**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Pd.\_\_\_\_\_**

**Light, Reflection, and Refraction Reading Assignment #1:**

**Access the Web site listed below. Answer all questions completely and draw diagrams to aid explanations when applicable.**

On a separate piece of paper or google document answer the following questions.

**Light Waves and Color**

<http://www.physicsclassroom.com/class/light>

**Lesson 1 - How Do We Know Light is a Wave?**

[Wavelike Behaviors of Light](http://www.physicsclassroom.com/class/light/Lesson-1/Wavelike-Behaviors-of-Light)

1. Explain what is meant by this statement *"Is light a wave or a stream of particles?"*
2. What proof is there that light is a wave or has wave type characteristics?
3. Explain what happens when light reflects off a surface.
4. Explain how light refracts.
5. What happens when light diffracts?

[Two Point Source Interference](http://www.physicsclassroom.com/class/light/Lesson-1/Two-Point-Source-Interference)

1. A two-point source interference pattern always has ­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. From the animations, describe the difference in patterns by changing the source separation, and by changing the wavelength.
3. What is monochromatic light? Examples……
4. What does the two point source pattern of monochromatic light look like?

[Thin Film Interference](http://www.physicsclassroom.com/class/light/Lesson-1/Thin-Film-Interference)

1. What does thin film interference look like? What are some common sources of this phenomenon?

[Polarization](http://www.physicsclassroom.com/class/light/Lesson-1/Polarization)

1. How are light waves produced?
2. What is the difference between polarized light and un-polarized light?
3. What are the 4 ways of polarizing light? How are they similar and how are they different?
4. How is polarization used in the film industry?

**Lesson 2 - Color and Vision**

[The Electromagnetic and Visible Spectra](http://www.physicsclassroom.com/class/light/Lesson-2/The-Electromagnetic-and-Visible-Spectra)

1. What wavelengths and colors can humans see as visible light?
2. The separation of white light into it’s colors is known as\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Consider the electromagnetic spectrum as you answer these three questions.
	1. Which region of the electromagnetic spectrum has the highest frequency?
	2. Which region of the electromagnetic spectrum has the longest wavelength?
	3. Which region of the electromagnetic spectrum will travel with the fastest speed?

[Visible Light and the Eye's Response](http://www.physicsclassroom.com/class/light/Lesson-2/Visible-Light-and-the-Eye-s-Response)

1. What part of the eye is responsible for seeing colors?

[Light Absorption, Reflection, and Transmission](http://www.physicsclassroom.com/class/light/Lesson-2/Light-Absorption%2C-Reflection%2C-and-Transmission)

1. What is actually happening when we say that light is being absorbed by a material?
2. What is actually occurring when light passes through a transparent material?
3. The appearance of a transparent object is dependent upon which color(s) of light is/are incident upon the object and which color(s) of light is/are transmitted through the object. Express your understanding of this principle by determining which color(s) of light will be transmitted and the color that the paper will appear to an observer.





[Color Addition](http://www.physicsclassroom.com/class/light/Lesson-2/Color-Addition)

1. What are the primary colors?
2. Explain how we get other colors from the primary colors?
3. What are the complementary colors?

[Color Subtraction](http://www.physicsclassroom.com/class/light/Lesson-2/Color-Subtraction)

1. Blue jeans appear blue because the jeans are permeated by a chemical dye. Explain the role of the dye. That is, what does the dye do (absorb or reflect) to the various frequencies of white light?
2. A red shirt looks red when visible light ("ROYGBIV") shines upon it. Use your physics understanding to explain this phenomenon.
3. Different colored light sources shine on different colored sheets of paper. The indicated paper color represents the appearance of the paper when viewed in white light. Fill in the table below to show the color of light that reflects from the paper (i.e., the color observed).

|  |
| --- |
|  |
| **Color of****Light** | **Color of****Paper** | **Color Observed** |
| Red | Yellow | http://www.physicsclassroom.com/Class/images/spacer.gif |
| Red | Magenta | http://www.physicsclassroom.com/Class/images/spacer.gif |
| Blue | Blue | http://www.physicsclassroom.com/Class/images/spacer.gif |
| Blue | Cyan | http://www.physicsclassroom.com/Class/images/spacer.gif |
| Blue | Red | http://www.physicsclassroom.com/Class/images/spacer.gif |
| Yellow | Red | http://www.physicsclassroom.com/Class/images/spacer.gif |
| Yellow | Blue |  |

[Blue Skies and Red Sunsets](http://www.physicsclassroom.com/class/light/Lesson-2/Blue-Skies-and-Red-Sunsets)

1. What colors is sunlight? Is it yellow?
2. Why is the sky blue?
3. Why are sunsets red?

**Lesson 3 - Mathematics of Two-Point Source Interference**

[Anatomy of a Two-Point Source Interference Pattern](http://www.physicsclassroom.com/class/light/Lesson-3/Anatomy-of-a-Two-Point-Source-Interference-Pattern)

1. Draw the two-point interference pattern, what do the red and blue dots represent? What is the difference between them?

[The Path Difference](http://www.physicsclassroom.com/class/light/Lesson-3/The-Path-Difference)

1. What is path difference and its equation?
2. Two point sources are generating periodic waves in phase. The wavelength of the waves is 3.0 cm. A point on a nodal line is 25 cm from one source and 20.5 cm from the other source. Construct a sketch of the physical situation and determine the nodal line number.

[Young's Equation](http://www.physicsclassroom.com/class/light/Lesson-3/Young-s-Equation)

1. Young equation is used for? Light needs to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for interference to occur?

[Young's Experiment](http://www.physicsclassroom.com/class/light/Lesson-3/Young-s-Experiment)

1. What was Young’s difficulty when doing his experiment to find the wavelengths of colors of light? How did he overcome this obstacle?
2. What light source do we now use when determining the wavelength of light?

[Other Applications of Two-Point Source Interference](http://www.physicsclassroom.com/class/light/Lesson-3/Other-Applications-of-Two-Point-Source-Interferenc)

1. What are some applications of two point source interference?
2. Why is it important to take in effect interference patterns when designing auditoriums?
3. Why don’t ordinary light bulbs create interference patterns?