

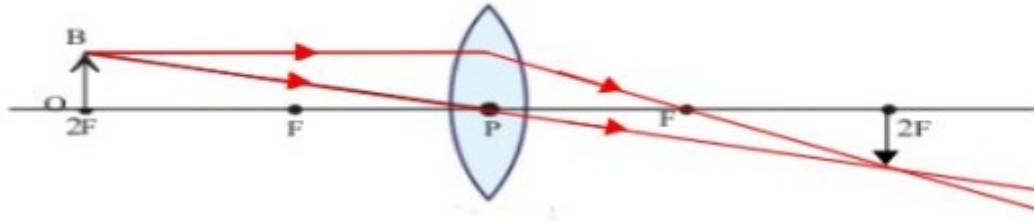
UNIT 5
Refraction of Light

01/01/2021 – Class 45

Activity 1

Let's draw the ray diagram of formation of images by lenses.

Object at 2F



Discussion

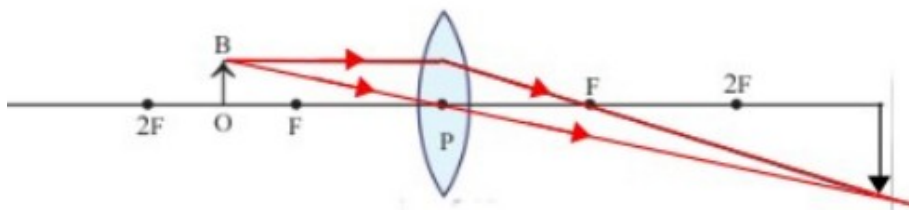
- Where is the position of the object (OB)? **At 2F.**
- Which are the rays incident on the lens from the object? **One ray is incident parallel to the principal axis and the second ray is incident on the optic centre of the lens.**
- What happens to the ray of light, incident on the lens, parallel to the principal axis? **It passes through the principal focus after refraction.**
- What happens to the ray of light, incident on the optic centre of the lens? **It passes without any deviation.**
- Where does the refracted rays meet? **At 2F.**
- Where is the position of the image? **At 2F.**
- What are the features of the image? **Real, Inverted, Same size.**

Inference

When the object is placed at **2F** of a convex lens, the image is formed at **2F** on the other side of the lens. Features of the image are **real, inverted and same size.**

Activity 2

Object between F and 2F



Discussion

- Where is the position of the object (OB)? **Between F and 2F.**
- Which are the rays incident on the lens from the object? **One ray is incident parallel to the principal axis and the second ray is incident on the optic centre of the lens.**
- What happens to the ray of light, incident on the lens, parallel to the principal axis? **It passes through the principal focus after refraction.**
- What happens to the ray of light, incident on the optic centre of the lens? **It passes without any deviation.**
- Where does the refracted rays meet? **Beyond 2F.**

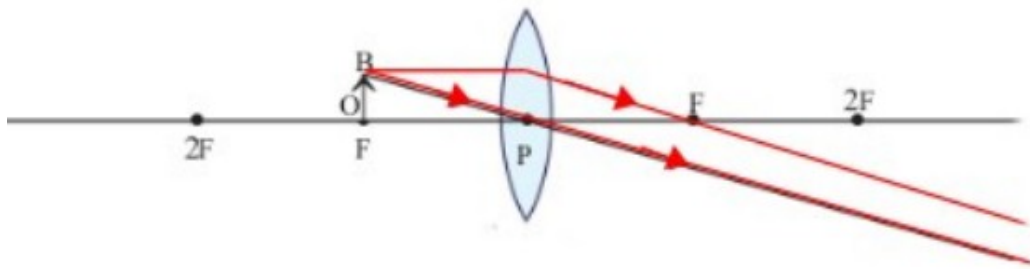
- Where is the position of the image? **Beyond 2F.**
- What are the features of the image? **Real, Inverted, Magnified.**

Inference

When the object is placed **between F and 2F** of a convex lens, the image is formed **beyond 2F** on the other side of the lens. Features of the image are **real, inverted and magnified.**

Activity 3

Object at F



Discussion

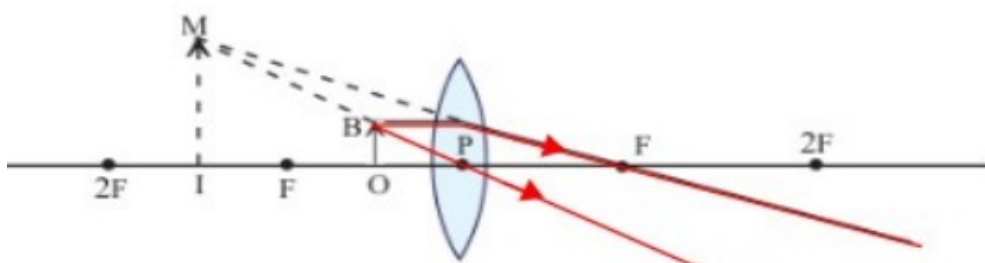
- Where is the position of the object (OB)? **At F.**
- Which are the rays incident on the lens from the object? **One ray is incident parallel to the principal axis and the second ray is incident on the optic centre of the lens.**
- What happens to the ray of light, incident on the lens, parallel to the principal axis? **It passes through the principal focus after refraction.**
- What happens to the ray of light, incident on the optic centre of the lens? **It passes without any deviation.**
- What is the speciality of the refracted rays? **They are parallel to each other.**
- Where will this parallel rays of light meet? **At infinity.**
- So, where should be the position of the image? **At infinity.**
- What are the features of the image? **Real, Inverted, Magnified.**

Inference

When the object is placed at the **focus (F)** of a convex lens, the image is formed at **infinity**. Features of the image are **real, inverted and magnified.**

Activity 4

Object between F and lens



Discussion

- Where is the position of the object (OB)? **Between F and lens**

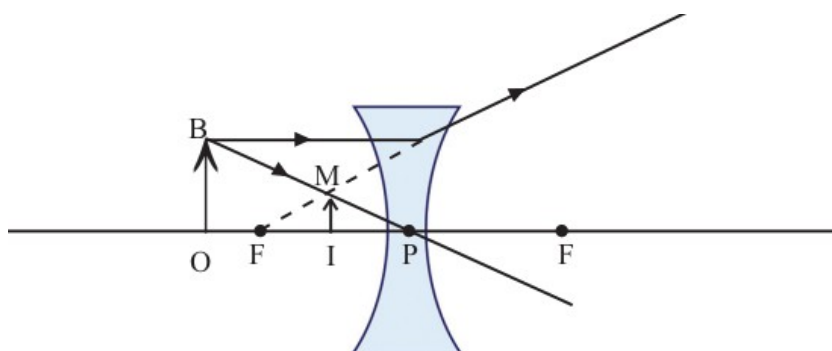
- Which are the rays incident on the lens from the object? **One ray is incident parallel to the principal axis and the second ray is incident on the optic centre of the lens.**
- What happens to the ray of light, incident on the lens, parallel to the principal axis? **It passes through the principal focus after refraction.**
- What happens to the ray of light, incident on the optic centre of the lens? **It passes without any deviation.**
- What is the speciality of the refracted rays? **They are diverging from each other.**
- When these light rays are extended backwards with imaginary lines, what happens? **They appear to meet at the same side of the object.**
- So, where is the position of the image? **At the same side of the object.**
- The image is real or virtual? **Virtual.**
- Why? **The refracted rays doesn't meet, they only appear to meet.**
- Image is erect or inverted? **Erect.**
- What about the size of the image? **Magnified.**

Inference

When the object is placed **between F and lens** of a convex lens, the image is formed at the **same side of the object**. Features of the image are **virtual, erect and magnified**.

Activity 5

Image formed by a concave lens



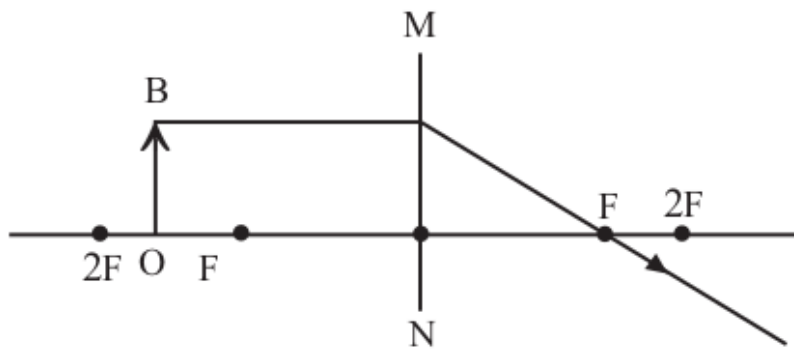
Discussion

- Which are the rays incident on the lens from the object (OB)? **One ray is incident parallel to the principal axis and the second ray is incident on the optic centre of the lens.**
- What happens to the ray of light, incident on the concave lens, parallel to the principal axis? **It appears to diverge from the principal focus on the same side of the incident ray.**
- What happens to the ray of light, incident on the optic centre of the lens? **It passes without any deviation.**
- Where do the two light rays from the object, appear to meet? **M**
- So, where is the position of the image (IM)? **At the same side of the object, between F and lens (P).**
- The image is real or virtual? **Virtual.**
- Why? **The refracted rays doesn't meet, they only appear to meet.**
- Image is erect or inverted? **Erect.**
- What about the size of the image? **Diminished.**

Inference

In a concave lens whatever may be the position of the object, the image is always formed at the same side of the object, **in between the optic centre (P) and focus(F)**. The image is **virtual, erect and diminished**.

Assignment



- (a) MN represents a lens. What type of lens is this?
- (b) What are the characteristics of the image?
- (c) Copy the ray diagrams in the science diary and complete it.