

## What Color is Your Shadow

Name \_\_\_\_\_ Date \_\_\_\_\_ Group \_\_\_\_\_ Period \_\_\_\_\_

**Objective:** To identify what determines the color of a shadow as well as to see what happens when different colors of light are combined.

**Materials:** Light Box, Power Supply, colored filters, colored squares, white paper screen, pencil.

**Safety:** The light box uses a halogen bulb which gets extremely hot. Do not try to adjust the bulb yourself. **Do not pick up** the light box to reposition it, just **slide it along the table** to do so.

**Procedures:** Before you begin, make sure the power supply is properly connected to the light box. Your teacher will show you how. Once you're done with the light box, turn off the power supply and let the light box cool down. Remove the color filters from the light box after use, as prolonged exposure to heat from the lamp may damage the filter and holder.

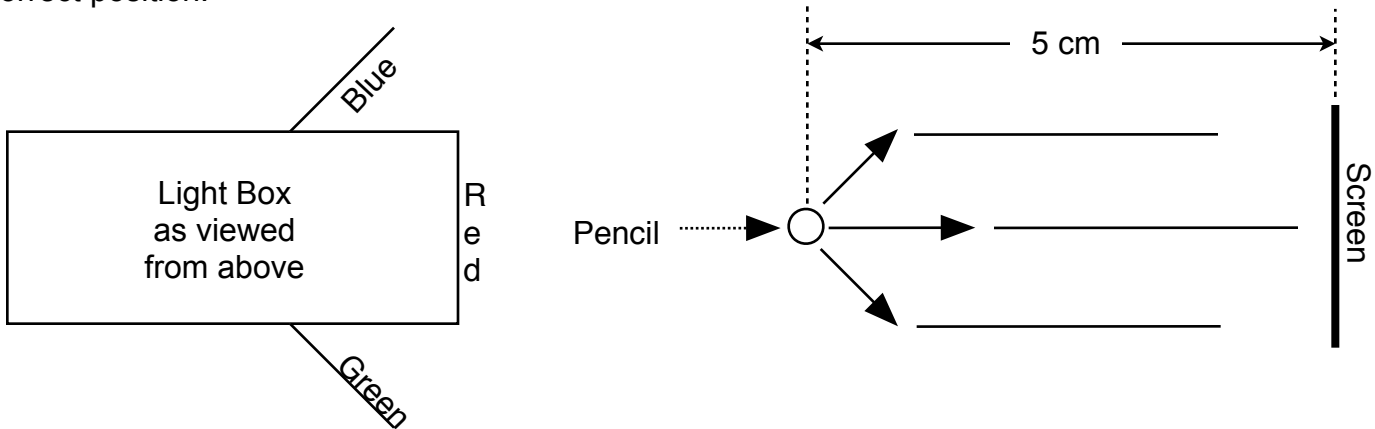
**Part 1:** In this first part of the lab, you will determine what color of light results when different light colors are combined. This will be done by putting different colored filters in the end position of a light box and on the side positions of a light box.

1. Position the light box so it faces a sheet of white paper/index card folded up at the end. The folded up end of the paper will be the screen. Starting with a red and blue filter in the slots on the light box, move the mirrors so the beams overlap and record the resulting color in the chart. Refer to the colored squares to be sure you use the correct name for the color they combine to make.
2. Use the other filters from the set to work out all the other possible combinations shown in the chart below. Some combinations will result in white light, or close to it, when mixed. If the color that results is a very pale shade of a color it should be recorded as white and is probably due to the bulb not being bright enough. Complementary colors are two colors that add together to make white light.

Colors of Filters used	Resulting Color
Red + Blue	
Red + Cyan	
Red + Green	
Blue + Yellow	
Blue + Green	
Yellow + Green	
Red + Blue + Yellow	
Red + Yellow + Green	
Blue + Yellow + Green	
Red + Blue + Green	

**Part 2:** In this part of the lab, you'll find out what effect the color of light has on shadows of objects.

1. Examine the light box diagram below. Place the three color filters shown below into the light box and project this onto the screen. Overlap together the light from the three filters onto the screen.
2. Place a pencil about 5 cm in front of the paper screen so that it is illuminated by all three beams.
3. Observe and record the colors of the shadows on the paper screen onto the diagram below in the spaces provided at the end of the arrows. Make sure the correct name of the shadow color is in the correct position.



**Questions**

1. What complimentary color ( two colors that combine to make white light) combinations did you find?(complete sentences)

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2. Look at the above diagram carefully and compare it to your answer for question 1. Based on these observations,what is the complimentary color for green? \_\_\_\_\_

3. What actually determines the color of a shadow? (complete sentences)

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**Sources of Error:** In looking back at the lab you just completed,what were two of the things you did that probably made your results less than a hundred percent reliable. They must be new and unique to this activity, and you must be specific about what the source of error is. (complete sentences)

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