Additive and Subtractive Color Lab On Line PreAP

1. Go to Explorelearning.com and try to LOG IN with your name. Your user name should be your name: First_LastAHS (example Sally_StudentAHS). Your password is physics.

2. If your log in was successful, you may go to the Gizmos. Go to pg. 2.

3. If you can’t log in, Click *Students with a Class Code » Enroll in a Class Here at upper right.

4. Choose “No, I don’t have a username or password.” Click New students, please click here to continue the enrollment process.

5. Enter the class code for your teacher/period from this table.

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Period</th>
<th>Class Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baughman</td>
<td>3</td>
<td>EUNV2V3JHP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Your class will show up as Ms. Coe period 7</td>
</tr>
<tr>
<td>Baughman</td>
<td>4</td>
<td>SYSMPLGNLM</td>
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<tr>
<td></td>
<td></td>
<td>Your class will show up as Ms. Coe period 4</td>
</tr>
<tr>
<td>Bowen</td>
<td>5</td>
<td>X Gebynudrv</td>
</tr>
<tr>
<td>Bowen</td>
<td>6</td>
<td>28ZtlwnjD9</td>
</tr>
</tbody>
</table>

6. Confirm class and teacher name.

7. Register: Enter your first and last name.

8. Account Login: Your username is your First_LastAHS (example Sally_StudentAHS) Your password is physics

9. Submit.

10. You should see a Home Page with the Additive and Subtractive Color Gizmos. Click Launch Gizmo.
Please write on these pages.

Do not do the assessment questions below the Gizmos until the end of the lab. They are graded.

Additive Color v2 Gizmo

What gives an object its color? The color that an object appears to be is determined by the light that reaches your eyes.

Light exists in a wide range of wavelengths, which are measured in nanometers (nm). Visible light is the narrow range of wavelengths in the electromagnetic spectrum that humans can see. Differences in the wavelengths of visible light account for the different colors we see.

Primary and Secondary Colors

The range of colors we see is called the visible spectrum. You can remember the colors in the visible spectrum by using the acronym ROYGBIV. This acronym lists the colors in the visible spectrum, in order - red, orange, yellow, green, blue, indigo, and violet. In this activity, you will discover the relationships among these colors.

1. In the Gizmo™, on the CONTROLS pane, select Red, Green, and Blue. These are the three primary colors of light.
2. Check Show RGB values. Every color has an RGB value that tells you how much red, how much green, and how much blue is in the color. The range for each value is from zero to 255.
   
   A. Mouseover the red circle and look under Show RGB values. What is the RGB value of pure red? How much green does pure red contain? How much blue? How can you tell?
   
   B. Similarly, mouseover the green circle. What is the RGB value for pure green? How much red does it contain? How much blue?

   C. What is the RGB value for pure blue?

   D. What is the RGB value for black? How much red, green, and blue light is in black?

3. Drag the red circle onto the green circle.
   
   A. What color do you get from combining red light and green light?

   B. What is the RGB value of this color?
4. Drag the red circle onto the blue circle.
   
   A. What color do you get from combining red light and blue light?
   
   B. This color is called magenta. What is the RGB value of magenta?

5. Drag the green circle onto the blue circle.
   
   A. What color do you get from combining green light and blue light?
   
   B. This color is called cyan. What is the RGB value of cyan?

6. Secondary colors are the colors that you get by combining two primary colors of light. What are the three secondary colors?

7. Be sure that all three color sliders are still set to full strength (255). Then drag all three circles on top of each other.
   
   A. What color do you get from combining red light, green light, and blue light?
   
   B. What is the RGB value of this color?

   C. Primary colors are defined to be the colors that produce white light when combined at full strength. This is why red, green, and blue are the primary colors of light.

8. You can also combine secondary and primary colors. (Again, be sure that the three color sliders are still set to 255.)
   
   A. Create the color yellow. What two primary colors produce yellow?
   
   B. Now combine yellow and blue. What color do you get? Explain why this is so.

   C. Create magenta. Then combine magenta and green. What color is the result? Explain.

   D. What do you think you will get if you combine cyan and red? Test your hypothesis in the Gizmo. Were you correct?

Now complete the on-line assessment questions. You must be logged in for your answers to be recorded.

You may check your status by clicking the myhomepage icon at the top right. You should see your name, your class period and teacher’s name.

Relaunch the Gizmo to take the assessment. Record your answers (right or wrong) here:
Subtractive Color v2 Gizmo

Go to my homepage at the top right to select the new Gizmo.

What color is a stop sign? Red, of course. When light strikes the sign, some of the light reflects off of it and is detected by your eyes. The sign appears red because red light is reflected.

Light that is not reflected is absorbed. A pigment is a light-absorbing substance. Different pigments absorb different colors of light. For example, the red paint on a stop sign contains pigments that absorb all of the colors of light except red.

When you mix pigments together, more colors of light are absorbed, or subtracted. Therefore, mixing colors of pigments is called color subtraction.

Primary Colors of Pigments

A pigment reflects the color you see. At the same time, a pigment absorbs, or subtracts, the colors that you do not see. In this activity, you will explore the primary colors of pigment.

1. In the Gizmo\textsuperscript{tm}, on the CONTROLS pane, select Cyan, Magenta, and Yellow. These are the three primary colors of pigment. Check Show RGB values. Every color has an RGB value that tells you how much red, green, and blue the color reflects. The range for each value is from zero to 255.

A. Mouseover the white area around the colored circles and look under Show RGB values. What is the RGB value of pure white? This means that white reflects all colors. This also means that white absorbs none of the colors.

B. Mouseover the cyan circle and look under Show RGB values. What is the RGB value of cyan? Out of the primary colors of light (red, green, and blue), which ones does cyan reflect? Which color does cyan absorb?

C. Similarly, mouseover the magenta circle. What is the RGB value for magenta? Which colors does magenta reflect? Which color does magenta absorb?

D. What is the RGB value for yellow? Which colors does yellow reflect? Which color does yellow absorb?

2. Drag the cyan circle onto the magenta circle.

A. What color do you get from combining cyan pigment and magenta pigment?

B. You should have seen that cyan and magenta pigment combine to make blue. What is the RGB value of blue?
C. Of the primary colors of light, which one does blue reflect? Which colors does blue absorb?

D. Explain the relationship between the colors that blue pigment absorbs and the colors that cyan and magenta pigments absorb.

3. Drag the cyan circle onto the yellow circle.
   A. What color do you get by combining cyan pigment and yellow pigment?
   B. What is the RGB value of the color created?
   C. What color does cyan absorb? What color does yellow absorb? What colors does green (the mixture of cyan and yellow) absorb?

4. Drag the magenta circle onto the yellow circle.
   A. What color do you get by combining magenta pigment and yellow pigment?
   B. What is the RGB value of the color created?
   C. What color does magenta absorb? What color does yellow absorb? What colors does red (the mixture of magenta and yellow) absorb?

5. Be sure that all three color sliders are still set to full strength (255). Then drag all three circles on top of each other.
   A. What color do you get from combining cyan pigment, magenta pigment, and yellow pigment?
   B. What is the RGB value of this color?
   C. What colors does black (the mixture of cyan, magenta, and yellow pigments) absorb?

Continued on next page
6. The color of light absorbed by a pigment is known as its complementary color.

A. What is the complementary color of cyan?

B. What is the complementary color of magenta?

C. What is the complementary color of yellow?

D. What color do you get if you combine cyan pigment with red pigment (its complementary color)? Explain why this is so.

E. What other pigment combinations do you think would create black? Explain why. Use the Gizmo to check your answer.

Now complete the on-line assessment questions. You must be logged in for your answers to be recorded.

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Relaunch the Gizmo to take the assessment. Record your answers (right or wrong) here:

Did you really complete this lab or is it just a pigment of your imagination?

--Mr. Baughman