

Light Wave Color Lab with M&Ms and Skittles

We're going to play with the properties of light by investigating the different colors and how they are absorbed and reflected using M&Ms or Skittles candy! You'll need candy and lights.

Have you ever wondered why some apples are red and certain grapes are green? It has to do with light and how it gets reflected or absorbed by objects. If there's no light, there's no color. When you look at a red apple, you can see it's red because the apple absorbs all colors of light *except* red. The apple looks red because the red light from the sun is bouncing (reflecting) off the apple to reach your eye.

Sunlight is all visible colors mixed together, so if you shine sunlight on your red apple, it will appear red. What if you shine only green light on your red apple? What color will it be then? That's what we're going to find out.

First, we need to get **three different colors** of light. You can do this in a couple of different ways:

1. Find three flashlights. Cover each with colored cellophane (these will be your color filters) or paint the plastic lens cover with nail polish (red, green, and blue).

If you don't want to paint the end of the flashlight, then cover it with clear tape and paint the tape itself, so when you're done you can peel off the color and it will be a white flashlight again.

2. Find a string of Christmas lights and cover up all except one red light, green light, and blue light. These are your three light sources. Figure out a way to isolate them (wrap each in its own section of a blanket, poke each through a paper cup, or similar so you can shine only one at a time).



3. Use "[Finger Lasers](#)" and don't use the white one for now. These are not really "lasers" – they are LEDs that strap onto your fingers. These work really well for this experiment. I have found these in toy stores, grocery stores in the cereal aisle, hardware stores by the cash register, and even office supply stores by the "impulse buy" section.



Lab #1: First, let's play with your lights. Shine onto a white ceiling or wall, overlap the colors and make new colors. Leave the flashlights on, line them up on a table, turn off the lights, and dance – you will be making rainbow shadows on the wall! (In addition, you can paint the lens of a fourth flashlight yellow to see what happens to your shadow.)

What's going on? What color is light? Sunlight may seem clear or invisible, but it's actually white light. Visible white light is made up of different colors. If you shine white light through a prism (made of glass, plastic, or even a glass of water), it will unmix the sunlight into its different colors.



Although there's a whole rainbow that comes out when you do this, there are really only three colors of light. The primary colors of light are not the same as the three primary colors of paint. For light, the primary colors are red, green, and blue!

Write down what you find below:

1. When we combine red and green light, we get _____ light.
2. Combine green and blue to get _____ light.
3. Combine blue and red to get _____ light.
4. When you turn on the red and green lights, the wall will appear _____.
Now wave your hand in front of the red and green lights and look for your shadow on the wall. What color are your shadows?
_____ and _____ shadows on the wall.
5. Turn on the green and blue lights, and the wall turns _____
_____ and _____ shadows on the wall.
6. Turning on the _____ and red give a magenta wall with
_____ and _____ shadows on the wall.
7. Turn on all colors and you will get a white wall with cyan, yellow, and magenta shadows – those are your rainbow shadows!

Troubleshooting If you're not getting the colored shadows, check to be sure that the flashlight is bright enough to illuminate a wall in the dark. Be sure to shut the doors, shades, windows, and drapes. In the dark, when you shine your red flashlight on the wall, the wall should glow red. Beware of using off-color nail polish – make sure it's really red, not hot pink.

Lab #2: Reflection and Absorption of Light

Read over all the directions below now so you'll know what to do in the dark.

1. Print out the data table on the next page.
2. Put everything you need on the floor in the room you're going to make very dark. You will need a pencil, sorting sheet, M&Ms or Skittles, and your colored lights from Lab #1.
3. Turn off the lights, close the shades and make the room very dark. Wait for 3-5 minutes for your eyes to adjust to the dark. Make sure the room is dark enough so you can't see color, not even a tiny bit.
4. Mix up the M&M or Skittles (or both) and using your hands, spread them in a single layer on the next page near the center if you can.
5. Using only RED, sort the candy on the lab sheet.
6. Turn on the lights and take a look at your sorting sheet. Were some of the colors in completely wrong boxes?
7. Using only GREEN, sort the candy on the lab sheet.
8. Turn on the lights and take a look at your sorting sheet. Were some of the colors in completely wrong boxes?
9. Using only BLUE, sort the candy on the lab sheet.
10. Turn on the lights and take a look at your sorting sheet. Were some of the colors in completely wrong boxes?

What's going on? With colored lights, certain colors of candy were probably difficult to sort, and some colors looked exactly the same! This happens when the light that makes up the main part of the candy's color wasn't present so it couldn't reflect that color of light. Did you notice if one color looked like it changed colors when you switched on a different light? Why do you think that happens?

SORT YOUR CANDY
USING ONLY **ONE COLOR**
OF LIGHT AT A TIME!

RED

BROWN

ORANGE

PURPLE

YELLOW

BLUE

GREEN

Answer Key

1. When you combine red and green light, I get yellow light.
2. Combine green and blue to get cyan (turquoise).
3. Combine blue and red to get magenta (purple).
4. When you turn on the red and green lights, the wall will appear yellow. Wave your hand in front of the lights and you will see cyan and magenta shadows on the yellow wall.
5. Turn on the green and blue lights, and the wall turns cyan with yellow and magenta shadows.
6. Turning on the blue and red give a magenta wall with yellow and cyan shadows.