	INDIAN SCHOOL AL WADI AL KABIR	
Class X	Department of Science 2020-2021 SUBJECT: Physics	
HANDOUTS	TOPIC : THE HUMAN EYE AND THE COLOURFUL WORLD – PART I	ATTACH IN : A4 File format
Name of the student:	Class & Section:	Roll No.

1. **Human eye:** The human eye is one of the most valuable and sensitive sense organs. It enables us to see the wonderful world and the colours around us.

2. **Crystalline lens:** The human eye is like a camera. Its lens system forms an image on a light-sensitive screen called the retina. The crystalline lens merely provides the finer adjustment of focal length required to focus objects at different distances on the retina.

3. **Cornea:** Light enters the eye through a thin membrane called the cornea. Most of the refraction for the light rays entering the eye occurs at the outer surface of the cornea.

4. **Eyeball:** It forms the transparent bulge on the front surface of the eyeball. The eyeball is approximately spherical in shape with a diameter of about 2.3 cm.

5. **Iris:** We find a structure called iris behind the cornea. Iris is a dark muscular diaphragm that controls the size of the pupil.

6. **Pupil:** The pupil regulates and controls the amount of light entering the eye.

7. **Working of an human eye:** When the light rays enter the eye,

- The eye lens forms an inverted real image of the object on the retina.
- The retina is a delicate membrane having enormous number of light-sensitive cells.
- The light-sensitive cells get activated upon illumination and generate electrical signals.
- These signals are sent to the brain via the optic nerves.
- The brain interprets these signals, and finally, processes the information so that we perceive objects as they are.

8. **Power of the accommodation:** The ability of the eye lens to adjust its focal length is called accommodation.

9. **How is it possible to see the distant objects clearly?**

- The eye lens is composed of a fibrous, jelly-like material.
- Its curvature can be modified to some extent by the ciliary muscles.
- The change in the curvature of the eye lens can thus change its focal length.
- When the muscles are relaxed, the lens becomes thin.
- Thus, its focal length increases. This enables us to see distant objects clearly.

10. **How is it possible to see nearby objects clearly?**

- 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.

11. **Near point of the eye:** The minimum distance, at which objects can be seen most distinctly without strain, is called **the least distance of distinct vision**. It is also called the near point of the eye. For a young adult with normal vision, the near point is about 25 cm.

12. **Far point of the eye:** The farthest point up to which the eye can see an object clearly is called the far point of the eye. It is infinity for a normal eye.

13. **What is the power of accommodation of a normal eye?**

A normal eye can see objects clearly that are between 25 cm and infinity.

14. **Cataract:** Sometimes, the crystalline lens of people at old age becomes milky and cloudy. This condition is called cataract. This causes partial or complete loss of vision. It is possible to restore vision through a cataract surgery.

15. **What are refractive defects?**

- Sometimes, the eye may gradually lose its power of accommodation. In such conditions, the person cannot see the objects distinctly and comfortably.
- The vision becomes blurred due to the refractive defects of the eye.

16. **What are the three types of refractive defects? How are they generally corrected ?**

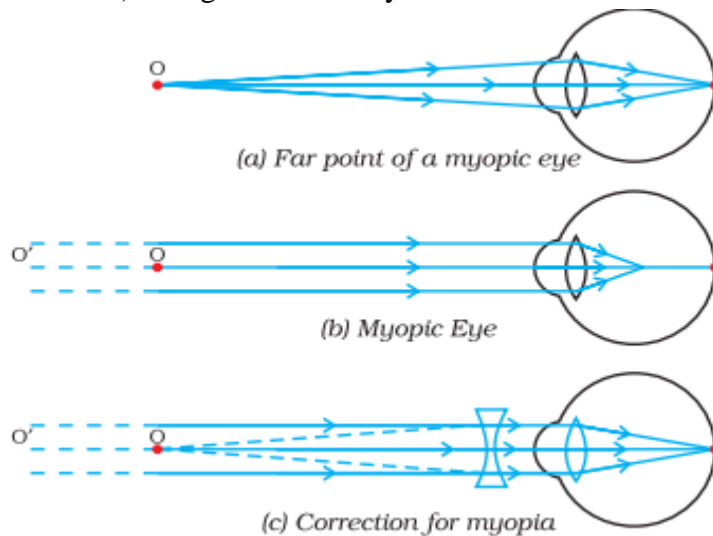
(i) myopia or near-sightedness (ii) Hypermetropia or far -sightedness, and (iii) Presbyopia. These defects can be corrected by the use of **suitable spherical lenses**.

17. Write four differences between myopia and hypermetropia?

MYOPIA	HYPERMERTROPIA
near-sightedness	far -sightedness.
can see nearby objects clearly but cannot see distant objects distinctly	can see distant objects clearly but cannot see nearby objects distinctly.
A person with this defect has the far point nearer than infinity	The near point, for the person, is farther away from the normal near point (25 cm).
A concave lens or diverging lens is used for correction	A convex lens or converging lens is used for correction.

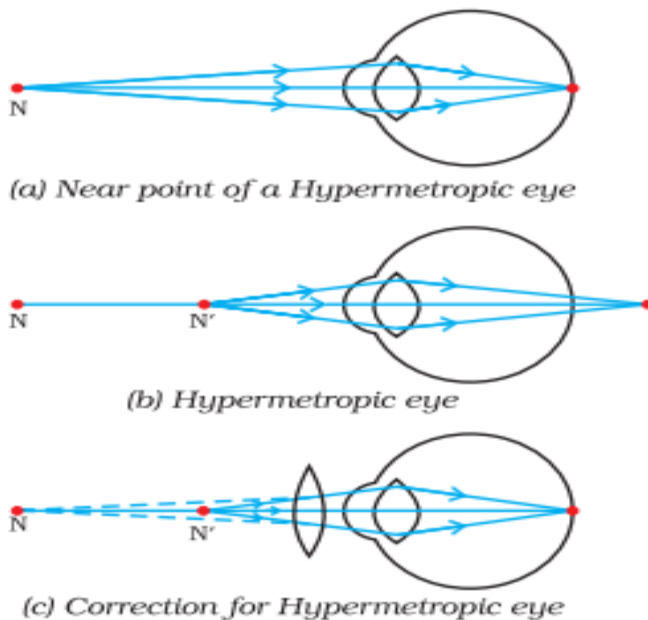
18. A student has difficulty in reading the blackboard while sitting in the last row. What could be the defect the child is suffering from? What are the causes? Make a diagram to show how the defect is corrected.

- The student is suffering from **Myopia**. (**Myopia** is the defect of vision due to which the person cannot see distant objects distinctly but can see the nearby objects clearly.)
- Causes** – i) Excessive curvature of the eye lens.
ii) Elongation of the eye ball.



19. What is hypermetropia? State its two causes. With the help of ray diagram show how the defect is corrected.

- Hypermetropia** is the defect of vision due to which the person cannot see nearby objects clearly but can see distant objects distinctly.
- Causes**-i) Focal length of eye lens is too long
ii) The eyeball has become too small



18. **Presbyopia:** The power of accommodation of the eye usually decreases with ageing. For most people, the near point gradually recedes away. They find it difficult to see nearby objects comfortably and distinctly without corrective eye-glasses. This defect is called Presbyopia.

Causes:

- (i) gradual weakening of the ciliary muscles
- (ii) diminishing flexibility of the eye lens.
- (iii) suffers from both myopia and hypermetropia.

Corrective measures:

- (i) A common type of **bi-focal lenses** consists of both concave and convex lens.
The upper part – concave lens – facilitates distant vision.
The lower part – convex lens – facilitates near vision.
- (ii) Use of contact lens or surgical interventions.

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