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Chapter 11: The Human Eye and the colourful world

1. **List the various eye defects and their corrections.**

Eye Defects	Definitions	Scientific Reasons	Corrective Measures
1. Myopia	Myopic eye can see nearby objects clearly but cannot see distant objects clearly.	1. Excessive curvature of the eye lens. 2. Elongation of the eyeball.	Concave lens of suitable power.
2.Hyper metropia	Hyper metropic can see distant objects clearly but cannot see nearby objects clearly.	.The focal length of the eye lens is too long. .The near point is farther away from the normal near point (25 cm). .The eyeball has become too small.	Convex lens of appropriate power can be used.
3.Presbyopia	The power of accommodation of the eye usually decreases with age. Gradual change in the near point.	Loss of flexibility of the eye lens. Gradual weakening of the ciliary muscles.	Concave and convex lens of appropriate power can be used.
4.Astigmatism	Change in the curvature of the eye lens	Defect in refraction of eye lens.	Usage of appropriate lens.
5.Cataract	The crystalline lens of people at old age become milky and cloudy.		Cataract surgery restores the vision

2. **Define the term vision range.**
   The difference between the near and farthest point which a normal eye can see is called the vision range.
3. **What is the near and farthest point of the eye?**
   The near point of the eye is about 25cm and farthest point is infinity.
4. **Explain Tyndall effect briefly.**
   The phenomenon of scattering of light by the colloidal particles is called Tyndall effect.
   Very fine particles of the medium scatter the light of shorter wave lengths while particles of larger size scatter light of longer wavelengths.
5. **What is spectrum? Give an example for natural spectrum.**
   The band of the coloured components of the light beam is called its spectrum. Rainbow is a natural spectrum.
6. **What is dispersion of light? Name the colours formed due to the dispersion of white light.**
   When a white light is incident on a prism it gets refracted and splits into 7 constituent colours. This phenomenon is called dispersion of light. The 7 colours so formed are violet, indigo, blue, green, yellow, orange and red (VIBGYOR)
7. **Why the dispersion of light occurs?**
   Different colours have different wavelengths. During refraction, each colour bends with an angle with respect to the incident ray.
8. **Briefly explain Newton's experiment that proved 7 colours constitute white light.**
   Two identical prisms are taken. One is placed erect and the second prism is placed in an inverted position. When white light incidents on an erect prism it will be refracted and dispersed into the spectrum of seven colours. When the

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8. **Briefly explain Newton's experiment that proved 7 colours constitute white light.**

   Two identical prisms are taken. One is placed erect and the second prism is placed in an inverted position. When white light incidents on an erect prism it will be refracted and dispersed into the spectrum of seven colours. When the spectrum incidents on the inverted prism, white light emerges out.

9. **Describe the process of formation of formation of a rainbow.**

   A rainbow is caused by dispersion of sunlight by tiny water droplets, present in the atmosphere. It is formed in a direction opposite to that of sun. The water droplets acts like small prisms. They refract and disperse the incident sunlight, then reflect it internally and finally refract it again when it comes out of the raindrop. Due to the dispersion of light and internal reflection, rainbow is formed.

10. **Why do stars twinkle?**

    The twinkling of a stars is due to atmospheric refraction of starlight. The starlight on entering the earth's atmosphere, undergoes refraction continuously before it reaches the earth. As the path of rays of light coming from the stars goes on varying slightly, the apparent position of the star fluctuates and causing twinkling effect.

11. **Why planets do not twinkle?**

    The planets are much closer to the earth and are thus seen as extended sources but as point sized sources of light. So the planets do not twinkle.

12. **Why will there be advanced sunrise and delayed sunset?**

    Due to atmospheric refraction, the sun is visible about 2 minutes before the actual sunrise and about 2 minutes after the actual sunset.

13. **Why is the colour of the clear sky blue?**

    Size of the molecules of air and other fine particles in the atmosphere is smaller than the wavelength of visible light. Hence these are more effective in scattering light of shorter wavelength at the blue end.

14. **Why is the sea water blue in colour?**

    Sea water absorbs the colours of longer wavelength in large quantity than the blue colour of shorter wavelength. So, from the white light entering the sea, only blue colour is reflected.

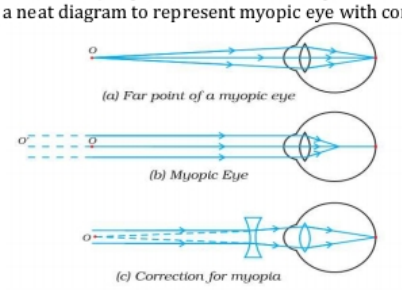
15. **Why is the colour of the sun red at sunrise and sunset?**

    During sunrise and sunset, the light form the sun travels a longer distance in the atmosphere, red colour of longer wavelength scatters more.

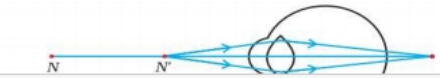
16. **Why danger signals use red colour? OR**
    Why are red lights used to stop the vehicles in traffic signals?

    Red colour can be seen from faraway distance. The red colour is least scattered by fog or smoke and has longer wavelength.

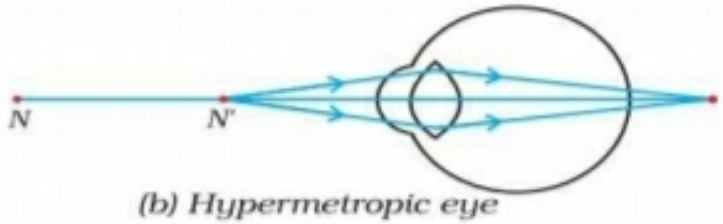
17. Draw a neat diagram to represent myopic eye with correction.



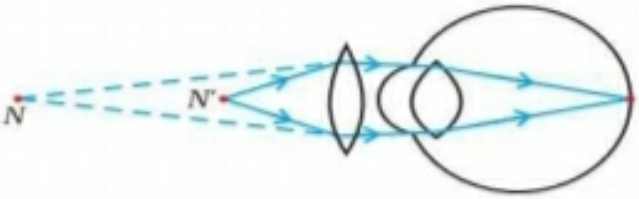
18. Draw a neat diagram to represent hypermetropic eye with correction.



18. Draw a neat diagram to represent hypermetropic eye with correction.



(b) Hypermetropic eye



(c) Correction for Hypermetropic eye