

## Colored Filters Activity

### Overview:

A filter is a transparent material that selectively absorbs certain colors of light and transmits the remaining colors through. In this activity, you will explore the effects of filters on colors of light.

### Getting Ready:

Navigate to the Colored Filters simulation in the Physics Interactives section.

**[www.physicsclassroom.com](http://www.physicsclassroom.com) => Physics Interactives => Light and Color => Colored Filters**

Once at the proper page, Launch the Interactive. Notice the three tabs - **Lasers**, **Light Bulbs**, and **Sunglasses** - across the top of the simulation. You will begin with the **Lasers** mode.

### Part 1: Lasers

One at a time, drag and drop the various filters to a position between the laser and the screen. Record the % light that gets absorbed by the filter for each of the primary colors. **NOTE:** The simulation reports the % that is transmitted; you need to record the % that is absorbed.

Filter Name	Red: % Absorbed	Green: % Absorbed	Blue: % Absorbed
Dark Red			
Light Red			
Dark Green			
Light Green			
Dark Blue			
Light Blue			
Dark Yellow			
Light Yellow			
Dark Cyan			
Light Cyan			
Dark Magenta			
Light Magenta			
Light Gray			

### Part 2: Light Bulbs

In **Part 1**, you investigated the effects of individual filters on individual light colors from a laser. In **Part 2**, you will investigate the effect upon light from a white light bulb. The light bulb, being a **white** light bulb - includes all three primary colors - **red**, **green**, and **blue** mixed together. Whatever light colors are not absorbed by the filters will be transmitted through the filter to the screen. The resulting color can be seen on the screen. Determine which two or three filters could be used to produce the various colors shown specified in the table. Use the results from your table above to accelerate the process.

Screen Color (%R,G,B)	Filter #1	Filter #2
<b>Blue</b> (0%,0%,100%)		
<b>Periwinkle</b> (50%,50%,100%)		
<b>Mint Green</b> (50%,100%,50%)		
<b>Deep Violet</b> (50%,0%,50%)		
<b>Lavender</b> (50%,0%,100%)		
<b>Orange</b> (100%,50%,0%)		

Screen Color	Filter #1	Filter #2	Filter #3
<b>Gray</b> (50%,50%,50%)			
<b>Deep Violet</b> (50%,0%,50%)			
<b>Maroon</b> (50%,0%,0%)			
<b>Turquoise</b> (0%,50%,50%)			
<b>Copper</b> (50%,25%,0%)			
<b>Dusty Rose</b> (50%,25%,25%)			

NOTE: Percentages are transmission percentages. Order of filters does not matter with the filters.

### Part 3: Application Question

Your boss has assigned you the task to make a ball appear red. You have the following available to accomplish the task:

- a ball that appears white in white light that can be turned either ON or OFF
- red, green, and blue lights
- cyan, magenta, and yellow filters

Describe at least three ways that you can make the ball look red.