ScienceCube

Object Color

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1. **Verify the color of the light reflected by objects of different colors and explain the object's color.**
2. **Verify the light transmitted through cellophane of various colors and explain the color of the cellophane.**

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Fundamental Concept

1. Opaque Objects

1) Characteristics: Seen in the color of the light they reflect.

2) Examples

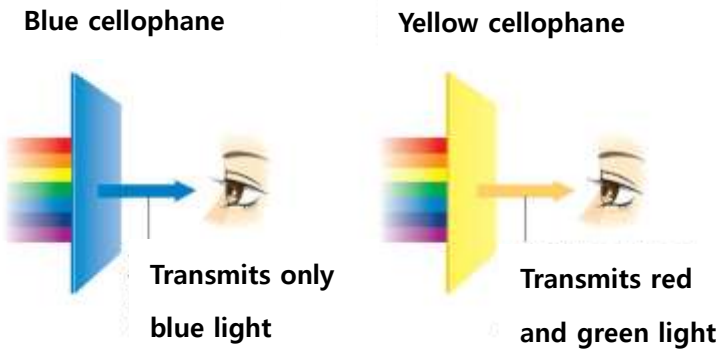
- Red rose: Reflects only red light and absorbs all other colors → appears red.
- Green leaf: Reflects only green light and absorbs all other colors → appears green.
- Yellow banana: Reflects red and green light and absorbs all other colors → appears yellow as a composite color.

2. Transparent Objects

1) Characteristics: Seen in the color of the light they transmit.

2) Examples

- Blue cellophane: Transmits only blue light and absorbs all other colors → appears blue.
- Yellow cellophane: Transmits red and green light and absorbs all other colors → appears yellow as a composite color.



Experiment

Materials Needed

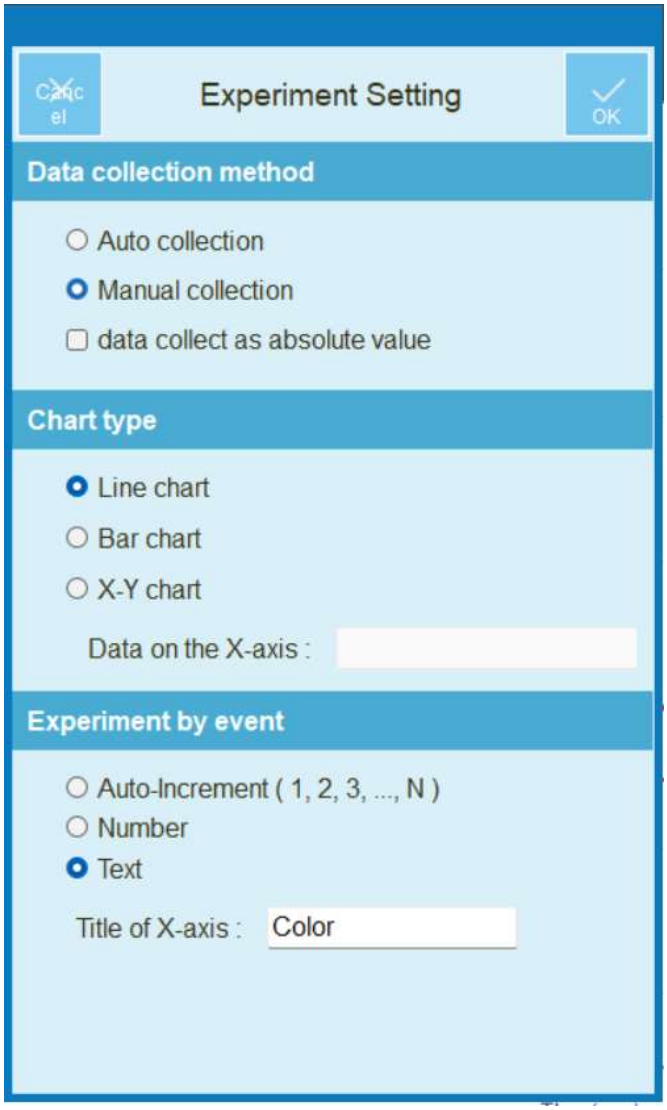
Smart Sensor Box, Science# program, incandescent lamp, cellophane (red, blue, green), PVC film (red, blue, green), A4 paper, box, clip, scissors

Preparing the Experiment Setup

1. Place a white A4 paper next to the stand and lay a piece of PVC film on top.
2. Place the box next to the film and invert the Smart Sensor Box on top of the box so that the light sensor faces the film.

Interface Setup

1.  Run the Science# program.
2. Connect the Smart Sensor Box to the Science# program.
3. Press the button  to set up the experimental environment as shown below, or press the button  to set it automatically.



4. 

Activate the light sensor in the program.

Data Collection

[Experiment 1] Color of Opaque Objects

1. Press the button  and then press the button  to collect the RGB data of the light reflected on the film, and enter the color of the film.
   Change the color of the PVC film and collect the RGB data of the light reflected on each film (be careful not to disturb other items while changing the film).

2. Press the button  to end the experiment..

[Experiment 2] Color of Transparent Objects

1. Place the light sensor under the stand light so that the light sensor faces the stand as shown in the picture.

2. Fold the cellophane in half and fix it with a clip to prevent it from fluttering

3. Place the cellophane on the light sensor and open a new chart.

4. Press the button  and then press the button  to collect the RGB data of the light transmitted through the cellophane, and enter the color of the cellophane.
5. Change the color of the cellophane and collect the RGB data of the light transmitted through each cellophane..
6. Press the button  to end the experiment.

Data Analysis

Recording Data

1. Compare the proportions of red, blue, and green light measured with different PVC film colors in a bar graph.

2. Compare the proportions of red, blue, and green light measured with different cellophane colors in a bar graph.

Data Application

1. Explain the color of the light reflected by the PVC film based on its color.

2. Explain the relationship between the color of the cellophane and the primary color of the

light transmitted through it.

3. Summarize the principle of how the color of opaque and transparent objects is perceived. Fill in the blanks with appropriate words.

The color of an opaque object is seen by the light that is ( ) by the object entering our eyes, and the color of a transparent object is seen by the light that ( ) through the object entering our eyes.