Hit the Lights

Background:

You are in charge of the stage lighting for the school play. There are 8 different colored costumes worn by the actors. Determine how they would look when illuminated with different colored lights. Objects appear a certain color because they contain pigments that absorb some colors and reflect others. The kind of light that illuminates them also affects their color.

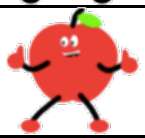
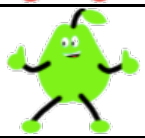
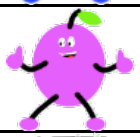
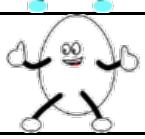
Getting Ready:

Navigate to the **Stage Lighting Interactive** at TPC (http://www.physicsclassroom.com).

Home Page ==> Physics Interactives ==> Light and Color ==> Stage Lighting

Tap **Launch Interactive**. Resize the Interactive as desired. Tap the various lights to change the light that shines on the actor. Tap the actor to change it to an actor with a different color. Explore the appearance of the actors under different color conditions. Record your observations in the table by indicating the color appearance; use color names or abbreviations (**W**, **ø**, **R**, **G**, **Y**, **B**, **M**, or **C**).

Data:

	Appearance of Actor Under Various Lighting Conditions							
Actor	**White R+G+B**	**Black ø**	**Red R**	**Green G**	**Yellow R+G**	**Blue B**	**Magenta R+B**	**Cyan B+G**
								
								
								
								
								
								
								
								

Analysis:

1. Based on your observations, what are the two factors that affect the color that objects appear?

   A. _____

   B. _____

2. Complete this paragraph:

   The additive primary colors of light are _____, _____, and _____. When these three primary colors of light are added together, , the result is _____ light. Mixing two primary colors of light in equal intensities produces a secondary light color. For instance, _____ light and _____ light add togher to produce yellow light. And _____ light and _____ light add togher to produce magenta light. Finally, _____ light and _____ light add togher to produce cyan light.

3. When white light shines on the yellow costume, the costume absorbs _____ light and reflects _____ and _____ light. The yellow costume would appear...

   a. ... red if illuminated with _____ light or with _____ light or with _____ light.

   b. ... green if illuminated with _____ light or with _____ light or with _____ light.

   c. ... black if illuminated with _____ light or with _____ light or with _____ light.

4. When white light shines on the cyan costume, the costume absorbs _____ light and reflects _____ and _____ light. The cyan costume would appear...

   a. ... blue if illuminated with _____ light or with _____ light or with _____ light.

   b. ... green if illuminated with _____ light or with _____ light or with _____ light.

   c. ... black if illuminated with _____ light or with _____ light or with _____ light.

5. When white light shines on the red costume, the costume absorbs _____ and _____ light and reflects _____ light. The red costume would also appear ...

   a. ... red if illuminated with _____ light or with _____ light or with _____ light.

   b. ... black if illuminated with _____ light or with _____ light or with _____ light.

6. Could a magenta object ever appear green? _____ Explain why or why not.

7. Name all the possible colors hat a magenta object could appear:

Credits:
This activity was inspired by Judy Kolb Rieke of Ursuline Academy in St. Louis. Thanks Judy!