17. Effects of Light

1. Fill in the blanks.

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

Ans : Umbra, Penumbra

(2) During a lunar eclipse the shadow of the..... falls on the..... .

Ans : Earth, Moon

(3) During a solar eclipse the shadow of the..... falls on the..... .

Ans : Moon, Earth

(4) Various shades of colour are seen in the sky at sunrise and sunset due to..... .

Ans : Scattering of light

(5) As seen from the earth, when a planet or a star passes behind the moon, that state is called a ..... .

Ans : Occultation

(6) The day on which the sun reaches exactly overhead is called the ..... .

Ans : Zero shadow day.

2. Give reasons.

(a) Space beyond the earth's atmosphere appears dark.

Ans : There is a vacuum beyond earth's atmosphere, due to that there is no medium for scattering of sunlight. So, space appears dark.

(b)We are able to read while sitting in the shade.

Ans : The sun is an extended source of light which is far away from the earth. The sunlight casts a shadow of the object, in its path, on the earth. This shadow has no umbra, but penumbra which is nothing but the shade. There is a sufficient amount of light available to read in the shade. Hence, we are able to read while sitting in the shade.

(c) We should not observe the solar eclipse with naked eyes.

Ans :The earth receives the harmful ultra-violet rays from the sun. During a solar eclipse, even if brightness of the sun is less, the ultra-violet rays directly enter our eyes and damage vision. Hence, the solar eclipse should not be observed with naked eyes.

3. Give some example of scattering of light that we come across in day to day life.

Ans :(1) A beam of light emerging from head lamps of a car moving through a thick fog. (2) A beam of light emerging from a cinema projector on a screen. (3) The sky appears blue. (4) The sun appears red at sunset.

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

Ans : The sun is an extended source of light which is extremely bigger than the earth. When a bird flies there is a formation of umbra and penumbra on the ground. But, as they fly high in the sky, their umbra becomes smaller and smaller and at a certain point it disappears. At the same time, their penumbra becomes bigger and bigger fainter and then disappears. As a result, the shadow of the flying high is not seen on the earth.

5. Why is a penumbra not obtained from a point source ?

Ans : Scattering of light emerging from a point source does not occur place. So, only dark shadow of the object placed in front of the point source is obtained.

6. Answer the following question in your own words.

(a) What is meant by scattering of light ?

Ans :The light rays hit the molecules, dust particles and other tiny particles present in the atmosphere and get scattered. This phenomenon is called scattering of light. When the scattered light rays enter our eyes, we perceive the light.reddish appearance of sun, A beam of light, blue sky, are all effects of scattering of light.

(b) Does the shadow really vanish in the zero shadow conditon ?

Ans : On the zero shadow day, at moon, the sun reaches exactly overhead. Thus , the shadow of our body in a standing position is formed right below the base of our feet. The shadow so formed is not seen and hence appears to be vanished.

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

Ans : Scattering of light is required for a ray of light to be visible. For this, the light rays should get scattered on hitting the tiny particles in its path. There are tiny particles of the incense stick scattered in the closed glass box, due to this the laser rays get scattered. These scattered rays enter our eyes and the laser beam is seen.

7. Discuss and write.

(a) Write a science based paragraph on 'what if the sun did not rise?'

Ans : If the earth stops revolving, The part of the earth opposite to the would never face the sun. Thus the sun would never rise at the part.

Following are its effects / consequences :

(1) The part of the earth opposite to the sun would not receive sunlight. That part would always experience darkness. Artificial sources of light would have to be used continuously. For which, a large amount of electricity would need to be generated.

(2) The phenomena like solar eclipse, zero shadow, spectrum, various, sheds of color in the sky would not be seen.

(3) Temperature of that part of the earth would decrease extremely. Water present in the liquid state on the earth would freeze completely. This would prove to be unfavorable for the living world.

(4) The process of photosynthesis in the plants would not take place in the absence of sunlight. This would adversely affect plant's growth. Animals that feed on plants would become

endangered. As a result, carnivorous animals that survive on these animals would become extinct.

(5) Water from the oceans would not undergo the process of evaporation, due to which there would be no rainfall. As a result, the amount of fresh water available on the earth would not increase. This would cause deficiency of water required for body.

(6) Use of solar energy would not be possible.

(7) Temperature of the part of earth facing the sun, would increase tremendously. This would lead to faster evaporation of water and there would be no rainfall. As a result, plant as well as animal life would come to an end.

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

Ans : We will make people understand and accept the fact that an eclipse is a natural phenomenon like rain, spectrum, seasons. For which, we will take following steps :

(1) We will provide the scientific information about eclipses through various media.

(2) If an eclipse is going to take place in the near future , we will create awareness about it through advertisements.

(3) We will give the experience of viewing an eclipse through special goggles and telescopes.

(4) We will arrange a tour to observe an eclipse taking place in the region far away from us.

(5) We will show people how an eclipse takes place by making models of the sun, the moon and the earth.

(6) We will convince people that the intake of food during the period of eclipse does not cause any ill effect on health.

(c) Various eclipses and the conditions during that period.

Ans : (1) A solar eclipse : The moon comes between the sun and the earth in a straight line. Thus, the shadow of the moon falls/ casts on the earth.

A total solar eclipse - (i) It is visible from within the part of the earth where the umbra of the moon falls. (ii) The solar disc is completely covered by the moon. (iii) Darkness spreads on the part of the earth where the shadow of the moon falls.

A partial solar eclipse - (i) It is visible from within the part of the earth where the penumbra of the moon falls. (ii) The moon does not cover the solar disc completely.

An annular solar eclipse - (i) It is seen/visible from the part of the earth where a very small portion of the umbra of the moon falls. (ii) It is seen that the pat of solar disc, except the peripheral ring, is completely covered by the moon.(iii) The edge of solar disc appears like an illuminated ring.

(2) A lunar eclipse : The earth comes between the sun and the moon in a straight line. Thus, the shadow of the earth falls/casts on the moon.

A total lunar eclipse - At this event, the moon completely comes in the shadow of the earth.

A partial lunar eclipse - At this event, a part of the moon comes in the shadow of the earth.

8. Explain the difference :

(a) Point sources and extended sources of light.

Ans :

Point sources	extended sources of light.
1. A point source in very small size.	1. An extended source of light is bigger in size
2. The umbra is obtained from this source of light.	2. The umbra and penumbra are both obtained from this source of light.
3. Example : Light coming from a tiny hole.	3. Example : The sun, a torch

(b) Umbra and penumbra.

Ans:

Umbra	penumbra
1. The darker part shadow is known as the umbra.	1. The fainter part of shadow is known as the penumbra.
2. The umbra is obtained from a point source as well as an expended source of light.	2. The penumbra is obtained only from an extended source of light.
3. A total eclipse takes place from the part of umbra.	3. A partial eclipse takes place from the of penumbra.

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