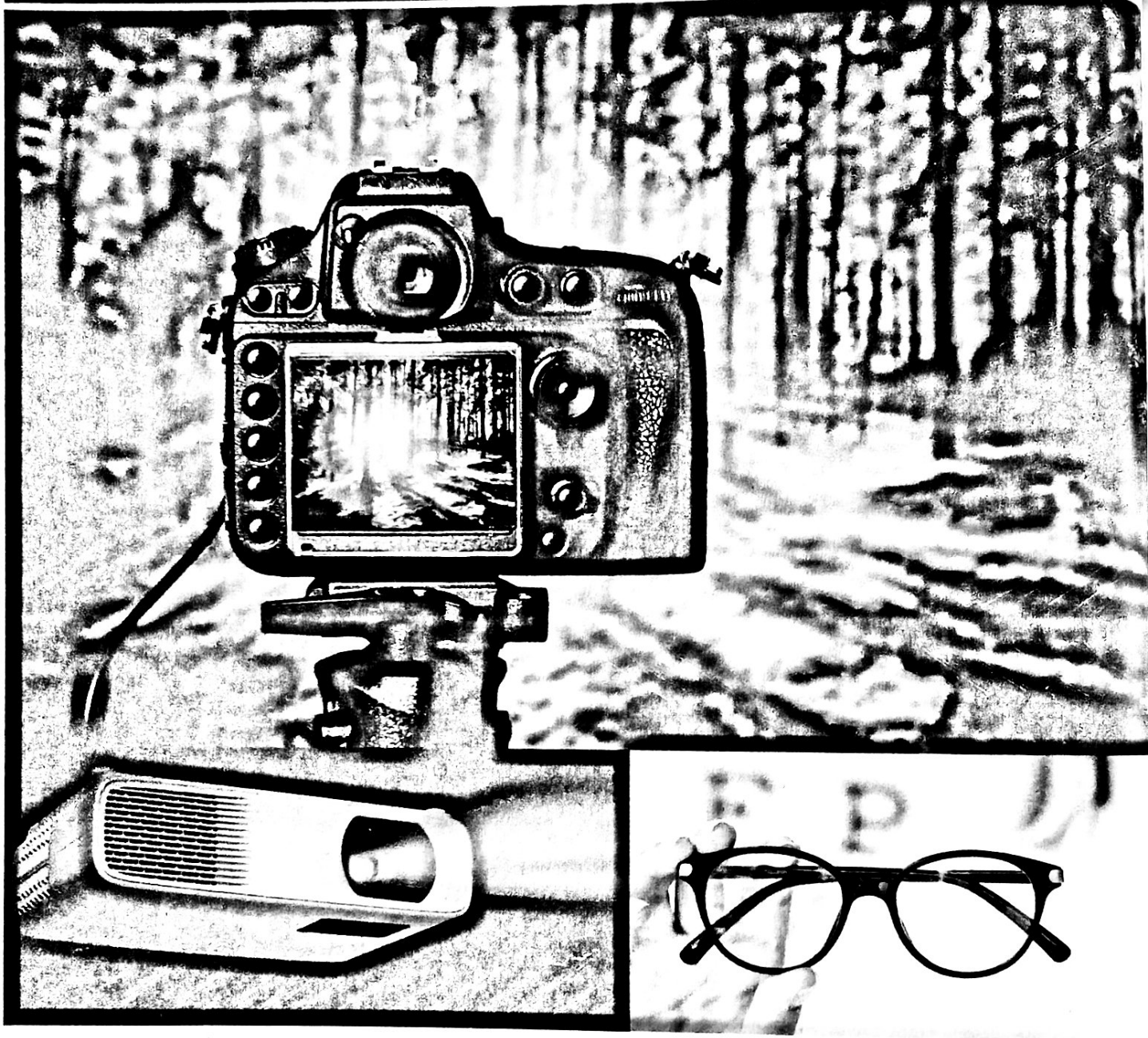




Lenses and Optical Instruments

S.3



By the end of this chapter, a learner should be able to;

- (a) know the properties of converging and diverging lenses, and how they are used in everyday life.
- (b) understand how lenses are used in optical systems such as the magnifying glass, correcting sight in the human eye and in camera lenses

INTRODUCTION

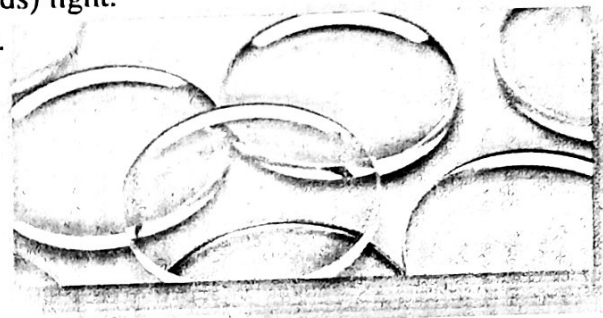
Have you ever seen people wearing spectacles or eyeglasses? These glasses contain lenses, which help people see better. Lenses are special pieces of transparent material, like glass or plastic, that bend light in a way that helps us focus on things more clearly.

Lenses are used in many different optical instruments like microscopes, telescopes, and cameras. These instruments help us see things that are too far away, too small, or even take clear pictures. In fact, without lenses in our eyes, we wouldn't be able to see as clearly.



What is a lens?

A lens is a curved piece of transparent material that refracts (bends) light. The materials used to make these lenses may be glass or plastics. When light passes through a lens, it changes direction.

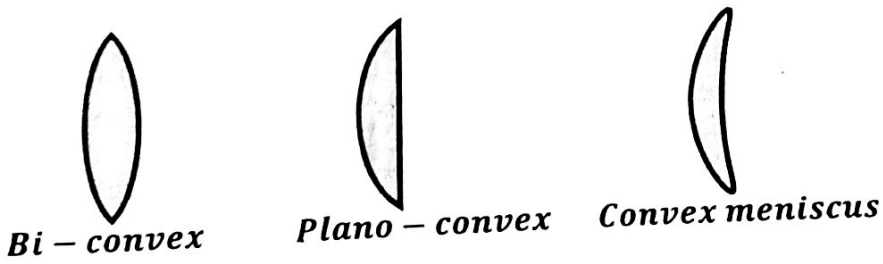
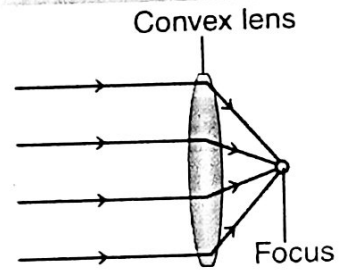


Types of lenses;

- There are two types of lenses namely;
- Convex (converging) lenses.
 - Concave (diverging lenses).

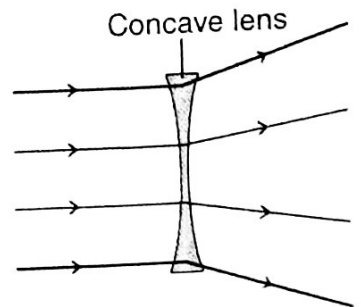
CONVERGING (CONVEX) LENSES:

These are thicker in the middle than at the edges. A convex lens converges all parallel rays incident to it meet at one point after refraction. They bend light rays inwards to a single focus. Examples of converging lenses include;



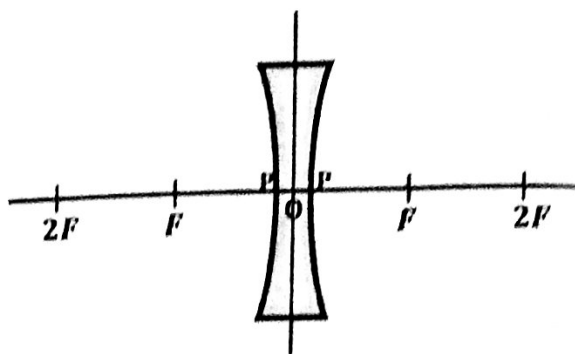
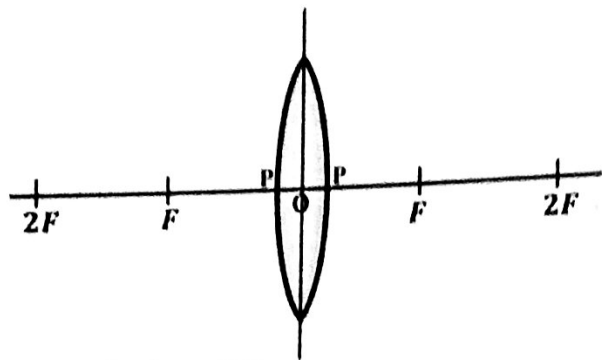
DIVERGING (CONCAVE) LENSES:

These are thicker at the edges than in the middle. A concave lens diverges all parallel rays incident to it and they appear to come from one point after refraction. They bend light rays outwards making them spread apart. Examples of diverging lenses include;





TERMS USED IN LENSES



Pole of a lens (P):

This is the mid-point of the surface of the lens.

Optical centre (O):

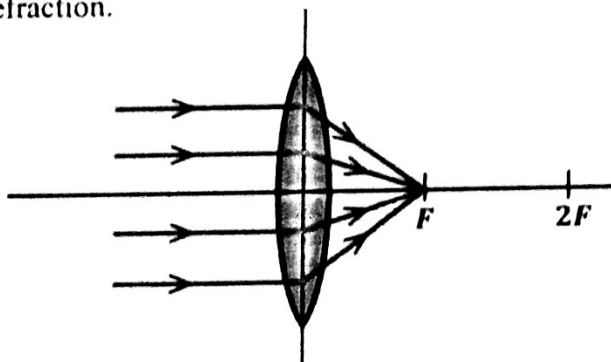
This is the centre of the lens between its poles.

Principal axis:

This is a straight line passing through the optical centre and principal focus of a lens.

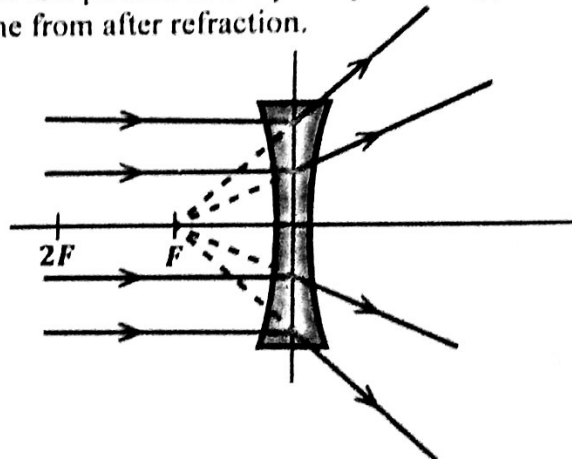
Principal focus, F of a converging lens:

This is a point on the principal axis where all rays close and parallel to the principal axis meet after refraction.



Principal focus, F of a diverging lens:

This is a point on the principal axis where all rays close and parallel to the principal axis appear to come from after refraction.

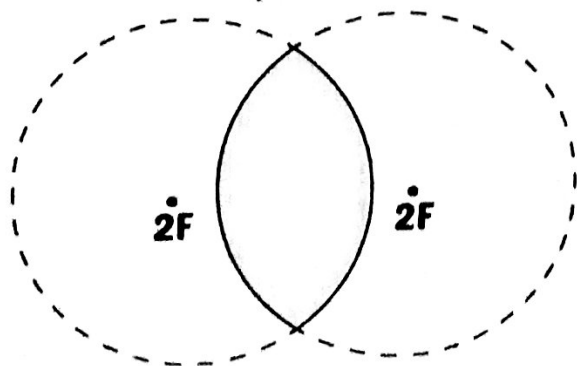


Focal length (f):

This is the distance between the optical centre and the principal focus of the lens.

Centre of curvature (2F):

The center of the sphere from which the lens surface is curved or part.

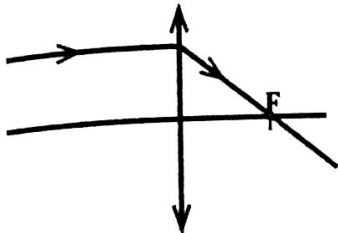




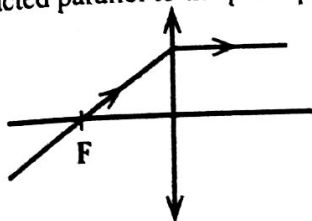
RULES FOR DRAWING RAY DIAGRAMS IN LENSES

CONVERGING LENS

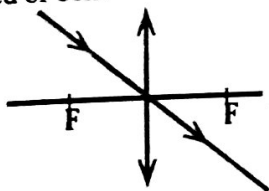
1. A ray parallel to the principal axis is refracted passing through the principal focus, F.



2. A ray passing through the principal focus is refracted parallel to the principal axis.

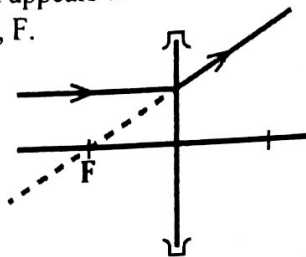


3. A ray passing through the optical centre is not refracted or bent

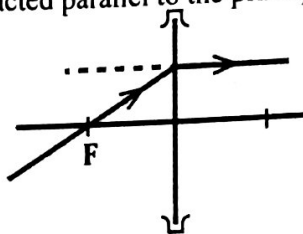


DIVERGING LENS

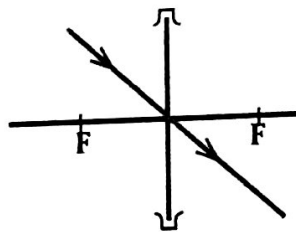
A ray parallel to the principal axis is refracted such that it appears to be coming from the principal focus, F.



A ray that pass through the principal focus is refracted parallel to the principal axis.



A ray passing through the optical centre is not refracted or bent

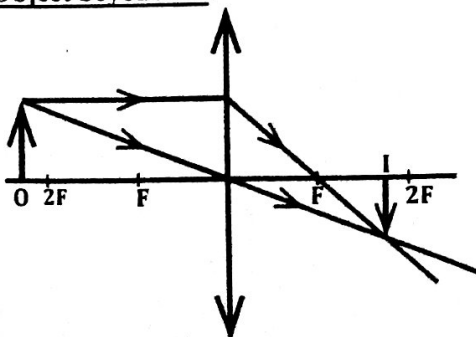


IMAGES FORMED BY CONVEX (CONVERGING) LENSES

The type of image formed by a convex lens depends on the position of the object relative to the lens. A convex lens can form **real** or **virtual** images, and the size, orientation, and position of the image vary depending on where the object is located.

- ☑ A **real image** is an image that is formed when light rays **actually converge** at a point after passing through the lens. They are drawn using solid lines.
- ☑ A **virtual image** is an image that appears to be formed by rays of light that **diverge** after passing through the lens. They are using dotted or broken lines.

(a) Object beyond 2F:

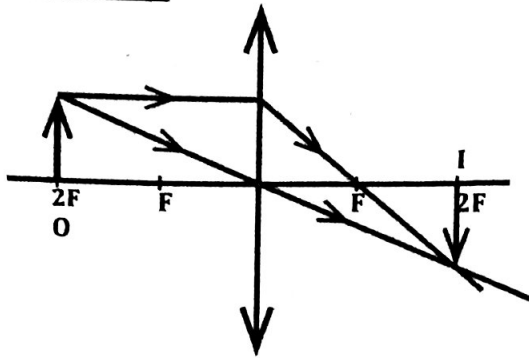


Nature of image, I formed:

- ✓ Between F and 2F.
- ✓ Real
- ✓ Inverted (upside down)
- ✓ Diminished (smaller than object)



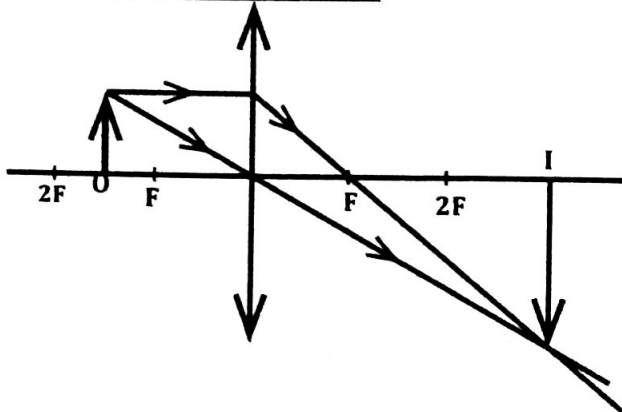
(b) Object at 2F:



Nature of image, I formed:

- ✓ Between at 2F.
- ✓ Real
- ✓ Inverted (upside down)
- ✓ Same size as object

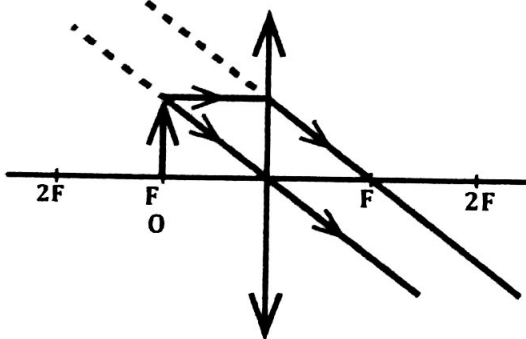
(c) Object between 2F and F:



Nature of image, I formed:

- ✓ Beyond 2F.
- ✓ Real
- ✓ Inverted (upside down)
- ✓ Magnified (bigger than object)

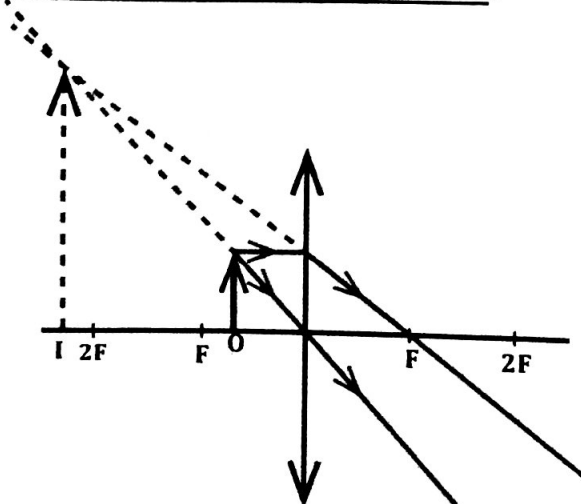
(d) Object at F:



Nature of image, I formed:

- ✓ At infinity.
- ✓ Magnified

(e) Object between F and optical centre:

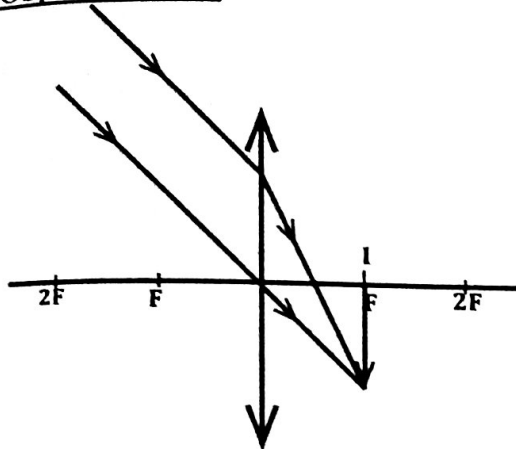


Nature of image, I formed:

- ✓ Beyond 2F.
- ✓ Virtual
- ✓ Upright
- ✓ Magnified

NOTE:
A converging lens acts as a magnifying glass when the object is placed between the principal focus and the optical centre.

(i) Object at infinity:

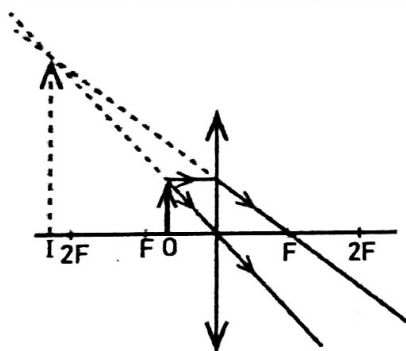


Nature of image, I formed:

- ✓ Formed at F.
- ✓ Real
- ✓ Inverted (upside down)
- ✓ Diminished (smaller than object)



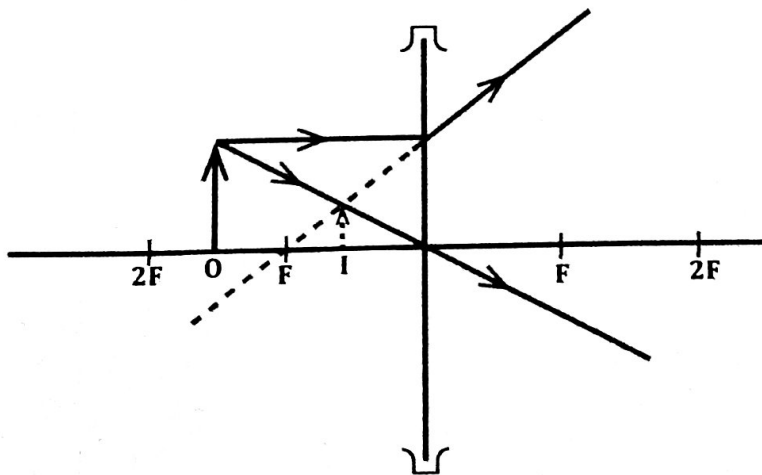
Explain how a converging lens can be used as a magnifying glass.



- ✓ A converging lens can be used as a magnifying glass when the object is placed between the principal focus and the optical centre.
- ✓ At this point, the image is upright and magnified.

IMAGES FORMED BY CONCAVE (DIVERGING) LENSES

For all positions of the object, the image formed by a concave lens is always virtual, upright and diminished.





CONSTRUCTION OF ACCURATE RAY DIAGRAMS ON A GRAPH PAPER

Steps taken:

- ❖ Draw a horizontal line which acts as the principal axis.
- ❖ Choose a suitable scale for the object and its position depending on the given distances.
- ❖ Measure focal length, f and mark positions F and $2F$ (Recall: $2F = 2f$)
- ❖ Use any two rules to draw ray diagrams.

1 WORKED EXAMPLES

(a) An object of height 4cm is placed at a distance of 60cm from a converging lens of focal length 20cm. Find by scale drawing the position, height and nature of the image.

Solution:

Vertical scale: 1 cm represents 2 cm

$$\text{Object height: } h_o = \frac{4}{2} = 2 \text{ cm}$$

Horizontal scale: 1 cm represents 10 cm

$$\text{Focal length: } f = \frac{20}{10} = 2 \text{ cm}$$

$$\text{Object distance: } u = \frac{60}{10} = 6 \text{ cm}$$

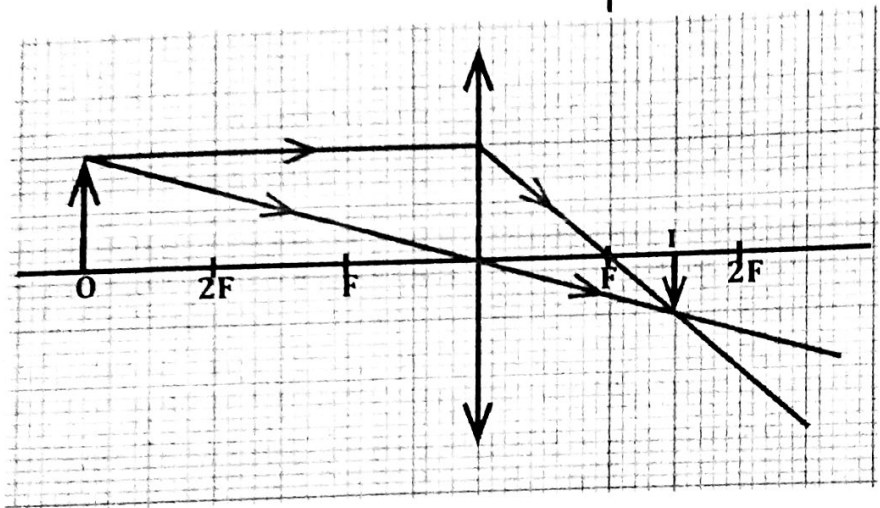


Image position, V

Hint: (3×10)

$$V = 30 \text{ cm}$$

Nature of image

- Inverted
- Diminished
- Real

Size of image

Hint: (1×2)

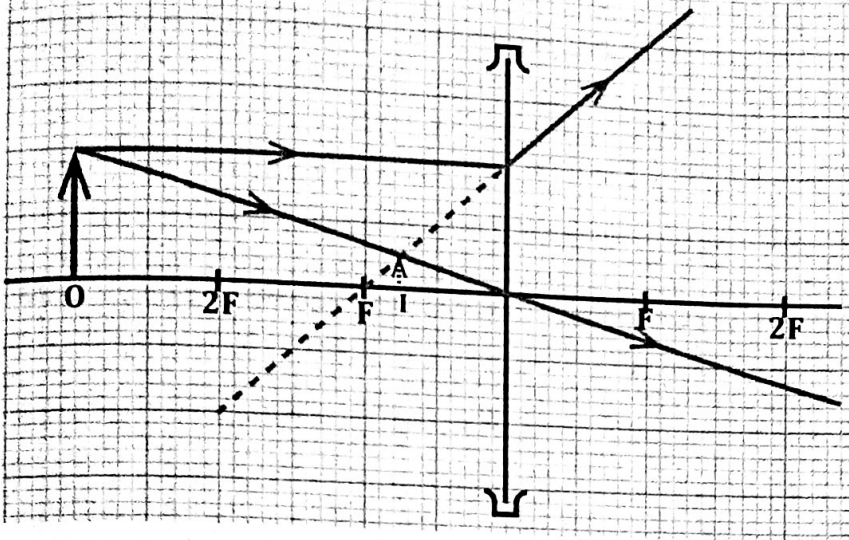
$$h_i = 2 \text{ cm}$$

(b) An object of height 10cm is placed at a distance of 60cm from a diverging lens of focal length 20cm. Find by accurate diagrams, the;

- Image position
- Height of image
- Nature of image
- Magnification

Solution:

Axis	Scale	Conversion
Vertical axis	1: 5cm	▪ <u>Height of object, O:</u> $\frac{10}{5} = 2 \text{ cm}$
Horizontal axis	1: 10cm	▪ <u>Focal length, f:</u> $\frac{20}{10} = 2 \text{ cm}$ ▪ <u>Object distance, U:</u> $\frac{60}{10} = 6 \text{ cm}$



i) Image position, V
 Hint: (1.5×10)
 $V = 15\text{cm}$

ii) Height of image
 Hint: (0.5×5)
 $h_i = 2.5\text{cm}$

iii) Nature of image
 - Upright
 - Diminished
 - Virtual

iv) Magnification
 $M = \frac{v}{u}$
 $M = \frac{15}{60} = 0.25$

(c) An object of height 2cm is placed at a distance of 10cm from a converging lens of focal length 30cm. Find by scale drawing the position, the height and the nature of the image.
 Solution:

Vertical scale: 1 cm represents 1 cm

Object height: $h_o = \frac{2}{1} = 2\text{ cm}$

Horizontal scale: 1 cm represents 10 cm

Focal length: $f = \frac{30}{10} = 3\text{ cm}$

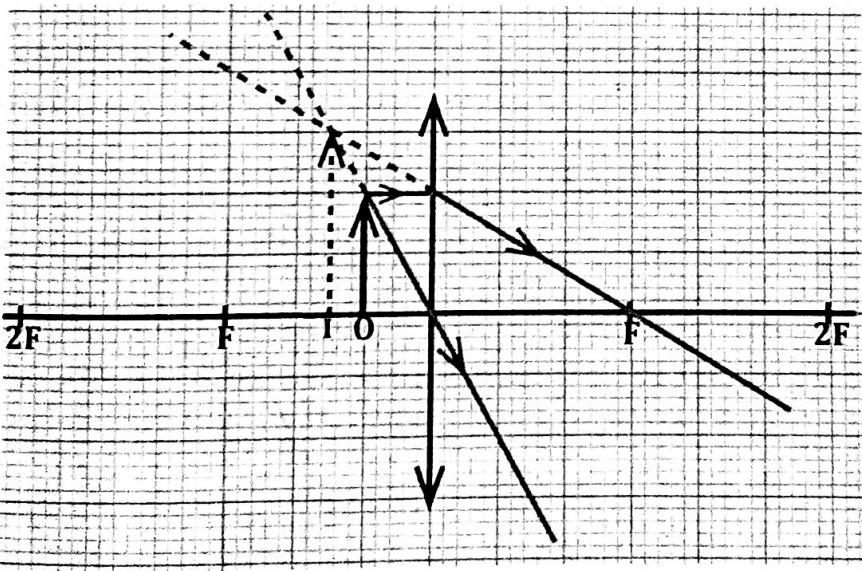
Object distance: $u = \frac{10}{10} = 1\text{ cm}$

Image position, V
 Hint: (1.5×10)
 $V = 15\text{cm}$

Nature of image
 - Upright
 - Magnified
 - Virtual

Height of image
 Hint: (3×1)
 $h_i = 3\text{cm}$

Magnification
 $M = \frac{v}{u} = \frac{15}{10}$
 $M = 1.5$



(d) An object 5cm tall placed in front of a converging lens forms an inverted image 10cm tall and 30cm from the lens. By construction, find the position of the object and focal length of the lens.
 Solution:

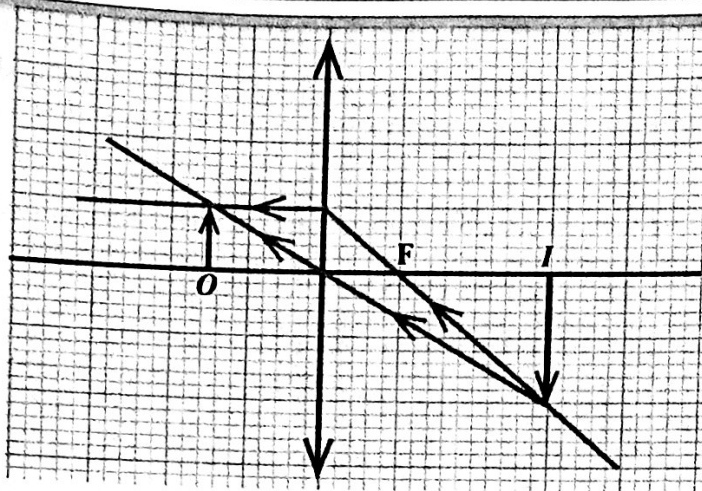
Vertical scale: 1 cm represents 5 cm

Object height: $h_o = \frac{5}{5} = 1\text{ cm}$

Image height: $h_i = \frac{10}{5} = 2\text{ cm}$

Horizontal scale: 1 cm represents 10 cm

Image distance: $v = \frac{30}{10} = 3\text{ cm}$



Object position, U

Hint: (1.5×10)
 $U = 15\text{cm}$

Focal length, f

Hint: (1×10)
 $f = 10\text{cm}$

Recall: Light rays are reversible

(e) An object of height 10 cm is placed 32.5cm from a diverging lens of focal length 12cm. By scale drawing find the position and nature of the image.

Solution:

Vertical scale: 1 cm represents 5 cm

$$\text{Object height: } h_o = \frac{10}{5} = 2 \text{ cm}$$

Horizontal scale: 1 cm represents 5 cm

$$\text{Focal length: } f = \frac{12}{5} = 2.4 \text{ cm}$$

$$\text{Object distance: } u = \frac{32.5}{5} = 6.5 \text{ cm}$$

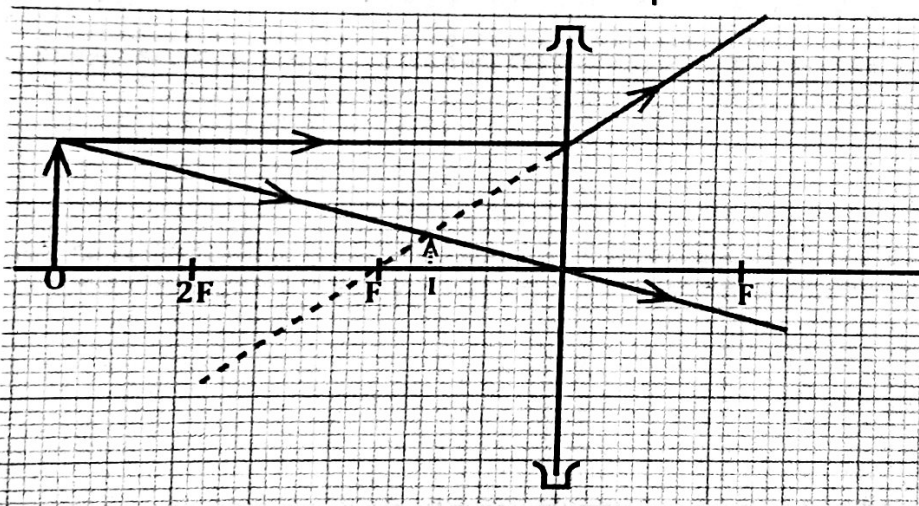


Image position, V

Hint: (1.75×5)
 $V = 8.75\text{cm}$

Nature of image

- Upright
- Diminished
- Virtual

LENS FORMULA

The both formula for both converging and diverging lenses is given by;

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

where f = focal length

u = object distance

v = image distance

Sign convention;

It states that "real" is positive and "virtual" is negative.

Note:

When calculating using the lens formula;

- The focal length, image distance and object distance of a converging lens are positive.
- The focal length and image distance of a diverging lens are negative but the object distance remains positive.

2 WORKED EXAMPLES

(a) An object of height 10cm is placed at a distance of 60cm from a diverging lens of focal length 20cm. Find the position of the image and state its nature.

Solution:

$u = 60\text{cm}, v = ?, f = -20\text{cm}$

Image position:

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$\begin{aligned} \frac{1}{-20} &= \frac{1}{60} + \frac{1}{v} \\ \frac{-20}{1} - \frac{60}{60} &= \frac{1}{v} \\ \frac{1}{v} &= \frac{-1}{15} \\ v &= -15\text{cm} \end{aligned}$$

The image is;

- Virtual (since V is negative)
- Upright and diminished (it is a diverging lens)

(b) An object of height 4cm is placed at a distance of 60cm from a converging lens of focal length 30cm. Find the position and height of the image.

Solution:

$u = 60\text{cm}, v = ?, f = 30\text{cm}, h_o = 4\text{cm}$

Image position:

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$\begin{aligned} \frac{1}{30} &= \frac{1}{60} + \frac{1}{v} \\ \frac{1}{30} - \frac{60}{60} &= \frac{1}{v} \\ \frac{1}{v} &= \frac{1}{60} \\ v &= 60\text{cm} \end{aligned}$$

$$\begin{aligned} \frac{v}{u} &= \frac{h_i}{h_o} \\ \frac{60}{60} &= \frac{h_i}{4} \\ h_i &= 4\text{cm} \end{aligned}$$

POWER OF A LENS

Before doctors give out spectacles to their patients, they first examine their eye sight to know the power of the lens to be included in the spectacles so as to focus light clearly onto the retina of the patient. The power of a lens tells how strongly the lens can bend light rays.

Definition:

Power of a lens is the reciprocal of its focal length in metres.

Its SI unit is Diopres (D).

$$\begin{aligned} \text{Power of a lens} &= \frac{1}{\text{focal length(m)}} \\ P &= \frac{1}{f(m)} \end{aligned}$$

Note:

- A shorter focal length gives a higher power (bends light more strongly).
- Power is positive for convex lenses and negative for concave lenses.

3 WORKED EXAMPLES

(a) Calculate the power of a converging lens of focal length 10mm.

$$\begin{aligned} f = 10\text{mm} &= \frac{10}{1000} = 0.01\text{m} \\ P &= \frac{1}{f} \end{aligned}$$

$$\begin{aligned} P &= \frac{1}{0.01} \\ P &= 100\text{D} \end{aligned}$$

(b) Calculate the power of a diverging lens of focal length 10cm.

$$f = -10\text{cm} = \frac{-10}{100} = -0.1\text{m}$$

$$P = \frac{1}{f}$$

$$P = \frac{1}{-0.1}$$

$$P = -10\text{D}$$

NOTE:

If two lenses are combined, we get their total power of combination.

Total power of combination = power of first lens + power of second lens

(c) Two converging lenses of focal length 15cm and 20cm are placed in contact. Calculate the power of combination.

$$f_1 = 15\text{cm} = \frac{15}{100} = 0.15\text{m}$$

$$f_2 = 20\text{cm} = \frac{20}{100} = 0.2\text{m}$$

$$P = P_1 + P_2$$

$$P = \frac{1}{f_1} + \frac{1}{f_2}$$

$$P = \frac{1}{0.15} + \frac{1}{0.2}$$

$$P = 11.67\text{D}$$

(d) A converging lens of focal length 20cm is placed in contact with a diverging lens of focal length 100mm. find the power of the combination.

$$f_1 = 20\text{cm} = \frac{20}{100} = 0.2\text{m}$$

$$f_2 = -100\text{mm} = \frac{-100}{1000} = -0.1\text{m}$$

$$P = P_1 + P_2$$

$$P = \frac{1}{f_1} + \frac{1}{f_2}$$

$$P = \frac{1}{0.2} + \frac{1}{-0.1}$$

$$P = -5\text{D}$$

Practice Exercise

- Mr. Musoke has a microscope with a convex lens of focal length 20 cm. Calculate the power of his convex lens. (5D)
- Madam Babirye wears spectacles with a diverging lens of focal length 15 cm. Unfortunately, she broke one of the lenses. She wants to replace it but does not know the power of her lenses. Help Agnes determine the power of her lenses. (-6.67D)
- An object 4cm high is placed perpendicularly on the principal axis 10cm away from a converging lens of focal length 15cm. With the aid of a ray diagram, determine nature, position and magnification of the image formed. (30cm, 3)
- An object 5cm tall placed in front of a converging lens, forms an inverted image twice as tall as the object and 30cm from the lens. By construction, find the position of the object, the focal length and power of the lens. (15cm, 10cm, 10D)
- An object of height 4cm is placed perpendicularly on the principal axis at a distance of 45cm from a converging lens of focal length 15cm. By graphical construction, determine
 - The position of the image (22.5cm)
 - The magnification (0.5)

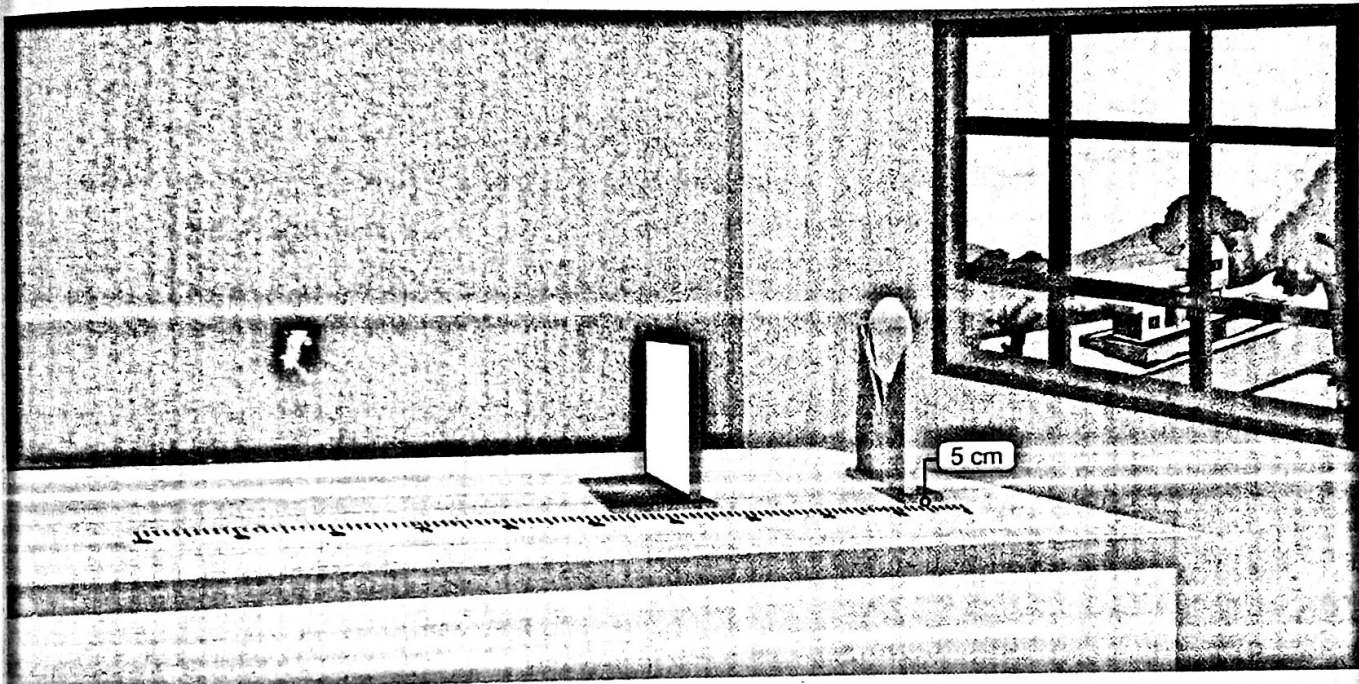


DETERMINING FOCAL LENGTH OF CONVERGING LENS

METHOD 1: USING A DISTANT OBJECT

What you need

- Distant Object e.g., window
- Metre rule
- Lens holder
- White screen
- Convex lens



What to do

- (a) Place the convex lens in a lens holder.
- (b) Align the lens, screen and distant object in a straight line as shown above.
- (c) Move the screen towards and away from the lens until the sharp clear image of the distant object is formed on it.
- (d) Measure and record the distance, f_1 between the lens and the screen.
- (e) Repeat procedures (c) to (d) two times to get other values of f_2 , and f_3 .
- (f) Determine the focal length by determining the average value $f = \frac{f_1+f_2+f_3}{3}$

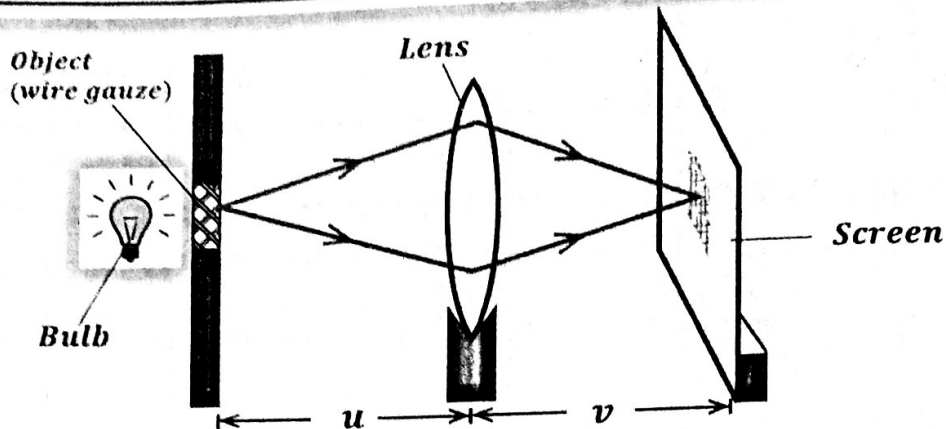
Note:

The above method is not accurate enough.

METHOD 2: USING OBJECT AND IMAGE DISTANCES

What you need

- Source of light e.g. bulb
- Metre rule
- Lens holder
- White screen
- Convex lens
- Screen with wire gauze



What to do

- (a) Arrange the apparatus as shown above with the lens between the screen and the object.
- (b) Place the lens at a known distance, $u = 20\text{ cm}$ from the wire gauze.
- (c) Move the screen towards and from the lens until a clear image of the object is formed on it.
- (d) Measure and record the image distance, v .
- (e) Repeat the experiment for different values of object distance, $u = 25, 30, 35, 40\text{ cm}$.
- (f) Record your results in a suitable table including values of $u + v$ and uv

$u\text{ (cm)}$	$v\text{ (cm)}$	$u + v\text{ (cm)}$	$uv\text{ (cm}^2\text{)}$
20			
25			
30			
35			
40			

- (g) Plot a graph of $u + v$ against uv .
- (h) Determine the slope, f of the graph

Note:

The slope obtained is equal to the focal length of the convex lens.

Applications of Lenses in Daily Life

Lenses are used in many devices and tools that we encounter daily. Here are some common applications:

- ❖ **Eyeglasses/Spectacles:**
Lenses are used in eyeglasses to correct vision problems.
- ❖ **Cameras:**
Cameras use lenses to focus light and form clear images of the scene in front of them.
- ❖ **Magnifying Glass:**
A magnifying glass uses a convex lens to enlarge the appearance of objects. It is often used in biology to magnify small objects.
- ❖ **Microscopes:**
Microscopes use multiple lenses to magnify tiny objects, such as cells or bacteria, that cannot be seen by the naked eye.



❖ **Telescopes:**

Telescopes use convex lenses (or mirrors in some cases) to focus light from distant objects like stars, planets, and galaxies. This allows us to see far-away objects clearly.

❖ **Projectors:**

In projectors, lenses are used to focus and enlarge images onto a screen. The lens adjusts the image size and sharpness for clear projection.

❖ **Contact Lenses:**

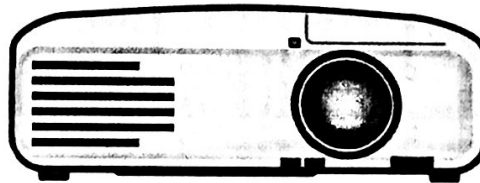
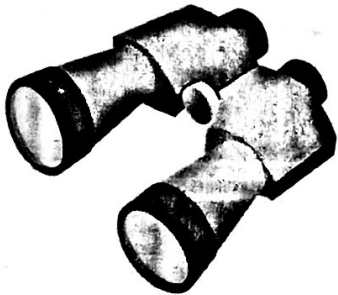
Contact lenses are thin lenses placed directly on the eye to correct vision problems, similar to spectacles.

❖ **Binoculars:**

Binoculars use two convex lenses to magnify distant objects and allow both eyes to focus on the object, providing a clearer and larger image.

❖ **Laser Machines:**

Lenses are used in lasers for focusing the light into a narrow beam. This can be used in various fields, such as in laser printers or medical surgeries.

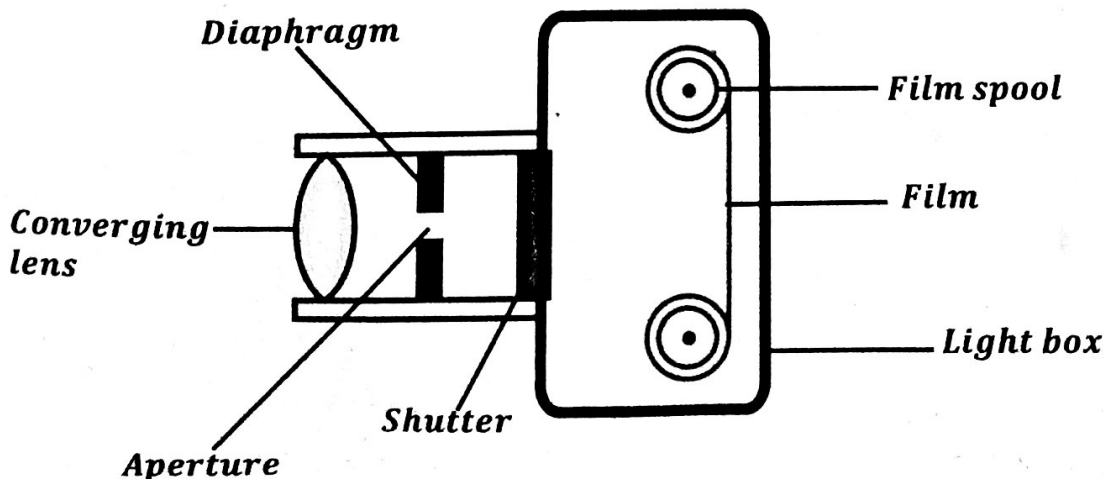


OPTICAL INSTRUMENTS

Optical instruments are devices that use lenses, mirrors, or prisms to manipulate light and form images. They are used in various fields such as medicine, astronomy, photography, and daily life for enhancing vision or capturing images.

LENS CAMERA

A lens camera is an optical device used to capture images by focusing light onto a light sensitive film. It consists of a light-tight box with a convex lens at the front side. It has a light sensitive film at the back on which a real, inverted and diminished image. The inner surface is painted black to prevent the reflection of stray rays of light which would blur the image.



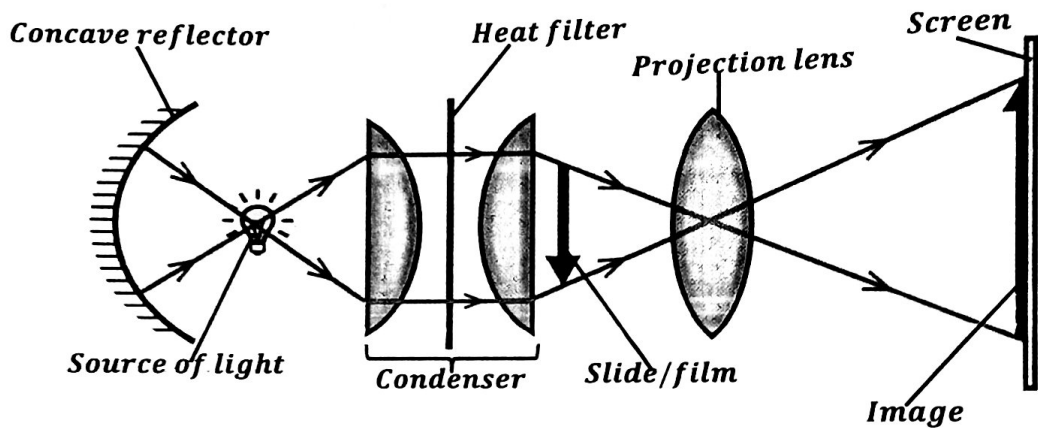


How a lens camera works

- ✓ When you take a photo, light enters the camera through the converging lens.
- ✓ The converging lens focuses the light onto the film to form an image.
- ✓ The diaphragm controls the amount of light entering the camera by adjusting the size of aperture.
- ✓ The shutter then opens for a short time, allowing light to reach the film sensor.
- ✓ Finally, the film captures the image, creating a final photograph. The film is a light-sensitive part where a real, inverted and diminished image is formed.

SLIDE PROJECTORS

A projector is an optical device that takes an image or video and enlarges it to display on a larger surface such as a screen or wall. Projectors are commonly used in presentations, classrooms, cinemas, and home theaters to display content in a large format.



How a Projector works

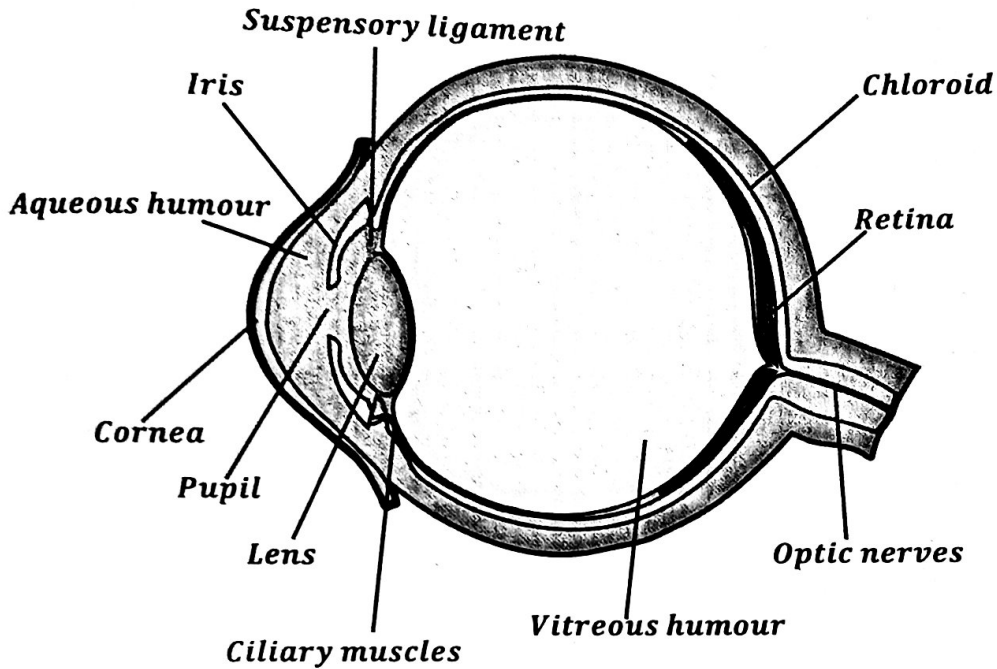
- ✓ The Source of Light provides a powerful beam of light that illuminates the whole system.
- ✓ The concave reflector reflects light rays back that would have been wasted, directing them toward the slide.
- ✓ The condenser is made up of two plano-convex lenses that focus and concentrate light onto the slide.
- ✓ The slide acts as the object whose image is to be projected.
- ✓ The projection lens magnifies the image of the slide onto the screen.
- ✓ The screen is where the real image of the slide is formed.
- ✓ The heat filter absorbs excess heat from the light source to prevent the slide from melting.



For modern digital projectors, slides are not used. Instead, the projector receives video signals through HDMI, VGA, wireless connections (Wi-Fi or Bluetooth), or USB. These signals are then processed and projected onto the screen.

THE HUMAN EYE

The human eye is an organ that allows us to see and interpret the world around us by detecting light. It works much like a camera, where light enters through the eye's lens, focuses on the retina, and sends visual information to the brain.



Light enters the eye through the cornea. The eye lens focusses the image of the object onto the retina. The retina is sensitive to light and sends messages to the brain through the optic nerves. The lens changes its size so as to focus images of far and near objects on the retina and this is referred to as accommodation.

Functions of the parts of the eye:

- Lens:** The convex lens changes its shape and size so as to focus light onto the retina.
- Ciliary muscle:** This muscle changes the focal length of the eye lens by adjusting its size.
- Iris:** It controls the amount of light entering the eye by regulating the size of the pupil.
- Retina:** This is where the image is formed.
- Optic nerves:** They transmit signals of the image from the retina to the brain for interpretation.



Important definitions

Accommodation:

This is the ability of the eye to change (adjust) the focal length of its lens so as to focus images of near and far objects clearly on the retina.

Near point: This is the closest or nearest point at which an eye can see an image clearly. For a normal eye, the near point is 25cm.

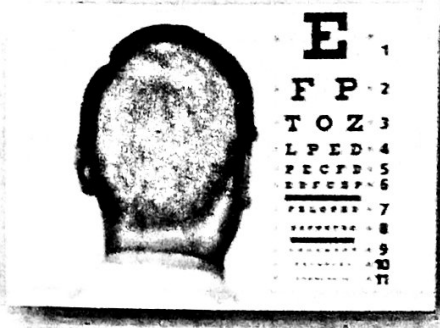
Far point: This is the most distant or furthest point at which the eye can see an image clearly. For a normal eye, the far point is at infinity.



ASSESSING ACCOMODATION AT HOME

What you need

- A reading material
- A distant object like a chart clock on the wall



What to do:

Near Vision Test (Near Point):

- Hold the reading material at a comfortable distance in front of your eyes.
- Slowly move the material closer to your eyes.
- When the text becomes blurry, note the distance from your eyes. This is your near point. For a normal eye, it should be about 25 cm away.
- If the material remains clear even at a very close distance, your eyes may have strong accommodation.

Far Vision Test (Far Point):

- Look at a distant object (e.g., a clock on the wall).
- Your eyes should be able to focus on the object without strain. If you can see it clearly from a distance, your accommodation is functioning well for far vision.
- If you find that you need to struggle to see clearly at a distance, it could indicate a problem with far-point accommodation.

EYE DEFECTS AND THEIR CORRECTIONS

The human eye is an amazing organ that allows us to see the world around us. However, sometimes the eye may not function perfectly, leading to eye defects. These defects affect how we see things and can range from mild to severe. Some defects are present from birth, while others develop over time due to various factors such as aging or environmental conditions.

In most cases, eye defects can be corrected or managed with the help of eye glasses or spectacles, contact lenses, or in some cases, surgery.

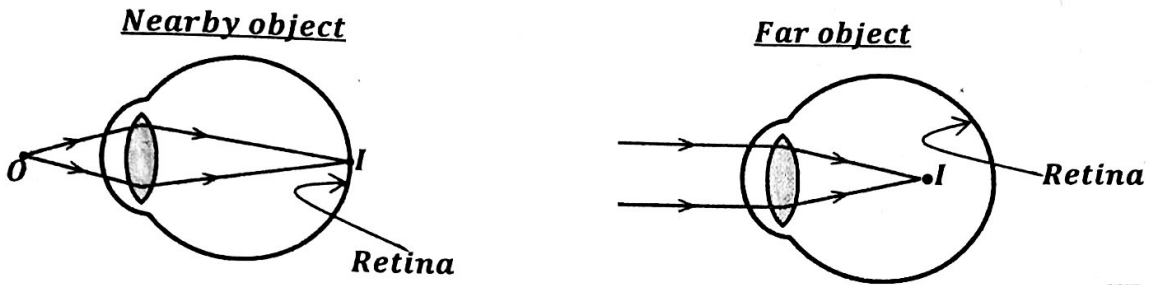


There are two common eye defects namely;

- Short sightedness (Myopia)
- Long sightedness (Hypermetropia)

SHORT SIGHTEDNESS (MYOPIA)

A short-sighted person can see nearby objects clearly but cannot see far objects clearly. This happens because the light entering the eye focuses in front of the retina instead of directly on it. The images of the near objects are formed on the retina but images of the far objects are formed in front of the retina



People with myopia tend to bring objects, like books, closer to their eyes to see them clearly. If the book is too far and they struggle to read it, it suggests that their eye may not be able to focus the light correctly, which is a common symptom of myopia.

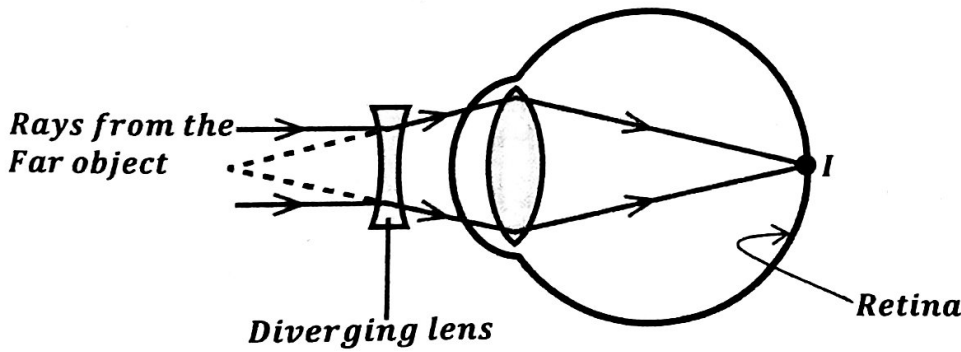


Myopia is caused by;

- The eyeball is longer than normal, so the light entering the eye focuses before it reaches the retina.

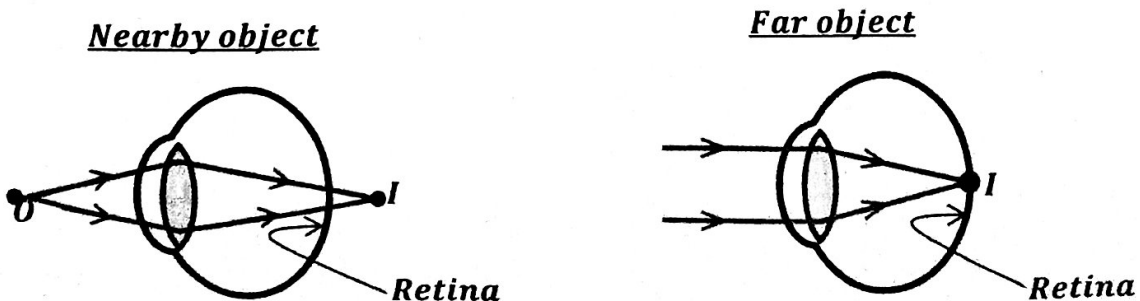
Correction of short sightedness:

- ✓ Short-sightedness (myopia) is corrected by wearing spectacles with diverging (concave) lenses.
- ✓ The concave lens diverges the light rays from far objects before they enter the eye.
- ✓ This allows the eye's lens to focus the diverged rays correctly on the retina, forming a clear image.



LONG SIGHTEDNESS (HYPERMETROPIA)

A long-sighted person can see far objects clearly but cannot see nearby objects clearly. This happens because the light entering the eye focuses behind the retina instead of directly on it. The images of the far objects are formed on the retina but the images of nearby objects are formed behind the retina.



People who are long sighted may find that holding a book too close makes the text not clear. To bring the image into focus, they might push the book further away, where the light can be focused more clearly on the retina.

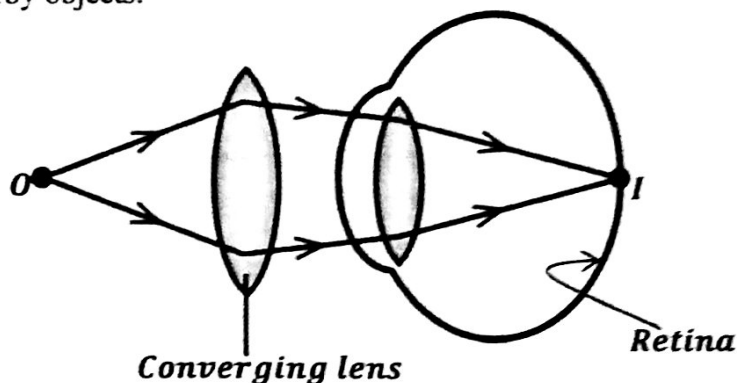


Long sightedness is caused by;

- The eyeball is too short, so the light entering the eye focuses behind the retina.

Correction of long sightedness:

- ✓ Long-sightedness (hypermetropia) is corrected by wearing spectacles with converging (convex) lens.
- ✓ The convex lens helps to converge the light rays from nearby objects before they enter the eye.
- ✓ This allows the eye's natural lens to focus the converged rays properly onto the retina, forming a clear image of nearby objects.



ASTIGMATISM:

This is where light rays entering the eye fail to come to a single focus point. This is often due to an irregular shape of the cornea or lens.

The person sees a distorted image. A person suffering from astigmatism faces eye strains and headaches after prolonged reading and watching televisions.

Activity of Integration

In your community, there has been an increasing number of people experiencing difficulties with their vision, especially among school children and workers who often spend long hours in front of screens. Many of them are complaining of blurry vision, frequent headaches, and difficulty reading or seeing objects clearly, both near and far. The local health clinic has noticed a rise in these complaints and is planning to host an eye care awareness campaign.

You have been chosen to prepare a report on the common eye conditions affecting the community and recommend ways to improve eye health and prevent further vision problems. The medical team will use your report to design the awareness campaign and provide appropriate interventions.

Task:

Write a report that you will present to the medical team.