

What's Your Wavelength?

Do you like keeping secrets? The properties of light make it really fun to write notes that only your friends can read. Complete this experiment to test it out! Your teacher will give you the materials you need.

COLOR CODES

1. Trace the sunglass pattern onto a sturdy piece of cardboard and cut it out.
2. Trace and cut a set of red cellophane lenses to fit slightly larger than the eyeholes.
3. Glue the lenses to the frames.
4. Use the blue crayon to write a brief, secret message.
5. Draw over the message in a crosshatch pattern with both the red pen and the yellow highlighter. When you're done, it should be difficult to see the blue writing.
6. Trade papers with your partner and try to decipher their message, with and without wearing your glasses.

Hint: Take note of what color the message appears to be.

What's Happening Here?

Light travels in waves. White light, such as from the sun, is made up of many different colors. Each color is a separate wave with its own length, called a wavelength. When light hits an object, that object absorbs some wavelengths of light and reflects or scatters other wavelengths. The reflected light is the color we see.

Without your glasses, the light reflected by the blue crayon is lost behind the combination of red ink and yellow highlighter. With your glasses, no light reaches your eye from the blue crayon; the crayon is only reflecting blue light, but the red lenses of the glasses only let red light through. This makes the blue writing appear black (no light reaching your eye), allowing you to clearly read the hidden message amid the red ink and yellow highlighter!

Complete the following to find out why the blue writing appeared black and what happens when you mix different colors together.



COLOR LAB

Follow these steps to mix the different colors of paint and colored paper your teacher gives you. Record your observations on the back of this sheet.

1. Start with one color and one piece of paper of a different color.
2. Then try other combinations of paint and paper as well as mixing together colors of paint.

What's Happening Here?

When using paints or pigments, the color you see is the light the object is reflecting. As you mix colors, more and more wavelengths of light are absorbed, and fewer are reflected. When you add all of the colors together, you get black, because the pigments will collectively block all color from reflecting back at you. This is called *subtractive mixing*, and explains why the secret message appeared black.

