ScienceCube

The Path of Light

Learning Objectives

Create a device to observe the path of light and explain how light travels.

Should I think about it?

How does light travel?

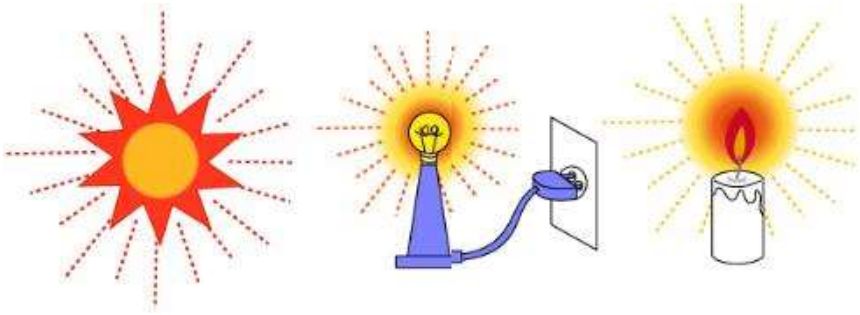
Learning Content

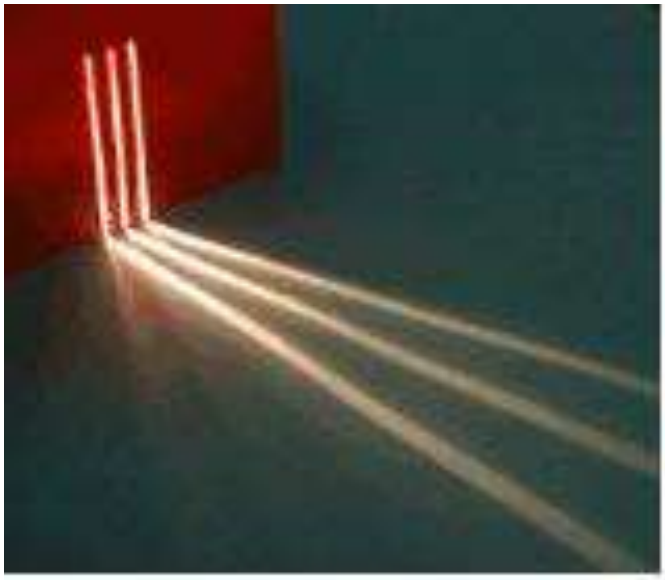
1. Rectilinear Propagation of Light

An object that emits light on its own is called a light source. Examples include the sun, light bulbs, and candles.

Light from a light source spreads in all possible directions in a three-dimensional space. The most basic property of light is that it travels in a straight line.

The path of light is always straight, and it cannot travel in curves.



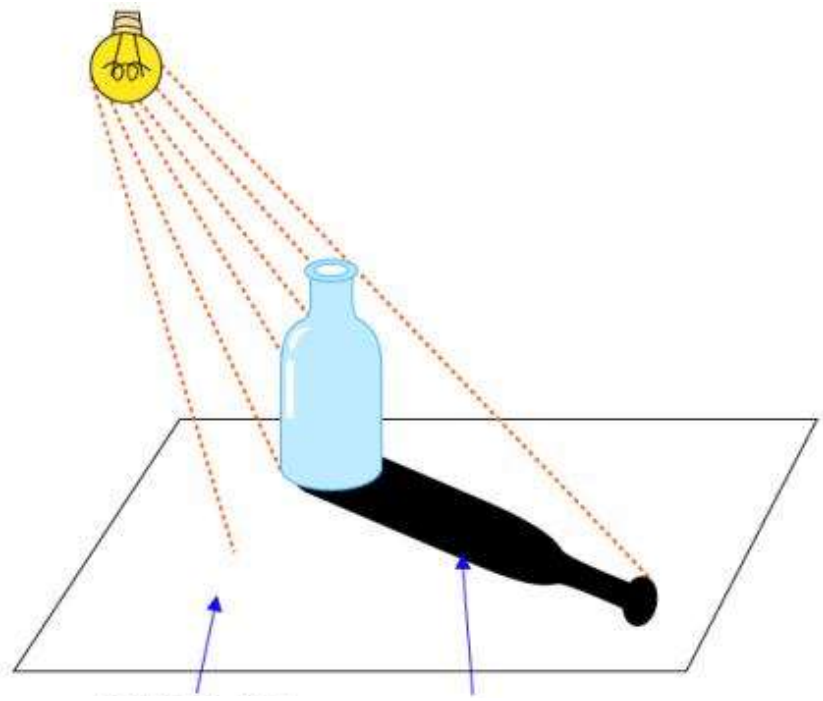


2. Shadows

When light traveling in a straight line from a light source encounters an opaque object, it cannot pass through.

As a result, an area where light cannot reach forms behind the object, creating a dark spot. This dark area is called a shadow.

Due to the rectilinear propagation of light, shadows take on the shape of the object blocking the light.



The part where light reaches **The part where light does not reach (shadow)**

Experimental Activities

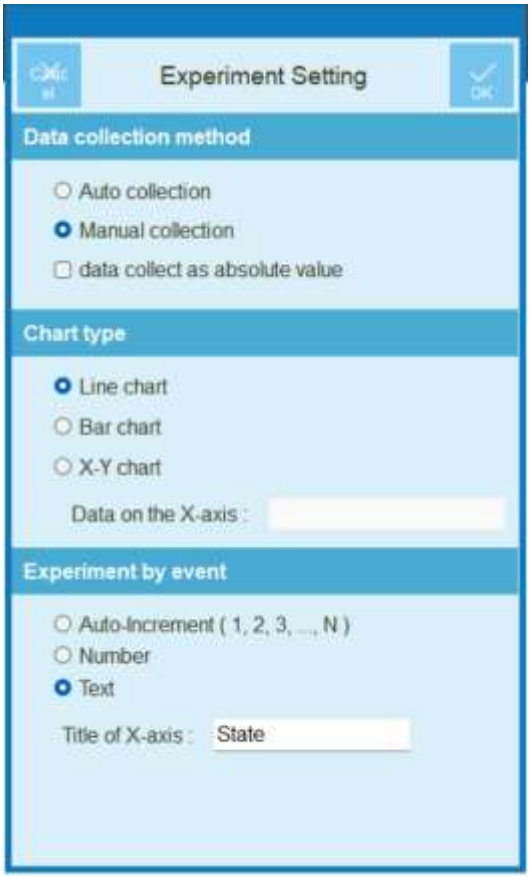
Materials Needed

Interface, Science# program (smart device), Light sensor, Flashlight, Black colored paper, Cellophane tape, Black foam board, Cutter, Ruler, Double-sided tape, Box (for height adjustment)

Experiment Procedure

Setting Up the Equipment

1. Run the Science# program on the smart device and connect it to the powered-on interface via Bluetooth or cable.
2. Connect the light sensor to the interface.
3. Press  in Science# to set up the experimental environment as shown below (the setup will be automatic when you press the button).

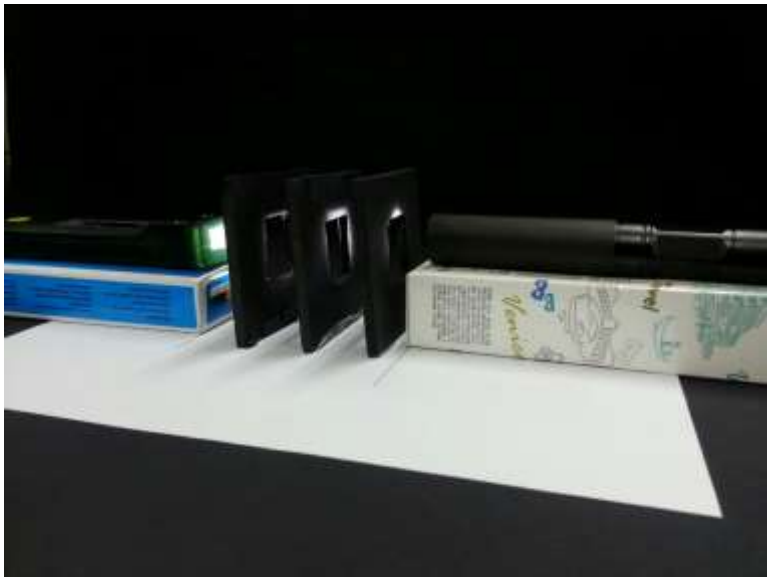


[Conducting the Experiment]

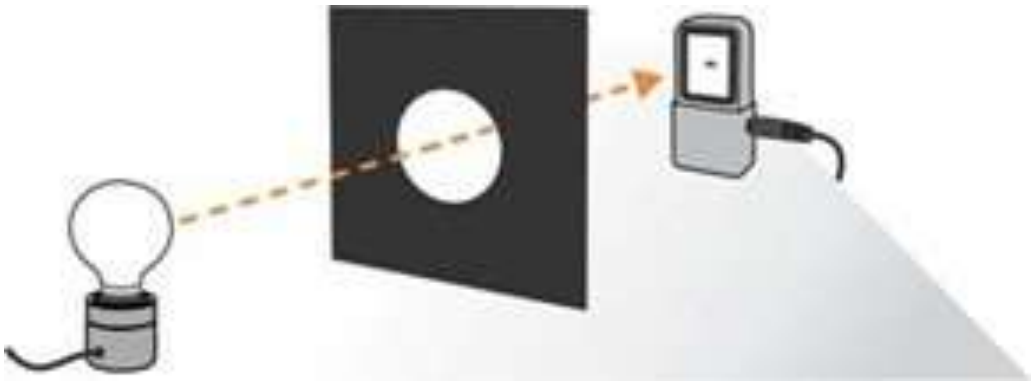
1. Cut three 10 cm x 10 cm squares of foam board and stack them together.
2. Cut a square hole of the same size in the center of the stacked foam boards.
3. Apply double-sided tape to one side of the foam boards to prevent them from falling over when stood upright.
4. Wrap the flashlight bulb with black colored paper to prevent light from spreading due to the flashlight's reflector.

5. Position the flashlight and sensor 20 cm apart, placing the three foam boards between them at 5 cm intervals.

6. Turn on the flashlight and adjust the height so that the center of the bulb aligns with the center of the sensor.



*** SMBL Experiment**



7. Press the button  to measure the amount of light passing through the three holes and record '3 holes' in the text input box.

8. Remove one foam board at a time and measure the amount of light, recording the number of remaining foam boards (e.g., 2, 1, 0).

9. Press the button  to end the experiment..

10. Scatter the aligned foam boards and press the button  to measure and record the amount of light (e.g., scattered arrangement).

11. Press the button  to end the experiment.

Experimental contents

1. Measure and compare the amount of light with different numbers of foam boards and with scattered arrangements using a bar graph.

[Amount of Light with Different Numbers of Foam Boards]

[Amount of Light with Scattered Arrangements]

Experimental results

1. Write down what you can deduce from the experimental results.

2. Predict what changes would occur if an object is placed in the path of the light.