

Name _____ Period _____ Date _____

Glow Little GloFish® Exploring Types of Light and GloFish® Colors

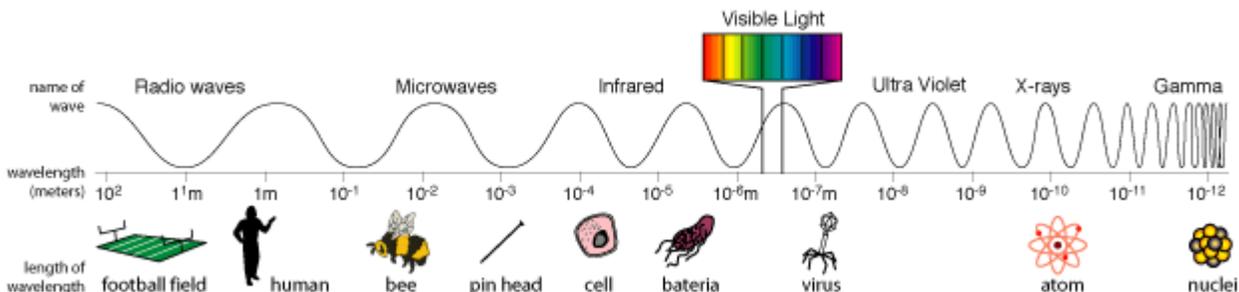
Objective

Students will determine if different types of light affect how we see the colors of GloFish® fluorescent fish.

Introduction

When we see the color of an object, we are actually seeing the reflection of that color light wave. All the other color light waves are being absorbed by the object. Light waves that we can see (visible light) make up a very small segment of the electromagnetic waves around us. (See Figure 1. – Electromagnetic Spectrum)

Waves in the electromagnetic spectrum vary in size from very long radio waves the size of buildings, to very short gamma-rays smaller than the size of the nucleus of an atom.



Taken from NASA website

Light waves come from the sun. However, for hundreds of years inventors and scientists have been developing different types of light sources so we can still have light even when there is no sunlight. Today there are a large variety of light sources available to us. GloFish® were developed when scientists removed a fluorescence gene from a sea coral and inserted it into a golden zebrafish embryo. The fluorescence gene became part of the DNA found in each cell of the developing zebrafish. The resulting genetically modified fish can pass the fluorescence gene along to its offspring. In this activity, GloFish will be viewed under different types of light sources. You are going to see if shining different types of lights on the GloFish cause a change in the way you see their color (reflection of the light.)

National Standards Addressed

Science as Inquiry A—Abilities necessary to do scientific inquiry

Lesson plan for GloFish® fluorescent fish; Starfire Red®, Sunburst Orange®, and Electric Green®. For additional **FREE** lesson plans, please visit the **GloFish.com** Classroom page at <http://www.glofish.com/classroom.asp>.

© 2009 Yorktown Technologies, L.P.

Materials Per Group

Different colors of GloFish in clear plastic cups
Flashlight, black light, fluorescent and red lights
Colored pencils
Fluorescent markers

Materials for Classroom

Research resources; internet, library, textbook

Safety Precautions

Students should not shine light sources at other students.

Procedures

Part A: Conducting Background Research

1. Using resources such as the library, textbooks and/or the internet, conduct research to find a complete answer to the question that has been assigned to your group.
2. Prepare a visual aid, such as a poster, video or power point presentation that depicts the answer to your question.
3. When called upon by your teacher, present your group's answer to the assigned question.
4. Record the information provided by each group as they share the answer to their assigned question.

Part B: Comparing GloFish® Under Different Light Sources

1. Observe the different color GloFish in their cups under the classroom lights. Draw a fish in the correct section of Table 9.1 and color it.
2. Shine one of the other light sources on the GloFish. Draw the fish and color it according to what you observed under the new light source.
3. Repeat step 2 for all the other light sources.

Part C: Group Research Questions

1. Do fish see in color? Explain your answer.

2. What colors make up the visible light spectrum and what are the wavelengths of each color in the spectrum?

3. Does light travel as compression or transverse waves? Explain the difference in these two types of waves.

4. How are fluorescent, incandescent and black lights different? How are they similar?

5. Do GloFish® glow or fluoresce? What is fluorescence?

Data

Table 9.1 - Drawings of GloFish® as Viewed Under Different Light Sources

Color of GloFish®	Type of light source				
	Classroom light Source	Fluorescent light	Red light	Incandescent light	Black light
<i>Starfire Red</i> ®					
<i>Electric Green</i> ®					
<i>Sunburst Orange</i> ®					

Discussion Questions:

1. Which type of light caused the GloFish® to look bright and glowing?
2. Explain how we see colors.
3. White light is actually the combination of all the visible light wavelengths. What colors make up white light?
4. Black lights send out wave lengths in the ultraviolet region of the electromagnetic spectrum. Are these longer or shorter wavelengths than those in the visible light area?
5. Light waves of long wavelength have low energy while those with short wavelengths have high energy. Which type of light waves can cause severe burns, radio waves or gamma rays?

Elaborations and Extensions

Assign the different types of light sources to students on which to conduct research. Students can find information about the light sources such as the time of development, which developed it, and how the light source works. Students can make short presentations to the class. Also, students could conduct research on the types of fluorescent organisms found on earth.

Glow Little GloFish®

Exploring Types of Light and GloFish® Colors

Answer Sheet

Intended Grade Level

6th, 7th, and 8th

Teacher Information

Consider assigning Part A as a homework task to save time.

If you do not have enough fish or light sources to give each group one of each, then set up several stations so students move through the stations and complete the lab.

Possible Answers to Discussion Questions

1. Which type of light caused the GloFish® to appear bright and glowing?

Black light and fluorescent light give the fish a bright, glowing appearance.

2. Explain how we see the colors.

Light travels in waves within a specific range in the electromagnetic spectrum. When we see the color of an object, we are actually seeing the reflection of that color light wave. All the other color light waves are being absorbed by the object.

3. White light is actually the combination of all the visible light wavelengths. What colors make up white light?

Students should know their primary colors from elementary school – red, orange, yellow, green, blue, indigo, and violet (ROY G. BIV).

4. Black lights send out wavelengths in the ultraviolet region of the electromagnetic spectrum. Are these longer or shorter wavelengths than those in the visible light area?

Shorter

5. Light waves with long wavelengths have low energy while those with short wavelengths have high energy. Which type of light waves can cause severe burns, radio waves or gamma rays?

Gamma rays