

• Human eye & colorful world



1. What is 'dispersion of white light'? State its cause. Draw a ray diagram to show the dispersion of white light by a glass prism.

(CBSE 2011, 2013, 2016, 2017)

2. How will you use two identical glass prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light? Draw and label the ray diagram.

(CBSE 2016, 2017, 2019, 2020)

3. Draw a ray diagram to show the refraction of light through a glass prism. Mark on it (a) the incident ray, (b) the emergent ray and (c) the angle of deviation.

(CBSE 2011, 2013, 2017)

4. State the function of each of the following parts of human eye:

(i) Cornea

(ii) Iris

iii) Pupil

(CBSE 2013, 2016, 2018)

5. A student is unable to see clearly the words written on the black board placed at a distance of approximately 3 m from him. Name the defect of vision the boy is suffering from. State the possible causes of this defect and explain the method of correcting it.

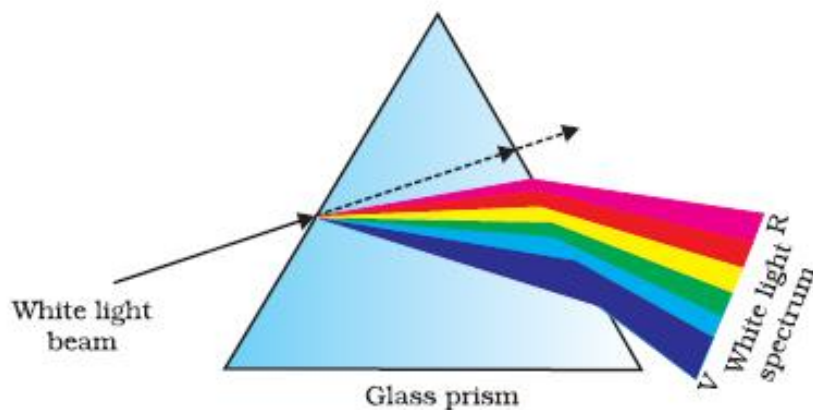
(CBSE 2017, 2018)

Solutions

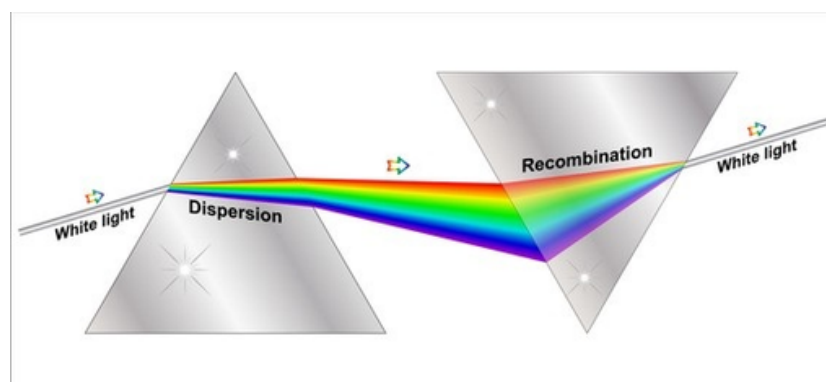
1. Splitting of white light into its seven constituent colors due to refraction is known as dispersion of white light.

Cause of dispersion: When a beam of white light enters a prism, it gets refracted and splits into seven constituent colors. The splitting of the light ray occurs due to the different bending angle for each color.

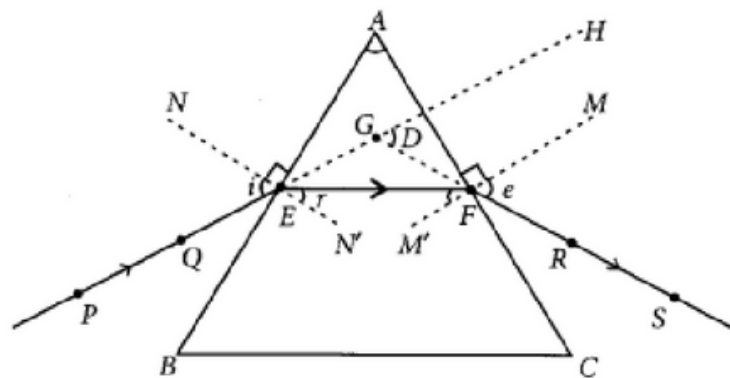
Thus, each color ray when passing through the prism bends at different angles with respect to the incident beam, thus giving rise to a spectrum.



2. Newton was the first to use a glass prism to obtain the spectrum of a white light. He then placed a second identical prism in an inverted position with respect to the first prism. This allowed all the colors of the white light to pass through the second prism combining to form a white light emerging from the other side of the second prism. This made him believe that white light was composed of different colors.



3.



i = angle of incidence

(a) PE = incident ray

(b) FS = emergent ray

(c) $\angle D$ = angle of deviation

4. (i) Cornea: It is a transparent bulge on the front surface of eyeball which refracts most of the light rays entering the eye.

(ii) Iris : A thin, pigmented structure found in the eye that can regulate the amount of light that can enter the retina.

(iii) Pupil: Black hole in the centre of the iris of the eye which permits light towards retina.

5. The student is suffering from myopia.

The two possible reasons due to which the defect of vision arises are: excessive curvature of the eye lens and elongation of the eye ball.

A student with myopia has the far point nearer than infinity, thus, the image of a distant object is formed in front of the retina.

Correction of myopia: This defect can be corrected by using a concave lens of suitable power as it brings the image back on to the retina, thus the defect is corrected.