**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_ Date\_\_\_\_\_\_\_\_**

Ocean Camouflage Colors

**KEY WORDS**

Spectrum Wavelength Reflect Absorb

**INSTRUCTIONS:**

Read the following selection and answer the questions which follow.

As you travel from surface waters to deeper waters, the quantity of light changes; it decreases with depth. The quality of light also varies with depth. Sunlight contains all of the colors of the visible spectrum (red, orange, yellow, green, blue and violet). These colors combined together appear white. Red light has the longest wavelength and therefore the least amount of energy in the visible spectrum. Violet light has the shortest wavelength and therefore the highest amount of energy in the visible spectrum. The wavelength decreases and the energy increases as you move from red to violet light across the spectrum in the following order: red, orange, yellow, green, blue and violet; the energy of the light is inversely proportional to the wavelength.

Red light is quickly filtered from water as depth increases. As the wavelength of light increases from red light to blue light, so does its ability to penetrate water; blue light penetrates best. Green light is second, yellow light is third followed by orange light and red light. The exception to the rule is violet light. Although it has the shortest wavelength and the highest energy, violet light is also quickly filtered from water; the small wavelength of light is easily scattered by particles in the water.

All objects that are not transparent or translucent either absorb or reflect nearly all of the light that strikes them. When struck by white light (containing all colors), a red fish reflects red light and absorbs all other colors. Likewise, grass reflects green light and absorbs all other colors. White objects appear white because they reflect all colors of light in the visible spectrum. Black objects appear black because they absorb all colors of light. On a hot sunny, summer day do you stay cooler wearing a white shirt or a black one? The answer is a white shirt! A white shirt reflects all wavelength of light, while a black shirt absorbs them. Now consider that red fish. If a red fish is swimming at the surface of the ocean, it appears red because it reflects red light. Can you see a red fish swimming at 100 meters? At this depth the red fish is difficult, if not impossible to see, and appears blackish because there is no red light to reflect at that depth and the fish absorbs all other wavelengths of color.

In the twilight zone, there are numerous animals that are black or red. At depth, these organisms are not visible. The black animals absorb all colors of light available and the red animals appear black as well; there is no red light to reflect and their bodies absorb all other available wavelengths of light. Thus red and black animals predominate. Since the color blue penetrates best in water, there simply are not that many blue animals in the midwater regions of the ocean; their entire bodies would reflect the blue light and they would be highly visible to predators.

**QUESTIONS**

1. What is the main idea of this article?
2. What would another good title for the article?
3. What would an additional paragraph at the end of this passage most likely be about?
4. What is the connection between *red light is quickly filtered from water as depth increases* in paragraph 1 and *the red fish is difficult, if not impossible to see?*
5. What does the author mean by saying, “*Thus red and black animals predominate?”*

Adapted from:

Islands in the Stream 2002: Exploring Underwater Oases

All That Glitters…by Stacia Fletcher,

South Carolina Aquarium for the National Oceanic

and Atmospheric Administration.<http://oceanexplorer.noaa.gov>

**ANSWERS:**

1. What is the main idea of this article?

***Answers will vary, Sample answer: Because to the way light waves behave as they pass through water, colors are different underwater. Aquatic animals have adapted to this and are often red or black in color.***

1. What would another good title for the article?

***Answers will vary***

1. What would an additional paragraph at the end of this passage most likely be about?

***Answers will vary, Sample answer: An additional paragraph at the end of the passage might discuss other ways aquatic animals camouflage themselves.***

1. What is the connection between *red light is quickly filtered from water as depth increases* in paragraph 1 and *the red fish is difficult, if not impossible to see?*

***Answers will vary, Sample answer: The fact that red light is quickly filtered from water as depth increases causes the effect he red fish is difficult, if not impossible to see.***

1. What does the author mean by saying, “*Thus red and black animals predominate?”*

***Answers will vary, Sample answer: The author means that MOST animals at this depth are red or black.***