



The Colors of the Seasons

Purpose

- To provide the opportunity for students to make observations in nature and compare their results.
- To help students understand seasonal changes as they relate to colors in their environment.
- To engage students in active observation and recording skills.

Overview

Using a color chart, students make observations outside in each of the four seasons. During each session, they will try to find as many colors as possible and record what they see. As a class they will make charts describing the colors they find in each season. At the end of the school year, students will compare their results and generate conclusions about variations in colors in nature both within a season and between different seasons.

Student Outcomes

After completing this activity, the students will understand how colors in nature relate to their local environment and to seasonal changes within that environment. The students will practice observation and recording skills, make comprehensive comparisons, and will form a hypothesis based on the information they have assembled throughout the school year.

Next Generation Science Standards

- DCI LS-2B: Cycles of Matter and Energy Transfer in Ecosystems
- Science Practice 4 Analyzing and interpreting data
- Crosscutting Concepts 1 Patterns

Geography

- 7 The physical processes that shape the patterns of Earth's surface

Time

- Part 1: One 30-minute class period
- Part 2: One 60-minute class period during each month or season
- Part 3: One 30- to 45-minute class period at the end of the school year

Level

Elementary (most appropriate for grades K-4)

Materials

Part 1:

- *Elementary GLOBE* storybook: *The Mystery of the Missing Hummingbirds*
- One color packet per student (contains two-inch squares of construction paper in: red, blue, yellow, green, orange, pink, purple, brown, black, and white)
- Brass-type fasteners
- One-hole punch

Part 2:

- One copy per student of *The Colors of the Seasons Student Activity Sheet* for each month/season
- Colored pencils/crayons in the ten colors listed above for each group
- One clipboard and pencil (or colored pencils) for each student
- Document projector to use with activity sheet, or chart paper and markers



Preparation

- Read the *Elementary GLOBE* storybook *The Mystery of the Missing Hummingbirds* – either read it to the class or have students read it to themselves. The book can be downloaded from www.globe.gov/elementaryglobe.
- Cut construction paper into two-inch squares, punch a hole in the corner of each square and arrange in containers according to their color. Note: to avoid having the colored paper fade throughout the school year, place black paper on the outside of each side of the color packet.
- Place brads on the table.
- Make copies of *The Colors of the Seasons Student Activity Sheet*. You'll need one copy for each student for each day when they will make observations.
- Prepare to use a document projector with *The Colors of the Seasons Student Activity Sheet* or create the sheet on chart paper.
- Note to teachers: Ideally, do this activity once a month throughout the school year. This way, at the end of the school year, the students can observe variations in the colors of the seasons both within a season and between seasons.

Teacher's Notes

Seasonal Changes

Phenology is the study of organisms' response to seasonal changes in their environment. Seasonal changes include variations in day length or duration of sunlight, precipitation, temperature, and other life-controlling factors. One important factor of seasonal change is the changes in colors in nature. Making observations about colors throughout the year will allow students to learn more about seasonal change in their local environments. These changes can be observed between different seasons as well as within a particular season (for example, when plants are budding in the spring, their colors will change as the leaves bud and then as flowers bloom).

Why Do Colors Change in Nature?

The growing season for deciduous trees, bushes, and shrubs is defined by the appearance of leaves in the spring and the dropping of leaves in the fall. This greening-up in the spring starts when *dormancy* (a state of suspended growth and metabolism) stops due to environmental conditions such as longer hours of sunlight, higher temperatures, and increased availability of water. This happens during spring for plants in temperate climates. Plant roots begin absorbing water and nutrients from the soil, and transport these to other parts within the plant including buds or shoots. Plant leaves start to come out, make chlorophyll to capture light energy and begin to photosynthesize. With long hours of sunlight and a good supply of liquid water, plants continue to make nutrients and energy in the form of glucose.

In the desert, some plants lose all their leaves and enter into full dormancy during the hottest months when plant parts are most easily damaged by heat and shortage of water.

As daylight becomes shorter, temperatures cool, water is harder to get, and plants begin to shut down photosynthesis. Deciduous trees – like maple, oaks, elms, aspen, and birch – shed their leaves in preparation for winter. Evergreens keep most of their leaves during winter and may continue to photosynthesize as long as they get enough water.

Making Observations with Students

Careful observation is a foundation of all science. In this activity, students will need to make observations like scientists do, observing things in nature very closely and paying attention to details. When looking for colors in nature, have the students look for different kinds of things: look for plants, animals, soil, rocks, etc. They should look all around them: look up high, look down at the ground, look under things. They should also look at the environment from far away and then choose things to look at more closely.



What To Do and How To Do It

Part 1:

1. Read the *Elementary GLOBE* storybook *The Mystery of the Missing Hummingbirds* – either read it to the class or have the students read it alone or in groups.
2. Have students assemble their color packets by taking one colored square from each container. (The order of the colors does not matter). Use a brad to fasten the packet together.

Part 2:

Note to teachers: If necessary, prior to this activity, make sure your students know the difference between things they will find outside that are natural versus those made by humans. In this activity, the students will need to focus on natural things that they will find in the same area throughout the year.

1. Give each student a pencil and one *The Colors of the Seasons Student Activity Sheet* on a clipboard.
2. Review the colors on *The Colors of the Seasons Student Activity Sheet* with the whole class and then have the students color in the small box in each square on the sheet using markers or crayons.
3. Explain to the students that they will be going outside to observe things in nature. Their first task is to try and locate as many things as possible that are the same colors as in their color packets. Their second task is to record their results in the appropriate color box using *The Colors of the Seasons Student Activity Sheet*. They can document their findings by writing and/or drawing what they found outside during their observations.
4. Repeat this process for each month/season of the school year.
5. After returning to the classroom, have the students share what they observed. Write the students' responses on a chart. Save this chart until the end of the school year so the class can compare their observations from the school year.

Part 3:

1. At the end of the school year, hang up the Season Charts your class compiled after each observation session so the students can see all of them at once.
2. Have the students help you tally how many colors were found in each season (if your class made observations each month, then group the charts by season); record these results at the top of each Season Chart.
3. Have a class discussion about the following ideas:
 - What colors were the easiest to find in each season?
 - Did you find the same colors for every season?
 - Throughout each season, how did the colors you found change?
 - Where did you locate the colors of a certain season?
 - Was there a season that had the most/least colors?
 - What are some possible reasons why there are more or less colors in certain seasons?
 - Which colors were you the most surprised to find?



Adaptations for Younger and Older Students

For Part 2, younger students can work in small groups and have an adult do the recording for them. Upon returning to the classroom they can remain in their small groups with the adult guiding them in reading the color words on their *The Colors of the Seasons Student Activity Sheet* and in remembering what they had observed in the field. It might also help avoid confusion if younger students only record one item they find for each color, rather than recording all of the items they find for each color.

For Part 3, older students can have a class discussion about some of the questions listed above. Then they can write out responses to other questions in their science journals and share their ideas in small groups.

Older students can also correlate this activity to the study of the Spring/Fall Equinoxes and the Summer/Winter Solstices.

Further Investigations

- **Bead Bracelet:** Make a bead bracelet of all the colors in the color packet using a brown pipe cleaner to string them on. Use this bracelet to make observations in each season and then let students take them home at the end of the year. Encourage the students to use the same idea of locating colors, during their vacation time away from school, in different locations such as the mountains, the beach, a park, and so on. Suggest they keep a journal of all the colors they can find in different settings. This will support their observation, comparison, and recording skills away from a school setting.
- **Paint Chip Colors:** Collect free paint chip strips from your local hardware store. Gather strips in a certain color scheme, for example different shades of green, orange, brown, etc. Send the students out to look for only one color using the full spectrum of that color.
- **Sneak-Preview of Budburst Learning Activity:** This activity can be found in the Earth As A System section of the *GLOBE Teacher's Guide* (www.globe.gov).
- **Green-Up Cards Learning Activity:** This activity can be found in the Earth As A System section of the *GLOBE Teacher's Guide* (www.globe.gov).
- **Phenology Investigations:** See the *GLOBE Teacher's Guide* for more information (www.globe.gov). Conduct the Green Up/Green Down Protocols and/or the Budburst Protocol with your students.



The Colors of the Seasons Student Activity Sheet

Name _____

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|---|---------------------------------------|--|
| <p>_____</p> <p>Date</p> <p>_____</p> <p>Season</p> | <p><input type="checkbox"/> Red</p> | <p><input type="checkbox"/> Blue</p> |
| <p><input type="checkbox"/> Yellow</p> | <p><input type="checkbox"/> Green</p> | <p><input type="checkbox"/> Orange</p> |
| <p><input type="checkbox"/> Purple</p> | <p><input type="checkbox"/> White</p> | <p><input type="checkbox"/> Brown</p> |
| <p><input type="checkbox"/> Pink</p> | <p><input type="checkbox"/> Gray</p> | <p><input type="checkbox"/> Black</p> |