

## ANSWERS TO TEXTBOOK QUESTIONS

### Objective Questions

### Science Mission cl 8 Chp16 Light Solution

#### A. Multiple choice questions.

- |       |      |      |      |       |
|-------|------|------|------|-------|
| 1. a  | 2. c | 3. a | 4. b | 5. c  |
| 6. b  | 7. c | 8. c | 9. a | 10. d |
| 11. c |      |      |      |       |

#### B. State whether true or false.

- |          |         |          |          |         |
|----------|---------|----------|----------|---------|
| 1. False | 2. True | 3. True  | 4. False | 5. True |
| 6. True  | 7. True | 8. False |          |         |

#### C. Given one word answers.

- |            |              |          |                 |               |
|------------|--------------|----------|-----------------|---------------|
| 1. Mirror  | 2. Diffusion | 3. Laser | 4. Dispersion   | 5. Iris       |
| 6. Ciliary | 7. Rods      | 8. Cones | 9. Kaleidoscope | 10. Incidence |

### Theoretical Questions

#### A. Short answer type questions.

1. The ray of light which strikes the reflecting surface (mirror) is called incident ray.
2. The ray of light which bounces back from the reflecting surface (mirror) on reflection is called reflected ray.
3. Imaginary vertical line drawn at  $90^\circ$  to the surface of the mirror from the point of incidence is called normal.
4. Light rays passing through the focus of a concave mirror can make a parallel beam of light.
5. The objects which do not emit light are called non-luminous objects. Non-luminous objects are seen only when light falls upon them.
6. Reflection of light from a highly smooth surface (such as a mirror) is regular reflection, where a beam of light is reflected as a beam and the angle of incidence of each ray is equal to the angle of reflection of that ray.
7. The arrangement of these seven colours in a rainbow is in a particular sequence. Starting from violet, it includes indigo, blue, green, yellow, orange and red. In short, we name these seven colours as 'VIBGYOR'. Violet is towards the inner side and red is towards the outer side of the rainbow.
8. Newton's disc is coloured with seven colours in the same sequence as rainbow. The disc is rotated fast. These colours get mixed up to turn the rotating disc appear white.
9. This is called lateral inversion of the image in a plane mirror. While facing the mirror your right side in the image is seen as the left side and the left side as the right side.
10. Reflected light from a rough surface gets scattered in different directions and so they get intermixed before they reach our eyes. This is called diffusion of light or the scattering of light. Diffused reflection does not give image formation.
11. Light reaching inside the room from light outside during the day is the scattered light.

#### B. Long answer type questions.

1. Rebounding of light from a surface is called reflection of light. All surfaces reflect light from their surface which makes them visible. Reflection of light from a highly smooth surface (such as mirror) is a regular reflection and reflection of light from a rough surface is irregular reflection. Mirror is a smooth sheet of glass coated with a silvery material covered with on one side. This coated surface is not the reflecting surface. The opposite side of the coated glass sheet is the reflecting surface.
2. All surfaces reflect light which makes them visible. You can see your image in a plane mirror or in still clean water but not on a wall, cardboard or a curtain.

3. Reflection of light from a rough surface is irregular reflection. The rays of light falling on a rough surface (such as a wall) is reflected in different directions, depending upon the angle at which they strike the surface. Light falling on a rough surface, thus, gets scattered in all directions. This is called diffusion of light or the scattering of light. Diffused reflection does not give image formation. It is the scattering of light that brightens all places which are not facing the source of light, including the corners. Light reaching inside the room from light outside during the day is the scattered light.

4. Human eyes are a pair of bulging globular organs fixed in sockets on front of the face. Refer fig. 16.11 of the textbook.

Parts of the eye (from exterior to interior) and their functions are given below.

Sclera made from fibres is the outer tough white covering of the eye ball to protect the eye from any kind of damage. It is transparent in front forming cornea.

Cornea is the transparent front bulging part of the eye. It is the window to the eye.

Iris is the dark coloured circular part in front central part of the eye. Iris may be black, brown, grey or blue. Iris has a hole at the centre termed as pupil. Iris automatically adjusts the size of the pupil to regulate the amount of light entering the eye.

Eye lens is a transparent muscular convex lens with adjustable thickness. It is placed behind the pupil. It is a flexible transparent living structure.

Ciliary muscles hold the eye-lens in position and help in flattening of the lens to view distant objects and in thickening of the lens to view nearby objects. Function of the ciliary muscles is to manage the focal length of the lens as per need.

Retina is the screen in line with the pupil and the lens, at the back inner part of the eye to receive the real, diminished and inverted image of the objects which comes in front of the eye. Retina is the sensitive 'nerve screen' which senses the picture (image) and converts it into nerve impulse. Retina is linked with the nerve endings leading to the optic nerve.

The retina has a large number of light-sensitive nerve cells of two kinds:

- (i) Rods are sensitive to poor or dim light and sense the image as black and white.
- (ii) Cones are sensitive to colour and are helpful in coloured vision. Cones are effective in the presence of light. In dark cones may not be able to distinguish between colours and may visualize all objects as black and white. Some people cannot distinguish between colours even in the presence of light. This is known as 'colour blindness'. Colour blindness is due to the absence of conical nerve endings on retina.

Optic nerve is extended nerve cells from retina to a bundle of nerves running from the eye to the brain. Image formed on retina is inverted and reduced in size and is transmitted to the brain as such but we view upright and image of normal size because the impulse of the image from retina carried to the brain by the optic nerve is re-inverted and enlarged to normal size when received by the brain.

Blind spot is a small area (spot) on retina at the junction of the retina and the optic nerve and is without any nerve endings (rods or cones), hence it does not sense any image.

Aqueous humour is the transparent saline water filling the space between the cornea and the lens.

Vitreous humour or vitreous gel is the transparent gel filling the space between the lens and the retina.

- 5 & 6. This is a common experience while you visit a hair dresser. After your hair cut is done the hair dresser holds a plane mirror while standing behind you in which you can view the back side hair dressing on your head. The image of the back of your head formed in the mirror held by the hair dresser is reflected to the mirror in front of you which enables you to see and check that the back of your head has been properly dressed. This is termed as 'reflection of reflected light'.

7. To explain that three images are formed of an object placed facing two plane mirrors that are placed vertically with their two edges (one edge of each mirror) touching each other at right angles we refer

to picture 16.6 on page 227.

Image 1 is reflected from the mirror 'A' to form another image 3. Image 2 is also reflected from the mirror 'B' to form another image 3. Both the images (numbering 3) get superimposed forming a single bright third image in the corner between the two mirrors.

8. In a periscope the two plane mirrors are placed away from one another at the two angles of the periscope. The plane mirrors in the periscope are so arranged that they are parallel to each other but are arranged in an inclined position at an angle of  $45^\circ$  against the corner with the result that the reflected light from each mirror moves away in different directions and do not fall on one another, as in the case of two plane mirrors facing each other in vertical position, hence they do not form multiple images.
  9. The original eye lens can adjust its focal length with the help of ciliary muscles in the eye which reduces or increases its bulge while the ordinary lens made from glass is rigid with fixed focal length.
  10. You have learnt about the Newton's disc. The disc is coloured with seven colours in the same sequence as rainbow. The disc is rotated fast. These colours get mixed up to turn the disc appear white.
  11. Iris has a hole at the centre termed as pupil. Iris automatically adjusts the size of the pupil to regulate the amount of light entering the eye. In bright light iris expands to reduce the size of the pupil to limit the amount of light entering the eye. In shade or when it is dark iris contracts to increase the size of the pupil to allow more light into the eye.
  12. Kaleidoscope is a toy or instrument in which three rectangular strips of plane mirrors (or even plane glass strips may be used) showing multiple images in a pattern. Its use is made by designers who view different patterns in the kaleidoscope and copy them on their products. Refer activity 3 on page 229 of the textbook for making a kaleidoscope.
  13. We view objects with two eyes simultaneously. Each eye views the object from slightly different side. The slightly different images entering the two eyes are superimposed in the brain to give the idea of the length, breadth and the thickness (the three dimensions) of the objects being viewed. This is stereoscopic or three dimensional vision. For example, when we view an object with left eye keeping the right eye closed and again view the same object at the same time and at the same place with right eye, keeping the left eye closed we observe that each eye observes slightly different dimensions of the object. When these two images overlap they give three dimensional image of the object.
  14. Refer answer 11.
  15. Refer fig 16.4 in the textbook.
  16. Refer fig 16.2 in the textbook.
  17. Try yourself.
  18. Refer fig 16.13 in the textbook.
-