

## Class 10: The Human Eye and the Colourful World Solved CBSE Test Paper - 03

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1. A student sitting at the back of the classroom cannot read clearly the letters written on the blackboard. What advice will a doctor give to her?

Ans: The student is suffering from myopia (near sightedness). Doctor advises her to use a concave lens of appropriate power to correct this defect.

2. How are we able to see nearby and also the distant objects clearly?

Ans: When you are looking at objects closer to the eye, the ciliary muscles contract. This increases the curvature of the eye lens. The eye lens then becomes thicker. Consequently, the focal length of the eye lens decreases. This enables us to see nearby objects clearly.

When you are looking at distant objects the ciliary muscles relaxed and the lens becomes thin. Thus, its focal length increases. This enables us to see distant objects clearly

3. A person needs a lens of power – 4.5 D for correction of her vision.

(a) What kind of defect in vision is she suffering from?

(b) What is the focal length of the corrective lens?

(c) What is the nature of the corrective lens?

Ans: (a) Negative sign of power of lens indicates that focal length is negative that is only possible in concave lens that is used for correction of Myopia

(b)  $f = 1/-4.5 = -2/9 = - 0.22 \text{ m}$ ,

(c) The nature of the corrective lens is diverging rays of light.

4. Is the position of a star as seen by us its true position? Justify your answer.

Ans: No. light from stars undergoes atmospheric refraction due to the variation in air density.

5. Why do we see a rainbow in the sky only after rainfall?

Ans: We see a rainbow in the sky only after rainfall because the water droplets behave like prisms and disperse sunlight.

The reasons of rainbow are atmospheric refraction and total internal refraction.

6. A rainbow is always formed in a direction opposite to that of the sun ?

Ans : The water droplets act like small prisms. They refract and disperse the incident sunlight, then refract it internally and finally refract it again when it comes out of the raindrop.

7. What is the difference in colors of the Sun observed during sunrise/sunset and noon? Give explanation for each.

Ans: During sunrise and sunset the sun appears reddish whereas at noon the sun appears white. At sunrise and sunset the light coming from the sun has to travel a longer distance through the atmosphere to reach us. Therefore the blue and green components of white light are gets scattered away (removed) almost completely leaving the longer wavelength. Hence, during sunrise and sunset the sun appears reddish.

When the sun is overhead at noon, then the light coming from the sun has to travel a relatively shorter distance through the atmosphere to reach us. As a result, only a little of the blue colour of the white light is scattered (most of the blue light remains in it). Since the light coming from the overhead sun has almost all its components colors in the right proportion, therefore, the sun appears white

8. Chicken can see only in bright light. What type of cells is present in its retina?

Ans: The retina of Chicken has only rod cells and no cone cells.

9. Give reason: What will be colour of the sky in the absence of atmosphere?

Ans: In the absence of any atmosphere, there will be no scattering of sunlight and the sky will appear dark.

10. Give reason: Why are the traffic light signals (or danger signals) of red colour? Ans: In the visible spectrum, the red colour has the largest wavelength. The red colour is least scattered by fog or dust particles. Therefore, we can observe red colour easily even in foggy and dusty conditions.

11. When a light ray passes obliquely through the atmosphere in an upward direction, how does its path generally change?

Ans : In an upward direction of the atmosphere, the optical density is decreasing continuously, so when light ray passes in such direction it bends away from the normal [denser to rare].

12. What is Tyndal Effect? Explain with an example.

Ans. The scattering of light by particles in its path is called Tyndall Effect. When a beam of sunlight enters a dusty room through a window then its path becomes visible to us. This is because the tiny dust particles present in the air of room scatter the beam of light all around the room. And when thus scattered light enters our eyes, we can see the beam of light. Thus, an example of Tyndall effect is the way a beam of sunlight becomes visible as it passes through dust particles in the air of a room.

13. The sun near the horizon appears flattened at the sun set and sun rise. Explain why.

Ans: This is due to atmospheric refraction. The density and refractive index of the atmosphere decreases with altitude, so the rays from the top and bottom portion of the sun on horizon are refracted by different degrees. This causes the apparent flattening of the sun. But the rays from the sides of the sun on a horizontal plane are generally refracted by the same amount, so the sun still appears circular along the sides.

14. To a person the lines drawn parallel to one another appear distorted. Name the defect in the eye?

Ans : Astigmatism is the defect.

15. A mixture of yellow and orange light is dispersed through a prism. Which colour will deviate least?

Ans : The yellow colour will deviate least.

16. What is an impure spectrum?

Ans : A spectrum in which the bands of different colour don't have sharp boundaries, is called impure spectrum.

17. What is aqueous humour ? Where is it found in the eye ball? State its two functions.

Ans. Aqueous humour, is a saline, watery fluid, transparent in nature. It fills in anterior part of the eye between the cornea and eye lens.

Functions :

(i) It prevents the anterior part of eye ball from collapsing due to the change in atmospheric pressure.

(ii) It keeps the cornea moist and prevents it from atmospheric change.

18. By giving reasons state your observations when a parallel beam of white light:

(i) is passed through by hypo-solution and then focused on a white screen

(ii) is passed through hypo-solution (to which few drops of sulphuric acid is added) and then focused on a white screen.

Ans.

(i) The path of white light is not visible in the hypo-solution. The beam focuses on the white screen as a bright white spot.

Reason: The white light does not get scattered because the size of particles in the hypo solution is too small compared to the wavelengths in white light.

(ii) (a) In 2-3 minutes, after the addition of sulphuric acid, the sides of container start emitting blue light.

(b) The light coming out of the container is initially orange, then red and focuses on the screen. This light gradually changes to crimson red.

Reason : The sulphuric acid reacts with hypo solution to form colloidal sulphur. Initially these sulphur particles are very small and hence scatter blue light.

Thus, the deficient light passing out of the container is orange in colour. However, as the reaction proceeds, more and more colloidal particles of sulphur are formed.

These sulphur particles then join to form bigger sulphur particles. These bigger particles scatter red colour and hence the light coming out of the container is crimson red.