Class 10 The Human Eye and the Colourfull World Solved CBSE Test Paper - 04

1. Name one defect of vision which cannot be corrected by any type of spectacle lenses?

Ans : Cataract.

2. What is the nature of image formed on the retina of the eye ?

Ans: Real and inverted.

3. What is the function of optic nerve in human eye ?

Ans: Optic nerve carries the image formed on the retina to the brain in the form of electrical signals.

4. Why do different colours deviate through different angles on passing through a prism?

Ans: This is because different colours travel through glass with different speeds and glass has different refractive index for different colours.

5. What is meant by scattering of light ?

Ans : Change of direction of light on striking a scatterer.

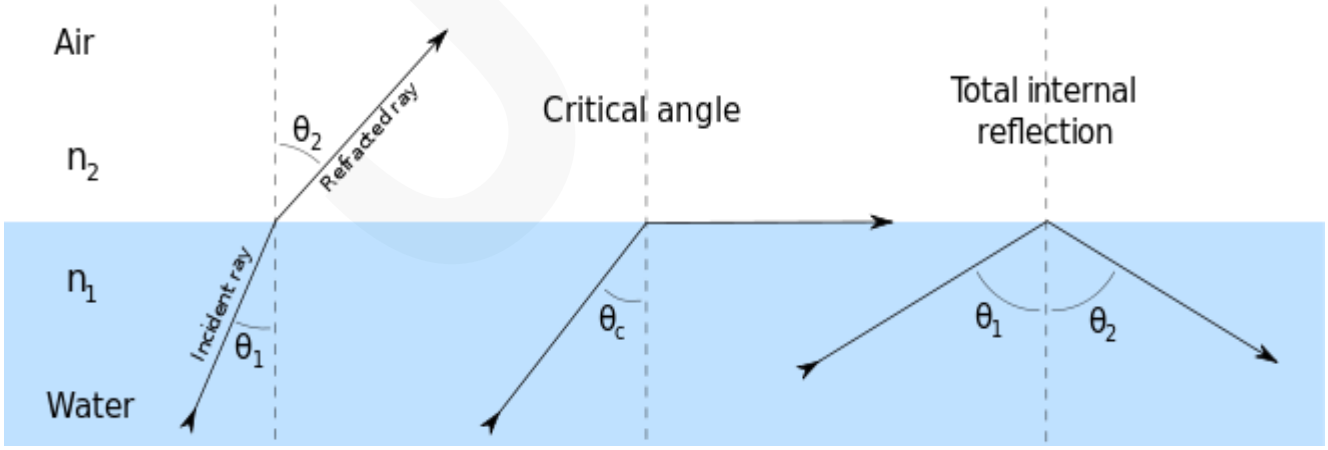
6. Name the defect of vision in person

a. Whose near point is more than 25cm away? b. Whose far point is less than infinity?

Ans : a. Hypermetropia b. Myopia

7. What is meant by 'total internal reflection'? State two essential conditions for total internal reflection to take place. With the help of a ray diagram, illustrate an application of total internal reflection.

Ans : When light passes from one medium to other, it bends from its path which is called



refraction. When a light ray passes from denser to rarer medium, at some angle of incidence it

does not go out of the denser medium but just grazes along the boundary (i.e. angle of refraction = 90^0). This angle of incidence is called critical angle.

Now, if you increase this angle of incidence, light ray is reflected back into the denser medium, which is called total internal reflection. The light ray is reflected every time it hits the boundary because angle if incidence is equal to angle of reflection, and is not able to come out of the medium. This phenomenon is called total internal reflection.

The conditions for total internal reflection are:

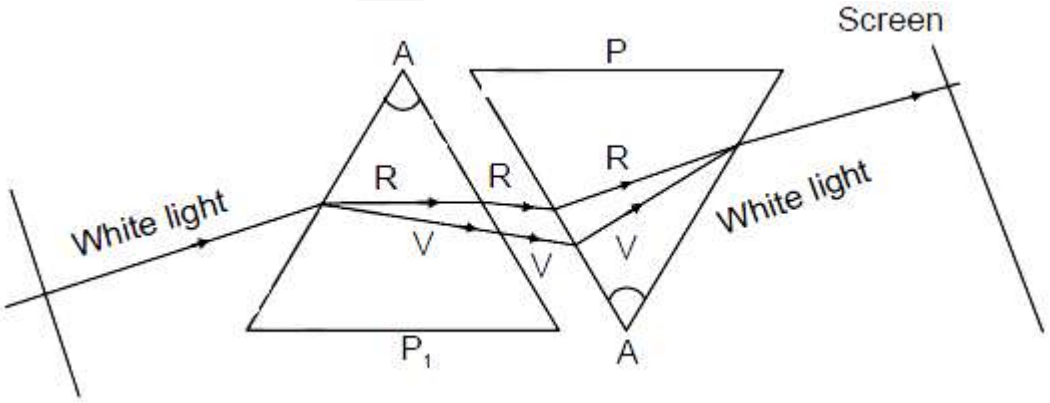
(i) the light ray must be travelling from optically denser medium to rarer medium and

(ii) the angle of incidence must be greater than the critical angle.

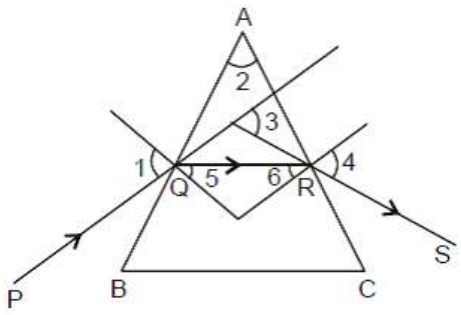
Optical fiber communication uses the principle of total internal reflection for transferring data through optical fibers.

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

Ans. By using two identical prisms, one placed inverted with respect to the other.



9. The given diagram shows the path of a ray of light through an equilateral prism. Answer the following questions :



(i) Which is the refracted ray?

(ii) Which is the emergent ray?

(iii) What name is given to angle 1?

(iv) What name is given to angle 3?

(v) What name is given to angle 5?

(vi) What is the relation between angles 1, 2, 3 and 4?

Ans. (i) QR is the refracted ray. (ii) RS is the emergent ray.

(iii) Angle 1 is called angle of incidence (iv) Angle 3 is called angle of deviation.

(v) Angle 5 is the angle of refraction on face AB. (vi) $\angle 2 + \angle 3 = \angle 1 + \angle 4$.

10. Why do the faces of persons sitting opposite to you around a camp fire appear to shimmer?

Ans. This happens due to the refraction of light. The rays of light reflected from the face of a person, sitting opposite to you, on passing through the hot air (produced by the burning of wood), get refracted. Since the air is rapidly moving and its optical density is continuously changing, therefore, the part of refracted rays passing through it also changes. This gives rise to shimmering effect.

11. Why does the smoke coming out of coal fired chimney appear blue on a misty day?

Ans. The tiny particles of carbon and moisture in the smoke scatter blue colour of white light in all possible directions. When this scattered blue light reaches our eyes, the smoke appears blue.

12. Why is red light used as universal danger signal?

Ans. The red light has the longest wavelength amongst the spectral colours and hence is least scattered by the atmosphere. Thus, red light can easily pass through fog or mist, without getting scattered and hence is visible from a long distance. Thus, it is used as universal danger signal

13. Where do the parallel rays meet on passing through crystalline lens of :

(i) long - sighted eye, (ii) short-sighted eye?

Ans: (i) In case of long-sighted eye, the parallel rays tend to meet behind the retina.

(ii) In case of short-sighted eye, the parallel rays tend to meet in front of the retina.

14. What is the function of the following in human eye? (i) Yellow sport (ii) Choroid

Ans. (i) Yellow sport is situated at the centre of the retina with large no. of rods and cones. Its function is to form an extremely clear image.

(ii) It is a grey membrane lining the sclerotic. Its function is to darken the eye ball from inside so that no reflection takes place from its sides.

15. Why does it take some time to see objects in a cinema hall when we just enter the hall from bright sunlight? Explain in brief.

Ans : When we just enter the cinema hall from bright sunlight, very little light reaches the eye lens due to the dim light. It takes some time for iris to expand and increase the size of pupil to allow more light to enter the eye. This is why it takes some time to see objects in a cinema hall when we just enter the cinema hall from bright sunlight