Transparency vs Opacity

Interrogation rooms, where police question prime suspects in criminal cases, have a unique structure. A small room contains only a dim light, a table, and a chair. One of the four walls has a special type of glass that is transparent from the outside but opaque from the inside, allowing people outside to see in while those inside cannot see out.

Sometimes, surprising and unconventional things happen that challenge our common sense. One such example is the transparent restroom. You might wonder how someone could use such a facility. However, once someone starts using the restroom, the walls become opaque, preventing anyone from seeing inside..

Generally, we think of glass as a transparent material, but it can now change from transparent to opaque under various conditions. Let's imagine how glass might evolve in the future and how it could transform our daily lives..

WHAT?

- **Identify and compare the characteristics of transparent and opaque materials.**
- **Investigate the light transmittance of materials and classify them as transparent or opaque.**

HOW?

Materials

Interface (Smart Sensor Box), Science# application, Flashlight (or smartphone), Transparent materials (glass, acrylic plate, OHP film), Translucent materials (disposable container lid or dish), Opaque materials (paper), Colored transparent materials (sunglasses), 30 cm ruler, Stand

Experimental Procedure

1. Find and list various objects in daily life that correspond to transparent, translucent, and opaque materials..

Category	variety
Transparent	
Opaque	
Translucent	

2. Observe the characteristics of transparent, translucent, and opaque materials and note them..

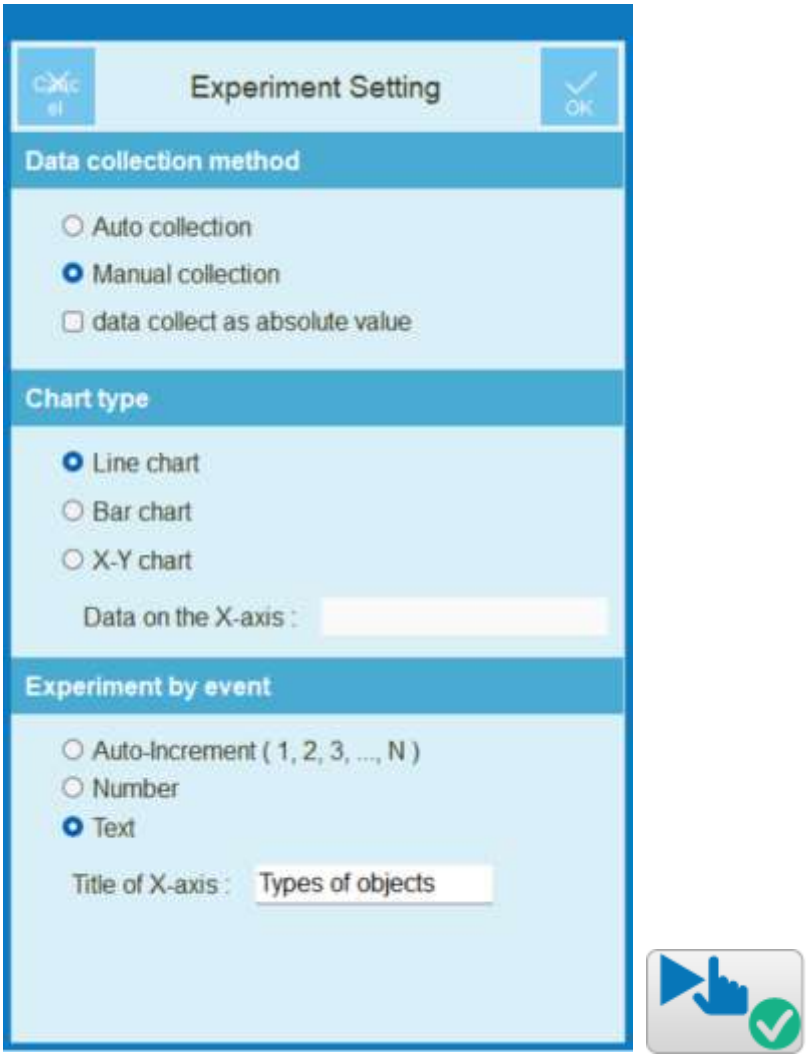
Category	Characteristics
Transparent	
Opaque	
Translucent	

3. Turn on the Smart Sensor Box and connect it to the Science# application on a tablet or the Science# (for Windows) program on a computer.

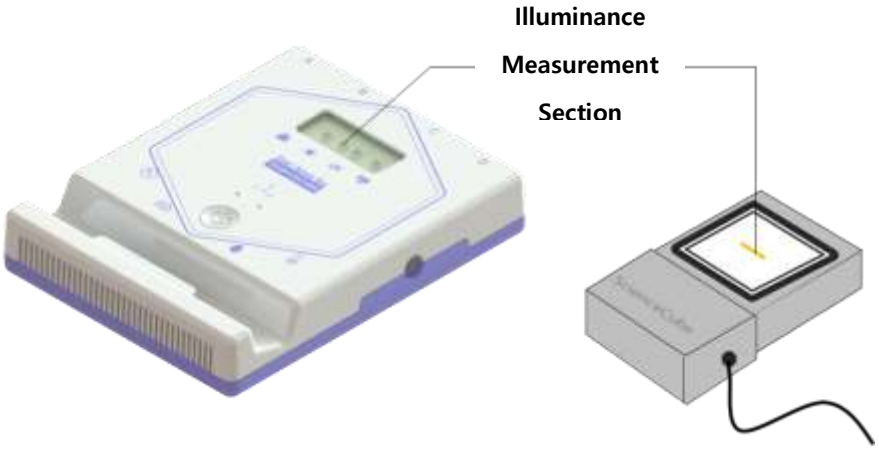
4. 

Select the illuminance sensor from the built-in sensor list.

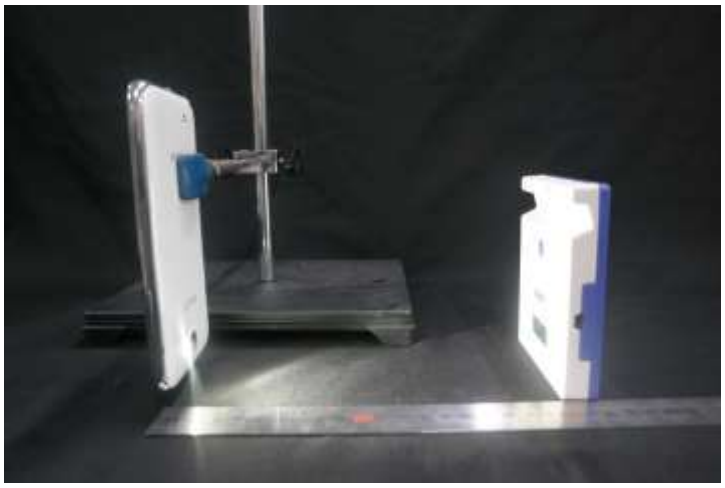
5. In the content window, find <Transparency vs Opacity> and press  to set the appropriate experimental environment.



6. Set up the Sensor Box and use the stand to fix the flashlight at a height aligned with the illuminance sensor.



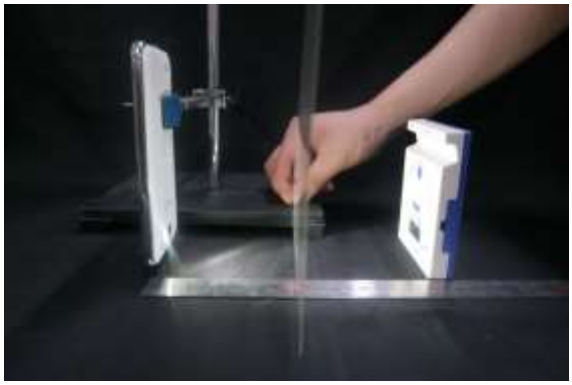
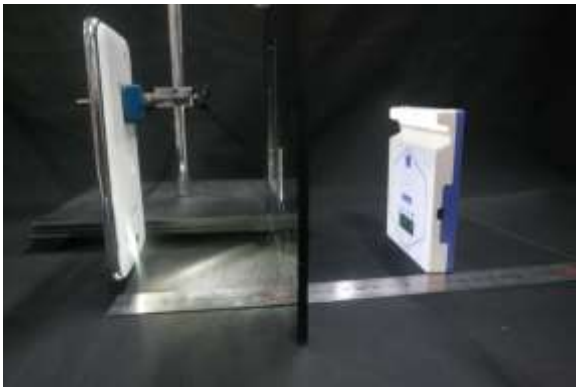
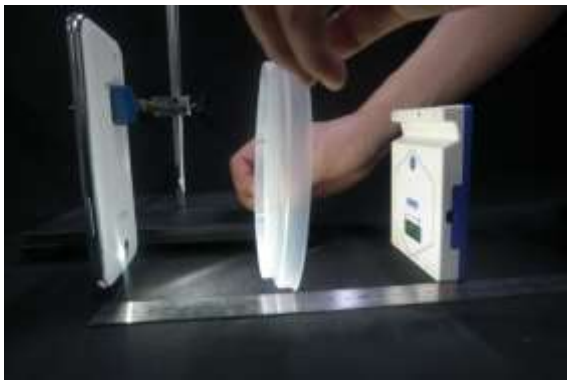
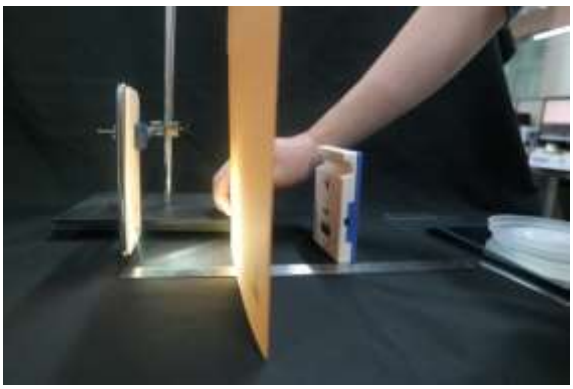
7. Place a ruler on the floor and fix the distance from the flashlight to the illuminance sensor at 20 cm.



8. Turn on the flashlight, press , and measure and record the illuminance of the flashlight.

9. Place the object to be tested at the 20 cm mark on the ruler, press , and measure and record the illuminance transmitted through the object.

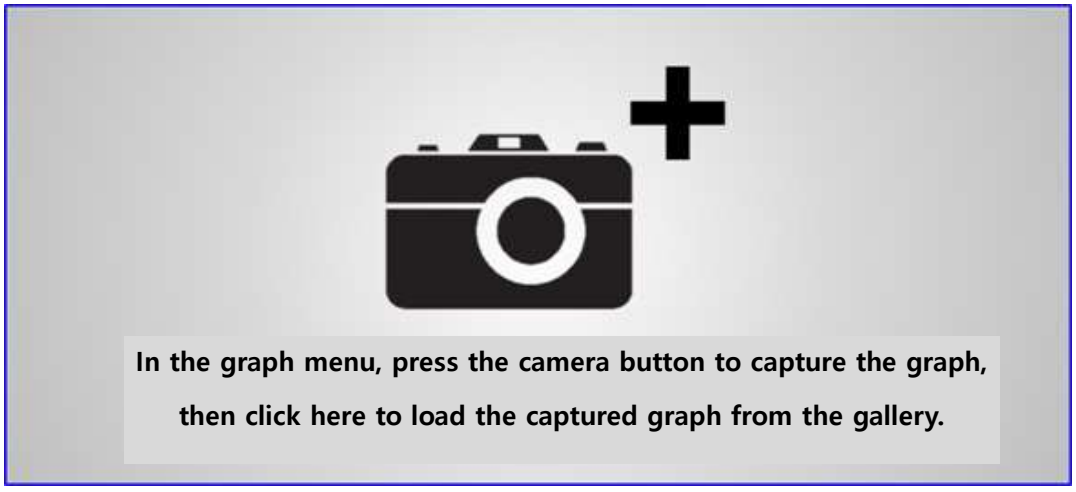
10. Repeat the above steps for other objects.

11.  Press to end the experiment..

Results

1. Measure and compare the illuminance transmitted through various materials using a bar graph.



2. Record the illuminance transmitted through each material in the following table.

Object	Transmitted Illuminance (lux)
Flashlight	
A. OHP Film	
B. Translucent Container Lid	
C. Dark Colored Acrylic	
D. Paper	

WHY?

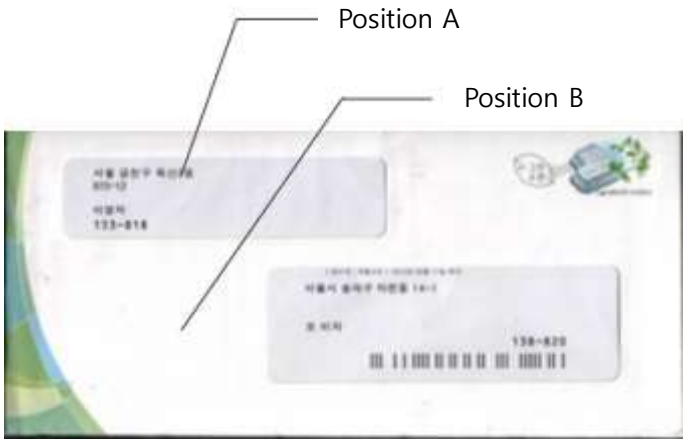
1. Compare Transparent, Opaque, and Translucent Materials Based on Measured Light Transmittance.

2. Everyday Uses of Transparent and Opaque Materials.

Category	Everyday Examples
Transparent	
Opaque	

3. Explain the Use of Transparent and Opaque Materials in the Following Diagram.

Category	Reason
Position A	
Position B	



Think about

Consider the difference in shadows created by transparent and opaque materials.

Learning By Doing

Blocking Light in Daily Life

	
Using a parasol to prevent sunburn on the face..	Covering ginseng with black plastic to protect it from excessive sunlight.
	
Using blackout curtains to darken a room by blocking external light..	Closing blinds to prevent the room from heating up due to sunlight.

Methods to Block Light

1) Completely blocking light: thick blackout curtains, hats, etc.

2) Partially blocking light: sunglasses, amber glass bottles, etc.

The Relationship Between Light and Our Lives

Stadium lighting: Allows us to see objects clearly..	Sun-dried clothes: sunlight helps kill germs.
	
Photosynthesis in plants: Enables plants to produce nutrients.	Solar-powered cars: Use sunlight to generate electricity..