Propagation of Light

Solution 1.a:

An object casts a shadow on a screen when an opaque object is placed between the object and a source of light. The opaque object does not allow the light to reach the screen, and hence, a shadow is formed.

Solution 1.b:

Light travels in a straight line and is called linear propagation of light. If any object is placed between the path of light, it casts a shadow. Thus, the formation of shadows takes place because of the linear propagation of light.

Solution 1.c:

The umbra and penumbra are formed with an extended source of light. The darker shadow is called umbra, and the fainter shadow is called penumbra.



Suppose MN (a torch of light) is an extended source of light and PQ is a ball (an opaque object) placed in front of it which blocks the light rays falling on the screen. Two types of shadows are formed on the screen – AD and BC. AD is a dark circular shadow surrounded by a fainter and a bigger region, BC. Hence, AD is the umbra and BC is the penumbra.

Solution 1.d:

A solar eclipse takes place when the Moon comes between the Sun and the Earth, and all three are in a straight line. This makes the shadow of the Moon fall on the Earth. A solar eclipse occurs on a New Moon day.

Solution 2.a:

The Sun, the Earth and the Moon must be in a straight line during their revolutions for an eclipse to occur because of the property of light called linear propagation.

Solution 2.b:

Two types of shadows are formed with an extended source of light, umbra and penumbra. The penumbra is faint because this region gets some light from some parts of the extended source of light.

Solution 2.c:

The Sun is an extended source of light and the Earth acts as a screen on which a shadow is formed. As the distance between the Earth and fast-moving objects like an aeroplane and a bird increases, the umbra becomes smaller and smaller till it completely disappears. Thus, an aeroplane or a bird does not cast a shadow when they are very high above the Earth.

Solution 2.d:

In the pinhole camera, the light enters through a very fine hole and is propagated in a straight line. An inverted image is formed in a pinhole camera because the light rays coming from the top and bottom of the object intersect at the pinhole. Thus, we get an upside down image in a pinhole camera because of the linear propagation of light through the hole of the pinhole camera.

Solution 3:

Group 'A'	Group 'B'
(a) Lunar eclipse	Full Moon day
(b) White	Prism
(c) Umbra	Deep
(d) Penumbra	Faint

Solution 4:

- 1. As sunlight passes through a prism, it gets divided into **seven** colours of which the **red** colour is at the top.
- 2. **Sunlight** is necessary for the growth of plants.
- 3. The path of light is linear.
- 4. A rainbow appears on the opposite of the **Sun**.