaks. Prey animals have characteristics that help them hide or run from predators: quills and/or keen smell, sight, and hearing.

Procedure

**PART I: CAMOUFLAGE IN ACTION**

1. Ask students if they have ever played hide-and-seek. Encourage them to think about things they do to help hide from the person who is “it.”

2. Explain they will be going outside to pretend they are hungry birds trying to find pieces of food (represented by colored yarn or other comparable objects). They may only pick one piece at a time to bring back to their designated nest before going off again. By doing this, students will find out which worms are good at hiding.

3. Take the class outside (see Tips for Teaching Outdoors, p. 1) to an area where you have already scattered pieces of the colored yarn.

**TIPS AND TRICKS**

For younger students, create a class chart and graph on the board for Part I of the lesson. Younger students can also focus on only two types of camouflage (e.g., concealing coloration and disruptive coloration) for Part II.
Background Information
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3. Take the class outside (see Tips for Teaching Outdoors, p. 1) to an area where you have already scattered pieces of the colored yarn.
4. Let them search for food for a designated time. When the time is up, count how many yarn pieces of each color were found. What colors were least likely to be captured? Most likely? Did the color of the worms make a difference?

5. Using the handout, children record their data and graph the results.

6. Review the term camouflage and ask how searching for the worms relates to camouflage. Why would animals or other creatures want to hide the way children do in hide-and-seek?

PART II: TYPES OF CAMOUFLAGE

1. Explain that many animals blend in with their surroundings. Most animals use camouflage as a form of defense, but some predators use camouflage to try to get close to their prey.

2. Ask the children to select two pieces of different wrapping paper. Using one as background, each child cuts several shapes from one sheet and pastes them all together overlapping like a “pack or herd” on the other sheet of wrapping paper.

3. From a distance, can the class identify how many shapes are pasted onto the wrapping paper? Why?

4. Explain that using patterns, such as stripes, spots, and speckles, to break up the outline of an animal’s body is called disruptive coloration. The students can label their wrapping paper creations with the title “Disruptive Coloration.”

5. Provide students with two pieces of same-colored construction paper. They cut out a basic animal shape from one piece and paste it on the other piece of construction paper.

6. Explain that when animals use coloration to hide against a background of the same color, they are using a form of camouflage called concealing coloration. Students can label their construction paper animals with the title “Concealing Coloration.”

7. Provide students with another piece of construction paper and an assortment of twigs or small sticks. They glue some sticks on their paper and then draw a head and legs coming from one of the sticks.

8. Explain that when animals use color and shape to look like objects where they spend most of their time, they are using disguise. Students can label their twig creation with the title “Disguise.”

9. As a class, brainstorm which animals use which types of camouflage.

10. To assess students’ understanding of three types of camouflage, they can complete the handout “Which Type of Camouflage?”

**Assessment**

<table>
<thead>
<tr>
<th>PART I: CAMOUFLAGE</th>
<th>Rubric</th>
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<tbody>
<tr>
<td><strong>Discussion</strong></td>
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<td><strong>Data Collection and Representation</strong></td>
<td>4</td>
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<td><strong>Data Analysis</strong></td>
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</table>

PART II ASSESSMENT: USE THE WHICH TYPE OF CAMOUFLAGE? HANDOUT.

Science Extension: Predator/Prey Game

Play the predator/prey game “Rabbits and Foxes” in an outdoor field or large gymnasium space. Most of the players are rabbits, with one or several foxes (depending on class size and the playing field). The rabbits line up at one end of the field, which represents their burrow or home, and behind that boundary is a bucket (or other container). Behind the line at the other end of the field is a bucket full of make-believe rabbit food (popsicle sticks, pebbles, plastic spoons, or other small items).
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<tr>
<td><strong>Discussion</strong></td>
<td>Listens actively, stays on topic, considers the ideas of others, respects others, and takes turns. Offers original ideas, shares observations, and makes inferences based on observations.</td>
<td>Most of the time listens actively, stays on topic, considers the ideas of others, respects others, and takes turns. Offers ideas, shares some observations, and makes inferences based on observations.</td>
<td>At least some of the time listens actively, stays on topic, considers the ideas of others, respects others, and takes turns. Offers at least one idea, observation, or inference.</td>
<td>Has difficulty listening, staying on topic, considering the ideas of others, respecting others, and taking turns. Doesn’t offer ideas, observations, or inferences.</td>
</tr>
<tr>
<td><strong>Data Collection and Representation</strong></td>
<td>Records colors and numbers of worms in a chart accurately and clearly. Puts data into line graph template, including color names and number labels clearly and accurately.</td>
<td>Records colors and numbers of worms in a chart accurately. Puts mostly accurate data into line graph template, including color names and number labels.</td>
<td>Records colors and numbers of worms in a chart. Puts some of the data into line graph template. May not include color names and number labels.</td>
<td>Does not record colors and numbers of worms in a chart and/or does not put the data into the line graph template.</td>
</tr>
<tr>
<td><strong>Data Analysis</strong></td>
<td>Draws reasonable and thoughtful conclusions about the data based on the line graphs.</td>
<td>Draws reasonable and/or thoughtful conclusions about the data based on the line graphs.</td>
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Each rabbit has to run across the field, get only one piece of food at a time, run home, and put it in the home bucket. The challenge for the rabbit is to avoid being tagged (eaten) by the fox. After the rabbit gets three pieces of food (so makes three trips to the food and back) without being eaten, the rabbit has consumed enough food to survive the winter and can sit down behind the home boundary.

The natural defenses of the rabbits help them escape the fox: running fast in a zig-zag or erratic pattern hiding in their homes, or using camouflage. If the rabbit freezes when the fox comes close, the rabbit will blend into the environment and the fox will not be able to see its prey and therefore is unable to eat (tag) the rabbit. The fox needs to eat three rabbits to survive the winter. If a rabbit is eaten, that player must sit on the sidelines.

After all rabbits have either arrived home with three pieces of rabbit food or been eaten, the game can begin again. One round usually lasts about 3 to 5 minutes. Foxes and rabbits can be changed for the new round. If the game is progressing slowly (e.g., the rabbits are strategically only moving only an inch or two at a time and then freezing), the teacher can give a 30-second countdown for rabbits to get back home.

For a variation, do not replenish the rabbit food after each new round so there is less food and not all rabbits will survive. Another variant is to add extra foxes so there are too many predators. Discuss how these changes affect the outcomes. What does the game have in common with real predator/prey relationships?

**Resources**


Shows how mammals are disguised in order to blend in with their ecological niche. Heller also has a number of other appropriate books on this topic: How to Hide a Butterfly & Other Insects, How to Hide a Crocodile & Other Reptiles, How to Hide a Meadow Frog & Other Amphibians, and How to Hide a Parakeet & Other Birds.


**Online Connections**

Visit the Berkshire Museum's Living Landscapes website at www.berkshiremuseum.org/programs/educators.html for the following online activities or resources:

- History of camouflage in art and the military
- How animal camouflage works
- Camouflage and predator/prey games
- How a new species can evolve

**Service Learning**

**CAMOUFLAGE! CARDS OF CARING**

Create greeting cards with pictures of animals in camouflage. Sell the cards to family and friends and donate the proceeds to an organization that helps protect animal habitat.
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Explores how and why certain birds, insects, and mammals disappear by blending in with their backgrounds.

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SERVICE LEARNING CAMOUFLAGE!
CARDS OF CARING
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Hungry Bird Collecting Camouflaged Worms

Naturalist's name: _______________________

1. In the chart, write the colors of the worms you collected.

2. Then record how many of each color you found.

<table>
<thead>
<tr>
<th>COLOR</th>
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3. Show your data in a line graph.

Use this template to add your data and labels.

4. Count by ones to at least 20.

5. Compare sets of up to at least 10 concrete objects using appropriate language and order numbers.

6. Recognize that people and other animals interact with the environment through their senses of sight, hearing, touch, smell, and taste.

7. Identify the ways in which an organism's habitat provides for its basic needs (plants require air, water, nutrients, and light; animals require food, water, air, and shelter).

8. Describe how some organisms meet some of their needs in an environment by using behaviors in response to information.

The lesson also addresses the Massachusetts Science and Technology Curriculum Framework's Science Skills of Inquiry.
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- Colors of worms
- Number found
Which Type of Camouflage?

Naturalist's name: ____________________________

1. Pick a picture of an animal, insect, or reptile and cut away the background so only the animal remains.

2. Glue a similar color of construction paper into the space provided, and paste the animal picture on top of the construction paper.

3. Use colored construction paper, textures cut from magazine illustrations, and/or colored markers, pencils, or crayons to create an environment around your animal.

4. Be sure to use either concealing coloration, disguise, or disruptive coloration to make a habitat where your animal will feel safe.

(circle the form of camouflage you use)

- concealing coloration
- disguise
- disruptive coloration

Earth science is just outside the classroom door. Children's natural curiosity about the world around them can serve as the springboard for observing, collecting, and recording information about the earth. Rocks provide direct and local links to understanding geology. A glass of water offers a way into the water cycle. Clouds show us daily connections to weather patterns.

By getting outside to collect rocks or sketch clouds, children begin to understand that science concepts are real and relevant to their lives. As Henry David Thoreau wrote in *Walden*, "The earth is not a mere fragment of dead history, stratum upon stratum like the leaves of a book, to be studied by geologists and antiquaries chiefly, but living poetry like the leaves of a tree, which preclude flowers and fruit—not a fossil earth, but a living earth." Being out in this living earth also brings science learning alive for children, inspiring them to ask their own questions and investigate things that puzzle and interest them.

In addition, kinesthetic and artistic activities allow children to connect to earth processes in multiple ways. They can act out the hydrologic cycle and create models of types of clouds. Creativity and science merge and propel students in dynamic directions.