

# OIMB GK12 CURRICULUM

5th Grade

60 minutes

## LIGHT IN THE DEEP SEA – Adapted from NOAA’s All That Glitters

### **Oregon Science Content Standards:**

5.2 Interaction and Change: Force, energy, matter, and organisms interact within living and non-living systems.

5.2L.1 Explain the interdependence of plants, animals, and environment, and how adaptation influences survival.

5.3 Scientific Inquiry: Scientific inquiry is a process of investigation based on science principles and questioning, collecting, describing, and examining evidence to explain natural phenomena and artifacts.

5.3S.1 Based on observations and science principles, identify questions that can be tested, design an experiment or investigation, and identify appropriate tools. Collect and record multiple observations while conducting investigations or experiments to test a scientific question or hypothesis.

5.3S.2 Identify patterns in data that support a reasonable explanation for the results of an investigation or experiment and communicate findings using graphs, charts, maps, models, and oral and written reports.

### **Ocean Literacy Principles:**

5. The ocean supports a great diversity of life and ecosystems

7. The ocean is largely unexplored

### **Goals:**

- To understand what happens to light and colors as one descends in the ocean
- To understand how deep sea creatures are adapted to lack of light in the deep sea

### **Concepts:**

- Light intensity decreases with increasing depth.
- Different colors disappear at different depths.
- Deep sea animals live in dark habitats.
- Deep sea animals have adaptations which help them survive in the dark of the deep sea.

### **Materials:**

- “Color of Shrimp” PowerPoint
- “Light and Color in the Ocean” PowerPoint
- Light in the Deep Sea experiment sheet (one per student)
- Deep Sea Dive Goggles, instructions below (one per pair of students)
- One red, orange, yellow, green, blue and black (dark brown) M&Ms per student pair

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- One sheet of black construction paper per student pair

### **Background:**

See the website “All That Glitters...” from NOAA’s Ocean Explorer:

[www.oceanexplorer.noaa.gov/explorations/02sab/background/edu/media/sab\\_deep\\_sea.pdf](http://www.oceanexplorer.noaa.gov/explorations/02sab/background/edu/media/sab_deep_sea.pdf)

### **Preparation:**

- Make one set of Deep Sea Dive Goggles for each pair of students:
  - For each dive goggle, cut blue plastic transparent report covers lengthwise into four strips approximately 2 inches by 12 inches, making 8 strips total (front and back of cover).
  - Staple the eight strips together, using two staples, along one short edge to make one “Deep Sea Dive Goggles”. The plastic will form a fan with one end stapled and the other loose.
- Separate M&Ms by colors so that each student pair has one of each: black (dark brown), red, orange, yellow, green and blue.

**Lesson:** *The following has been modified from the NOAA Ocean Explorer Lesson “All That Glitters...”*

1. Ask students what a rainbow looks like. Ask them what they know about light and what happens when light passes through a prism. Establish that light is composed of a spectrum of colors of different wavelengths.
2. Hand out the Light in the Deep Sea experiment sheet, one per student.
3. Ask students to write down/draw what they think happens to light in the deep sea, and if they think certain colors of light penetrate deeper than others in the ocean.
4. Discuss their answers by making a list and/or drawing on the board.
5. Show the students the 3-slide Color of Shrimp PowerPoint presenting GK12 Fellow Heather Austin’s research on the color of shrimp at different depths off the Bahamas, from near surface waters (~150 meters) to deep water (~900 meters).
6. While showing the pictures, ask students to write differences between the shrimp from the surface and from deep water. Do the shrimp look different at different depths? What colors are the surface water shrimp? What colors are the deep sea shrimp?
7. Have students write a prediction about why they think the shrimp at the surface are a different color than the shrimp found at depth.
8. Tell students that they are going to experience what the underwater world looks like to these creatures by using Deep Sea Dive Goggles.
9. Pass out one sheet of black construction paper, one Deep Sea Diving Goggles, and one M&M set to each student pair.
10. Ask what the black piece of paper represents. (*The darkness of the deep sea.*) What do the layers of the goggles represent? (*Increasing water depth.*)
11. Have the students spread their M&Ms on the black paper.

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12. Tell the students to carefully bend 7 layers of the report covers back and observe the M&Ms through one layer. What color M&Ms are visible? Each student of the pair should make their observations and record the data (which colors are visible) on their data sheet.
13. Repeat with each layer one at a time, simulating what it looks like to go deeper into the ocean. What is happening to each color? The layers of the goggles allow the students to see what happens to colors as one goes deeper and deeper in the ocean. The blue strips filter out colors just as the water does.
14. After completing the activity, have each student pair report their results. Which color disappeared first? Which color disappeared last? (Black should disappear first, followed by red, then orange, then yellow.)
15. Question the students about their observations on what happened to each color of M&Ms and discuss how the disappearance of these colors may affect animals in deeper waters and perhaps the coloration of deep sea creatures, like the shrimp. *(As a color is filtered out, anything that is that color becomes essentially invisible. Therefore, in the deep sea, red is a good camouflage color.)*
16. End the discussion with the “Light and Color in the Ocean” PowerPoint, and review what happens to light in the ocean.
17. Finally, ask students how their observations with their Deep Sea Dive Goggles might explain why the deep sea crustaceans were red.

**Assessment:** Completion of “Light in the Deep Sea” experiment sheet and oral report of results from the Deep Sea Dive Goggle activity.

**Sources:**

NOAA Ocean Explorer Lesson “*All That Glitters...*” found at the following website: [oceanexplorer.noaa.gov/explorations/02sab/background/edu/media/sab\\_deep\\_sea.pdf](http://oceanexplorer.noaa.gov/explorations/02sab/background/edu/media/sab_deep_sea.pdf) Modified by GK12 Fellow Heather Austin

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Name \_\_\_\_\_

Date \_\_\_\_\_

### Light in the Deep Sea Experiment Sheet

Write down/draw what you think happens to light in the deep sea. Do you think certain colors of light penetrate deeper in the ocean?

What differences do you observe between shrimp found near the surface and shrimp found in the deep sea?

Write a prediction about why you think the shrimp at the surface are a different color from the shrimp found at depth.

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## M&Ms Observations: Data Chart

Put an X in the square if the M&M can still be seen

<b>Dive Goggles</b>	<b>Red</b>	<b>Orange</b>	<b>Yellow</b>	<b>Green</b>	<b>Blue</b>	<b>Black</b>
1 layer						
2 layers						
3 layers						
4 layers						
5 layers						
6 layers						

Which color disappeared first?

Which color disappeared last?

If you were an animal wishing to hide in the twilight zone, what colors would provide the best camouflage?

What colors would provide the worst camouflage?

Why do you think the deep sea shrimp are the color they are?

Why do some colors disappear sooner than others?