



What a Colorful World Lesson Plan

Overview

When viewed from space, the Earth exhibits a stunning array of beautiful colors. In this lesson, children will explore the connections between many colors that can be seen from space, and the surface features (e.g. deserts, forests, grasslands/croplands, snow and ice, and oceans) that these colors represent. Children will also learn that clouds look white from space and can obscure the surface colors when they are present. This lesson serves as a foundation for students to interpret satellite imagery and the surface color changes that may occur due to seasonal variability and land cover change.

Suggested Lesson Sequence	Please see the Foundations: Maps and Images , Foundations: Migrations and Changes , and Global Visions module descriptions.
Lesson Level	Entry
Science Connections	<ul style="list-style-type: none"> Students will observe colors on the Earth's surface from space by viewing satellite images. Students will observe images showing white clouds from space that obscure the ground surface color.
Mathematics Connection	<ul style="list-style-type: none"> Students will estimate the dominant color of the ground surface.
Lesson Assessment Tools	<ul style="list-style-type: none"> Assessment and Standards Table (Word) Assessment Activity Description Lesson Extensions for Authentic Assessment

Materials

- Powerpoint Reader ([Windows](#) / [Mac](#))
- Computer with screen or projection device.
- Crayons
- What a Colorful World slideshow ([Powerpoint](#))
- What a Colorful World Assessment activity sheet ([Word](#)), one per student

About the slideshow: This slideshow is not meant for students to read through on their own. It is intended to be viewed together, to outline and illustrate a discussion of the day's themes,

led by the teacher. You might have a different student read each slide's text.

Vocabulary

- Desert: a land area that receives very little rain or snow and has few plants.
- Cropland: an area where farmers grow special food-producing plants such as corn or beans.
- Obscure: to cover up. Clouds *obscure* the land from being seen by satellites in outer space.

Vocabulary Note: students will likely be unfamiliar with other vocabulary presented in this lesson. This is done intentionally, to spur additional conversations and discussion about these words and their meanings. Encourage your students to ask about words they may be unfamiliar with.

Procedure

I. Assessing Prior Knowledge

Introduce this lesson by asking the class what colors they see in outside places, such as on the school playground, on their way to school, and near their home. What sorts of things do these colors represent? You may wish to keep a running list of colors and their associated objects (such as "roads are gray", "trees are green", etc.) on the board. Have students think about whether these colors are the same throughout the year, and if not, what other colors can these objects be during different seasons?

II. Contextual Preparation

This lesson is to build students' awareness of the colors of the Earth as seen from space. Continue your class discussion by asking students to imagine that they were a bird that could soar high above the Earth. What colors would they see on the ground if they were a bird? Some responses may be very similar to the same list previously noted, but some students may note that it is difficult to see color details of small objects from way above the Earth and that the colors would become more "smoothed out" to show the colors of the major land covers. Some students may live in tall apartment buildings or have been fortunate enough to have flown in an airplane; ask these students what colors they might expect to see if they looked out of such windows. What color would they see if they were high enough to be above a cloud?

III. Student Activity

With the [What a Colorful World slideshow](#) already loaded onto the computer (with either a

projection or on-screen display), make the room as dark as possible. (The slideshow contains beautifully colored imagery that is most vibrant when the room is darkened.) Guide the students through the various questions posed throughout the slideshow, and have them reason through their responses. You may wish to move backward and forward through the slideshow so that you can compare the images on separate pages. Hints for discussion: the satellite images can also be used to point out and name the continents, to highlight where international students may have come from, to show where students' ancestors may have lived, and to locate your own school. Relate these special places to the colors and ground locations that are shown in the slide show. Note: with the exception of the last slide (the image showing clouds), all of the other images were created by "cutting and pasting" cloud-free images of the daytime Earth together so that the surface can be clearly seen. Also, notice that because all images show the entire sunlit Earth at once, they had to be "cut and pasted" from smaller images collected over the course of many separate daytime periods. You may wish to point this out to your students to avoid confusion.

Referring again to the global image without clouds, make a tally with your students of the number of deserts, light blue coastal areas, green regions, and snow/ice locations around the world. Guide children through a discussion about what else they might expect to find in these various regions. For example, what sorts of animals and insects would they expect to find in each of the regions? These sorts of questions will encourage children to begin thinking about how the colors in the image actually can be used to surmise how parts of the Earth are interdependent.

IV. Assessment

Print and distribute the [What a Colorful World Assessment Activity Sheet](#) and ensure that students have crayons to use with the sheet. Encourage students to think about the colors they would expect to see during different times of the year in their favorite park. An example of good student work will have rational choices for surface colors that should appropriately change over the course of the seasons. Some students may point out that many flowers bloom in the springtime, and choose a color to represent these colors. Although urban flowers seldom bloom with enough collective color to influence colors as seen from space, this sort of thinking should be encouraged. Excellent student work might also note periods of mud, snow, different plant colors, etc. on the surface, or more/less cloud cover.

Lesson Extensions for Authentic Assessment

- Look back at the slide show image of the entire Earth. At this scale, it is difficult to directly see any human influences on the Earth's surface color. However, with a closer look, it is possible, using satellites, to see many changes brought about by humans. For such examples, explore the USGS Earthshots website at: earthshots.usgs.gov. What color changes occur when you take a closer look at the Earth? What different sorts of human evidence exist in these images?

- By looking at the cloudy image, have students estimate how much of the Earth's surface is covered by clouds in that image. What patterns can be seen in the clouds? What could someone learn about wind by looking at the clouds? Are there parts of the world that are more or less cloudy than others? Have students examine the difference in Africa between the deserts (few clouds) and the central rainforest (many clouds). More clouds tend to occur over vegetated areas because plants pump large amounts of water from the soil to the atmosphere through a process called transpiration.