

UNIT 6

Vision And The World of Colours

04/01/2021 – Class 48

Activity 1

Discussion

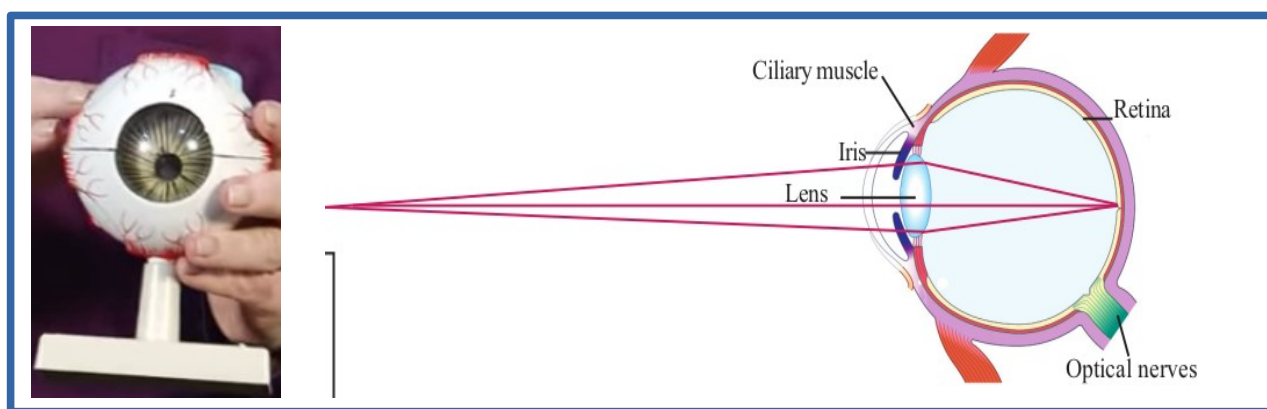
- Which type of lens converges light rays? **Convex lens.**
- Which image is formed on a screen, real or virtual? **Real image.**
- Which type of lens can form real images? **Convex lens.**

Inference

Convex lenses can form real images as well as virtual image. Real image is formed on a screen.

Activity 2

Observe the model of an eye and the image formation in an eye.



Discussion

- Which are the main parts of the eye? **Cornea, Retina, Iris, Lens, Ciliary muscle, pupil.**
- Which type of lens is in our eye? **Convex lens.**
- When, light from an object passes through this convex lens, what happens? **Convex lens converges the light rays to the retina.**
- Where does the image formed in our eye? **At the retina.**

Inference

It is through the pupil, which is in the middle of the iris, that light from an object reaches the lens of the eye. Convex lens of our eye, converges this light rays to the retina. An inverted image is formed on the retina. The impulses produced on the retina are transmitted to the brain through the optical nerves. The brain will interpret this impulses and give us the sensation of seeing.

Activity 3

Given below are the ray diagrams of image formation in the eye.

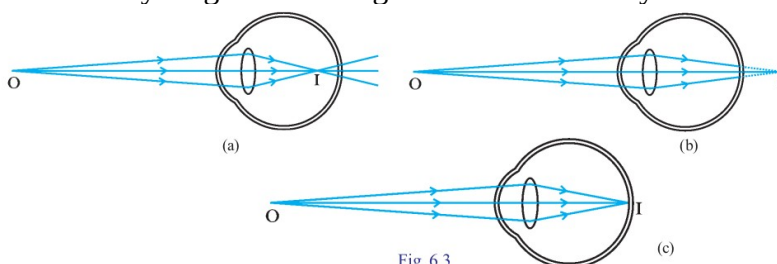


Fig. 6.3

Discussion

- In which case is the image formed on the retina itself? **Fig (c).**
- Where does the image is formed on other two figures? **In Fig (a) in front of the retina and in fig (b) behind the retina.**
- For a healthy eye, where does the image is formed? **At the retina.**

Inference

For a healthy eye, image is formed exactly on the retina.

Activity 4

Try to read a book, holding it very close to your nose.

Discussion

- Can you see the letters clearly? **No**
- What happens, when the book is moved away? **Can see the letter clearly.**
- At what distance from the eye can you get a clear vision? **25 cm.**
- This point is called? **Near point.**

Inference

Near point is the nearest point at which the objects can be seen distinctly. The near point of an eye with healthy vision is **25 cm.**

- What is the farthest point an eye can see clearly? **Infinity.**
- This point is called? **Far point.**

Inference

Far point is the farthest point at which the objects can be seen distinctly. The far point of an eye with healthy vision is at **infinity.**

Activity 5


How do the images fall on the retina of the eye clearly when we read a book or while we are looking at a star?



Discussion

- In a convex lens, what happens to the position of image, when we change the position of the object? **Position of the image is also change.**
- What is the reason for this? **Focal length of the lens doesn't change.**
- But is there a change in the distance between the retina and the lens in our eye? **No.**

Experiment 1

Adjust the distance between the screen and the lens as 40 cm for doing the experiment. Place a lighted candle (object) at a distance 13 cm from the lens.



Activity	Observation
Place a convex lens of focal length 20 cm on the lens stand. 	Doesn't get a clear image on the screen.

<p>Place another convex lens of focal length 15 cm on the lens stand.</p> 	<p>Doesn't get a clear image on the screen.</p>
<p>Place another convex lens of focal length 10 cm on the lens stand.</p> 	<p>Clear image is formed on the screen.</p>

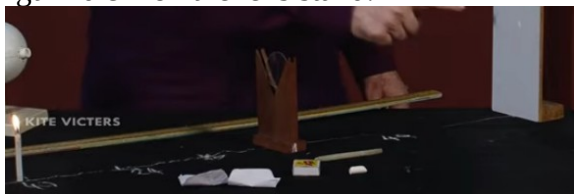
Inference
 Clear image is formed on the screen, when the convex lens of **focal length of 10 cm** is used.

Experiment 2

Adjust the distance between the screen and the lens as 40 cm for doing the experiment. Place a lighted candle (object) at a distance 24 cm from the lens.

Activity	Observation
<p>Place the convex lens of focal length 10 cm on the lens stand.</p> 	<p>Doesn't get a clear image on the screen.</p>
<p>Place the convex lens of focal length 15 cm on the lens stand.</p> 	<p>Clear image is formed on the screen.</p>

Place a lighted candle (object) at a distance 40 cm from the lens. Place the convex lens of focal length 20 cm on the lens stand.



Clear image is formed on the screen.

Distance of object from the lens (cm)	Distance from the lens to the screen (cm)	The focal length for getting a clear image (cm)
13	40	10
24	40	15
40	40	20

Discussion

- Does the distance from the lens to the screen is changed, in the experiments? **No**
- When the distance to the object from the lens is changed, how we formed clear images on the screen? **By changing the focal length (By changing the lens).**

Inference

Use **lenses of different focal lengths** for **objects situated at different positions** to get clear images on the screen which is at a fixed distance from the lens.

Activity 6

To get a clear vision, the image of objects from far point up to the near point must be obtained on the retina itself. How it happens?

Discussion

- Does the distance from the lens of our eye to the retina (v) is changing? **No.**
- Is the distance from the object to the lens of our eye is a constant? **No**
- Then, how the images of objects from the far point and near point are formed exactly on the retina? **By changing the focal length of our eye lens.**
- When we look at nearer objects, what happens to the ciliary muscles related to the convex lenses in our eyes? **Contracted.**
- Then, what happens to the curvature of the eye lens? **Curvature of the eye lens increased.**
- When the curvature of the eye lens increased, what happens to its focal length? **Focal length is decreased.**

Inference

When we look at **nearer objects**, the **ciliary muscles related** to convex lenses in our eyes are **contracted** and **the curvature of the lens increases**. The **focal length decreases**.

Discussion

- When we look at far objects, what happens to the ciliary muscles related to the convex lenses in our eyes? **Relaxed.**
- Then, what happens to the curvature of the eye lens? **Curvature of the eye lens Decreased.**
- When the curvature of the eye lens decreased, what happens to its focal length? **Focal length is Increased.**

Inference

When we looked at **far objects** the **ciliary muscles** are **relaxed** and the **curvature of the lens decreases**. The **focal length** of the lens **increases**.

- The ability of our eye is called? **Power of accommodation.**

Power of Accommodation

Power of accommodation is the ability of the eye to form an image on the retina by adjusting the focal length of the lens in the eye, by varying the curvature of the lens, irrespective of the position of the object.

Assignment

- a) What is the distance to the near point for a normal healthy eye ?**
- b) For a normal healthy eye where is the far point?**
- c) When we look at a different objects at different distances we can see the objects clearly. Explain how this is achieved.**