Effects of Light

EXERCISE [PAGE 117]

Exercise | Q 1.1 | Page 117

Fill in the blanks:

When the beams from the headlights of a car fall on an object in the night, the shadows called _____ and _____ can be seen.

Solution: When the beams from the headlights of a car fall on an object in the night, the shadows called **umbra** and **penumbra** can be seen.

Exercise | Q 1.2 | Page 117

Fill in the blanks:

During a lunar eclipse, the shadow of the _____falls on the _____

Solution: During a lunar eclipse, the shadow of the **Earth** falls on the **Moon**.

Exercise | Q 1.3 | Page 117

Fill in the blanks:

During a solar eclipse, the shadow of the _____ falls on the _____

Solution: During a solar eclipse, the shadow of the **Moon** falls on the **Earth**.

Exercise | Q 1.4 | Page 117

Fill in the blank:

Various shades of colour are seen in the sky at sunrise and sunset due to_____

Solution: Various shades of colour are seen in the sky at sunrise and sunset due to the **scattering of sunlight**.

Exercise | Q 2.1 | Page 117

Give reasons:

Space beyond the earth's atmosphere appears dark.

Solution: When sunlight is scattered by the particles present in the atmosphere, the surrounding gets illuminated and appears bright. In space, there is no atmosphere i.e.

no source for scattering the sunlight. Thus, as sunlight is not scattered in different directions in the space, it appears dark.

Exercise | Q 2.2 | Page 117

Give reasons:

We are able to read while sitting in the shade.

Solution: Light, which is required for seeing and reading, will reach us even when we are sitting under the shade. This light comes to us upon reflecting on various objects around us.

Exercise | Q 2.3 | Page 117

Give reasons:

We should not observe the solar eclipse with naked eyes.

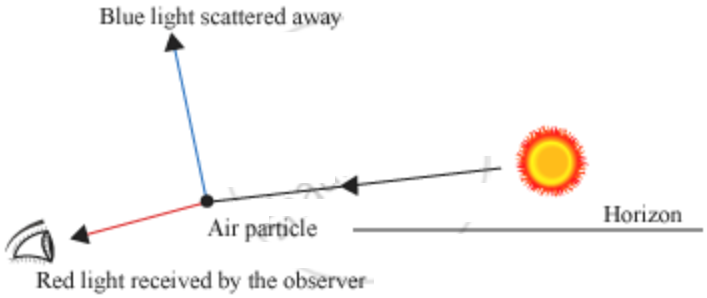
Solution: We should not observe a solar eclipse with naked eyes because by doing so we might damage our eyesight. We may suffer from permanent vision impairment or serious eye injuries. Thus, we should always use some device such as binoculars while watching the sun during a solar eclipse.

Exercise | Q 3 | Page 117

Give some examples of scattering of light that we come across in day-to-day life.

Solution: Some example of scattering of light that we come across in day-to-day life are:

- **The blue colour of the sky:** Out of the seven components present in sunlight, the blue colour is scattered the most by the particles present in the atmosphere and hence, the sky appears blue.
- **The reddish colour of the sun during sunrise and sunset:** At sunrise or sunset, the sun is located near the horizon of the Earth. Hence, light has to travel a long distance through the Earth's atmosphere. At the time of sunrise or sunset, when white sunlight falls on suspended atmospheric particles, blue colour light scatters out in deep space, while red colour light scatters less, and reaches the observer on the surface of the Earth. Hence, when this less scattered red light reaches our eyes, the sun and its surroundings appear to be reddish.

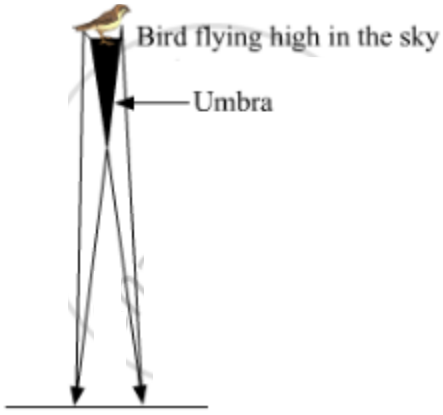


- **Danger signals in red colour:** Red colour is scattered least by the atmospheric particles and it can travel long distance as compared to other colours. Thus, it alarms a person of the potential danger from a far distance.

Exercise | Q 4 | Page 117

Why is the shadow of a bird flying high not seen on the earth?

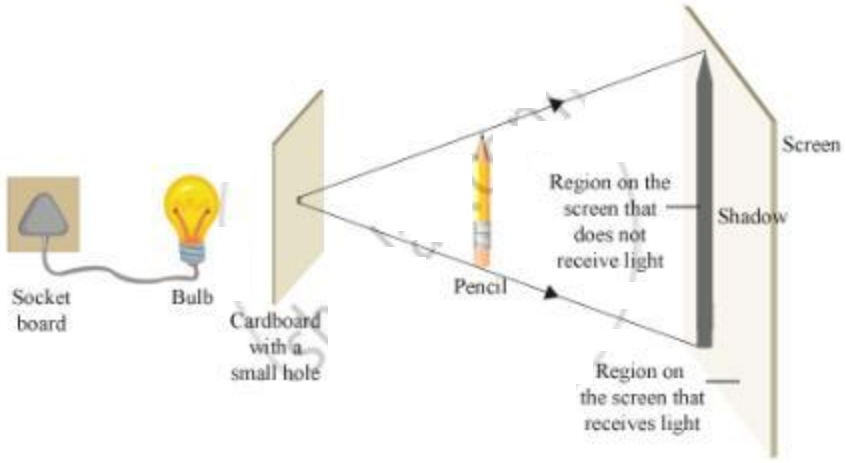
Solution: When a bird flies high up in the sky, the darkest part of its shadow, called the umbra, does not reach the Earth. Hence, the shadow of a bird flying high is not seen on the Earth.



Exercise | Q 5 | Page 117

Why is a penumbra not obtained from a point source?

Solution: We do not obtain penumbra from a point source because all the light rays falling on the shadowing object are completely blocked by it. This is illustrated in the figure below.



Exercise | Q 6.1 | Page 117

Answer the following question in your own words:

What is meant by the scattering of light?

Solution: The ability of light to spread in various directions is known as the scattering of light.

Exercise | Q 6.2 | Page 117

Answer the following question in your own words:

Does the shadow really vanish in the zero shadow condition?

Solution: In the zero shadow condition, the shadow does not really vanish. In fact, it is formed just beneath the object because of which we are not able to see it.

Exercise | Q 6.3 | Page 117

Answer the following question in your own words:

Will the laser beam be seen if it passes through a glass box which contains a lighted incense stick?

Solution: Yes, the laser beam will be seen if it passes through a glass box which contains a lighted incense stick. This is because the laser beam will be scattered by the smoke particles formed in the glass box due to the burning of incense sticks. Due to this scattering, the path of the laser beam will become visible.

Exercise | Q 7.1 | Page 117

Discuss and write:

Write a science-based paragraph on 'What if the sun did not rise?'

Solution: If the Sun did not rise, the Earth will not get illuminated. Due to this, we won't be able to see objects around us if any other temporary source of light is not used. Also, we know, Sun is the main source of energy for all living beings. So, plants won't be able to prepare their food because of the absence of sunlight and soon they will die. This will create an imbalance in the food chain which in turn will result in the destruction of all kinds of organisms on Earth. Also, all the production of electrical energy will get terminated because of the absence of this solar energy. Thus, it is true today that Sun is the main source of our survival.

Exercise | Q 7.2 | Page 117

Discuss and write:

What efforts will you make to remove the misconceptions about eclipses?

Solution: To remove the misconceptions about eclipses, such as we should not eat during eclipses, etc., following efforts can be made:

- Social media such as Newspapers, T.V., radio, etc. should launch some programmes and debates discussing the myths existing related to eclipses. These mediums should highlight the superstitious talks prevailing from the past and how we can remove this. These mediums should discuss why science does not support these misconceptions.
- At the school level, a discussion should be held in classrooms regarding these misconceptions. They should be asked whether they have seen such thing existing in their home. If yes, they should be taught how to change the mindset of their parents and grandparents to eradicate these misconceptions.

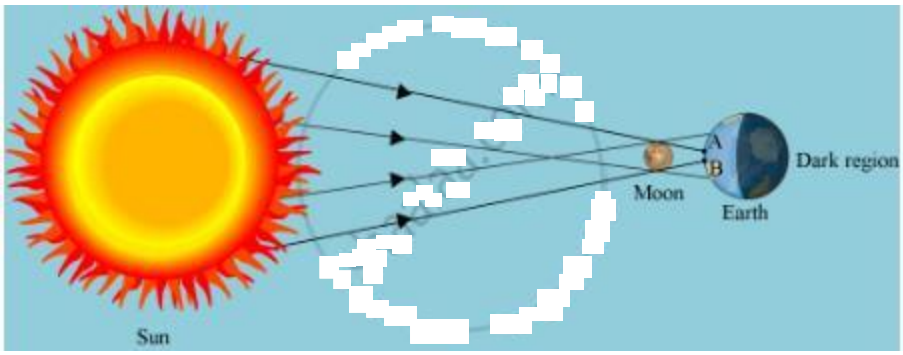
Exercise | Q 7.3 | Page 117

Discuss and write:

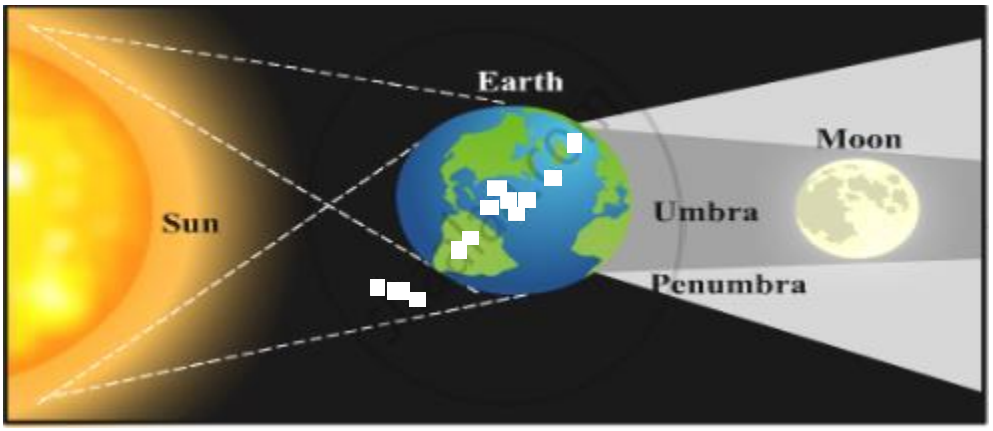
Various eclipses and the conditions during the period.

Solution: There are two types of eclipses known as

- **Solar eclipse:** It occurs when the Moon comes in between the Earth and the Sun and the Moon's shadow falls on the Earth. The solar eclipse occurs only on the new moon day. Two types of solar eclipse are:
  Total Solar eclipse: When the solar disc is completely covered by the Moon.
  Partial Solar eclipse: When the solar disc is partially covered by the Moon.



- **Lunar eclipse:** It occurs when the Earth comes in between the Moon and the Sun and the Earth's shadow falls on the Moon. The lunar eclipse occurs on the full moon night. Two types of lunar eclipse are:
  Total lunar eclipse: When the total Moon comes under the shadow of the Earth.
  Partial lunar eclipse: When the partial Moon or some part of the Moon comes under the shadow of the Earth.



Exercise | Q 8.1 | Page 117

Explain the difference:

Point sources and extended sources of light.

Solution:

Point Source of Light	Extended Source of light
It is that source of light which forms only the umbra region on the screen of the shadowed object.	It is that source of light that forms umbra as well as the penumbra region on the screen of the shadowed object.
eg: A pinhole through which sunlight is entering is a point source of light	eg: Sun is an extended source of light

Exercise | Q 8.2 | Page 117

Explain the difference:

Umbra and penumbra.

Solution:

Umbra	**Penumbra**
It is the part of the shadow where all of the light from the source is blocked by the shadowing object.	It is the region around the umbra where the light from the source is partially blocked by the shadowing object.
It is formed using an extended source of light.	It is formed using a point source of light.