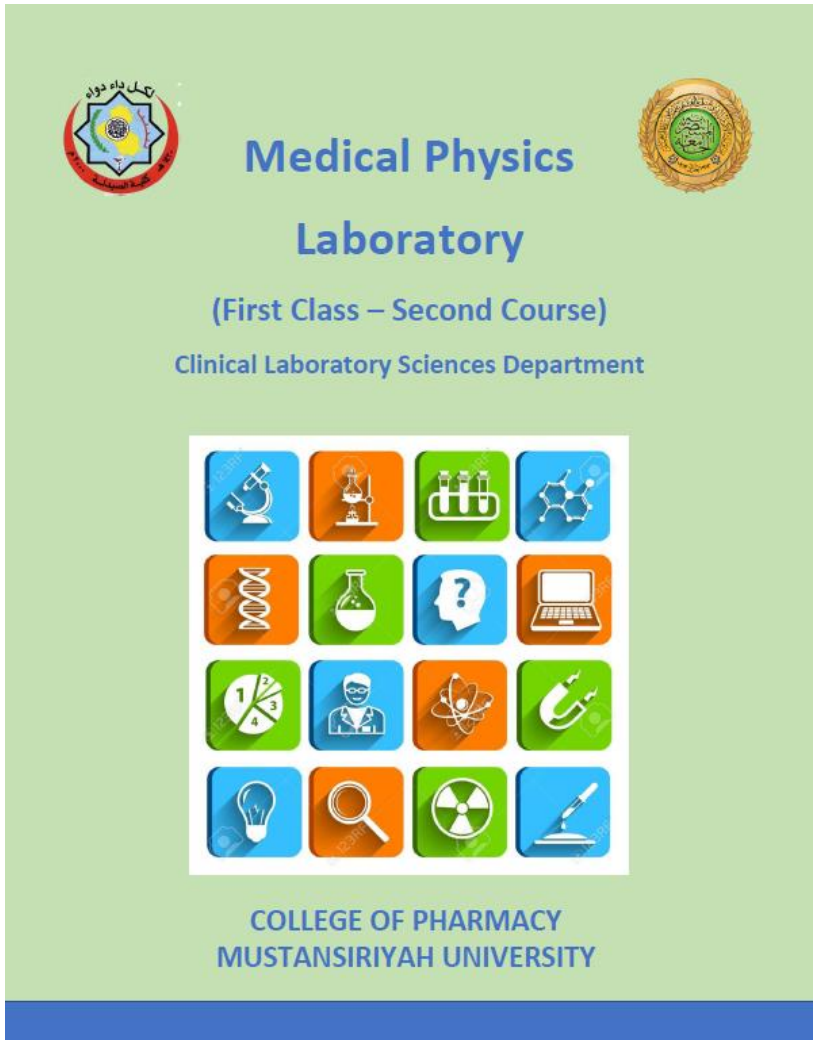
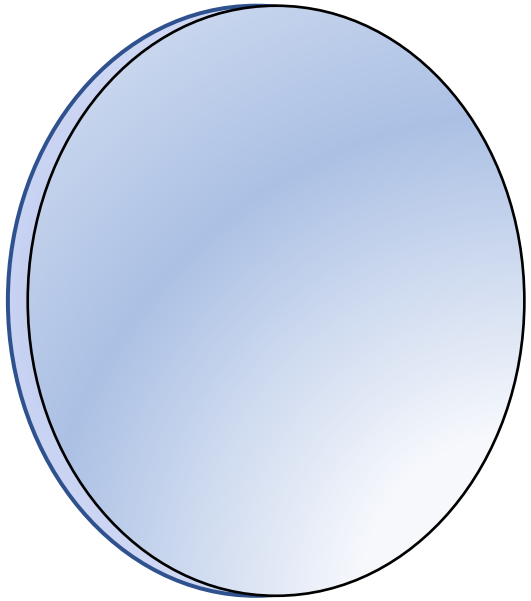
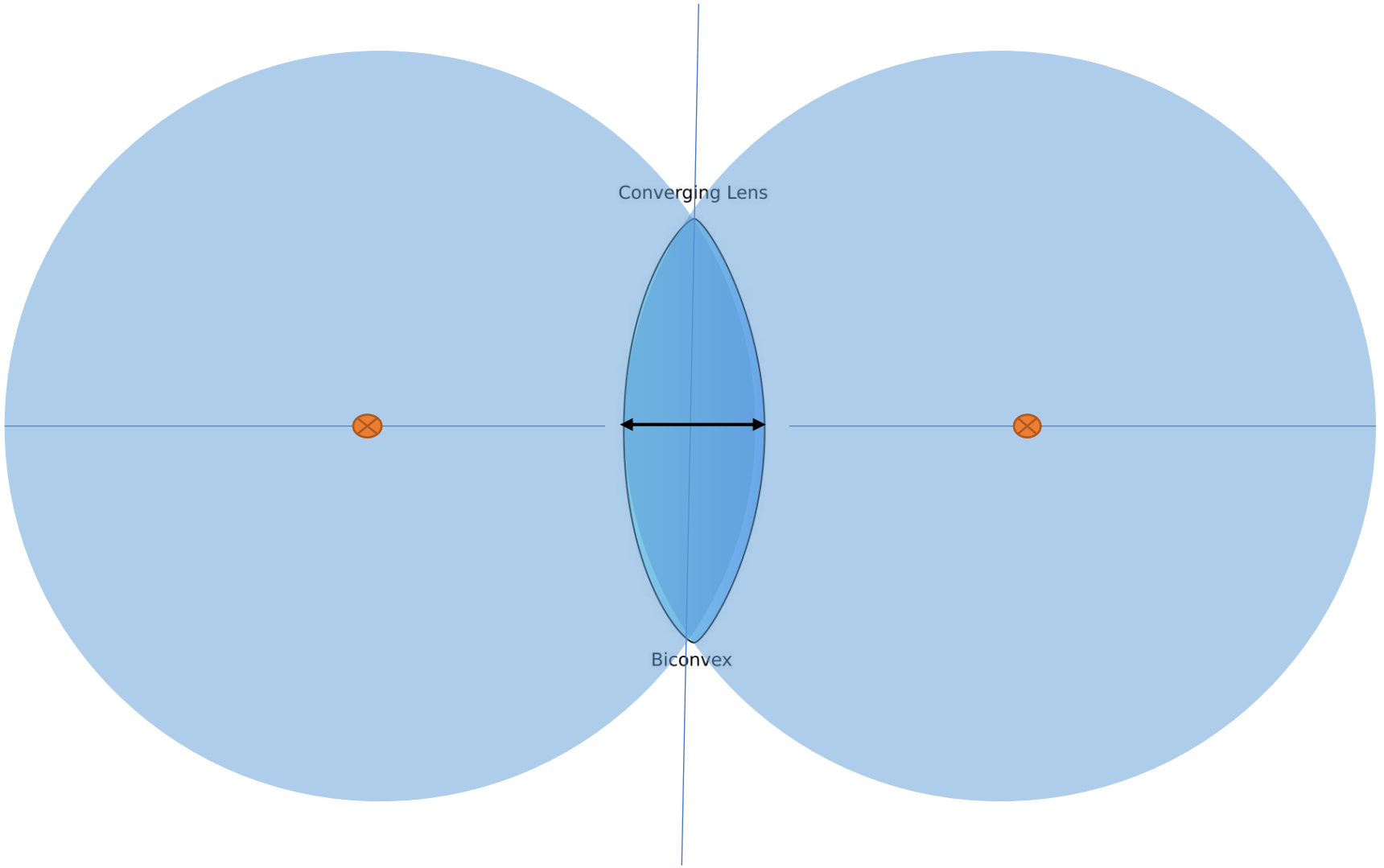
Medical Physics Lab

Exp. 3
The focal length of biconvex lens



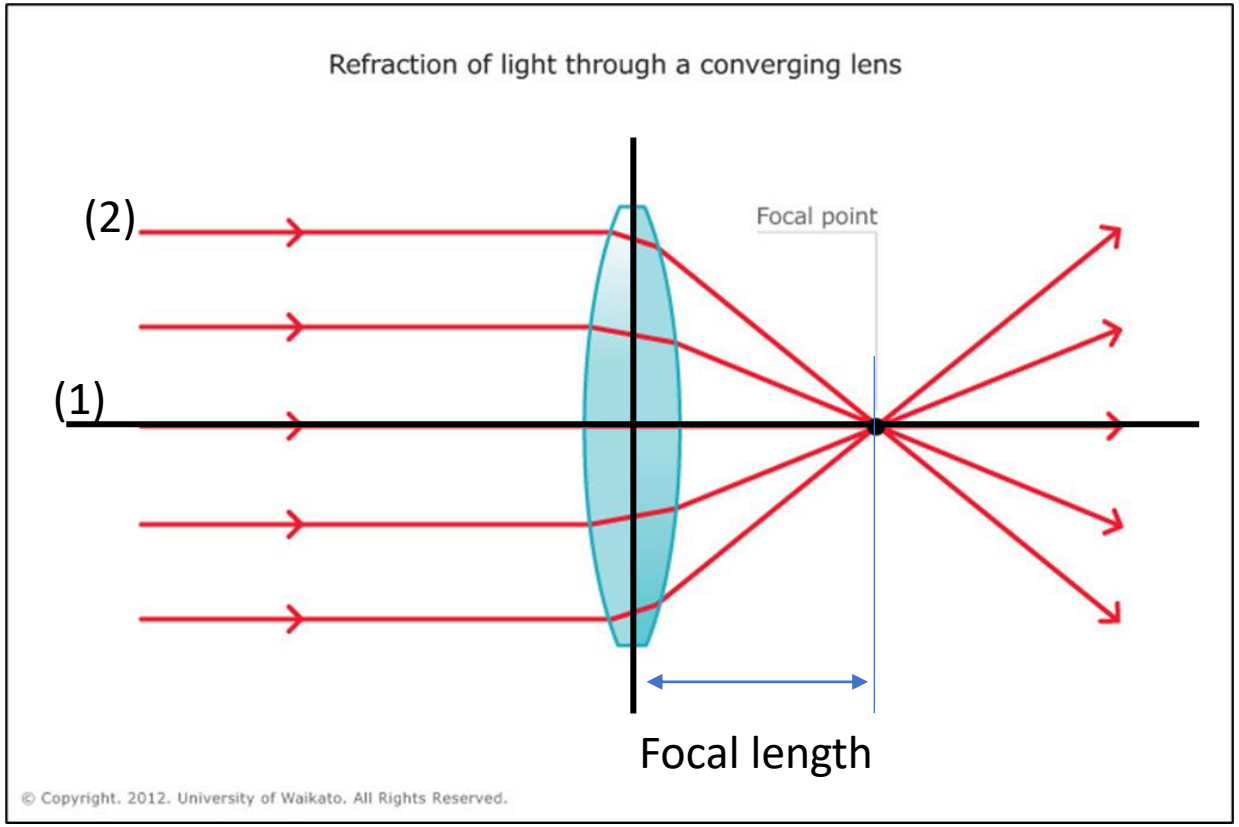
Converging lens (biconvex lens):





Converging lens :

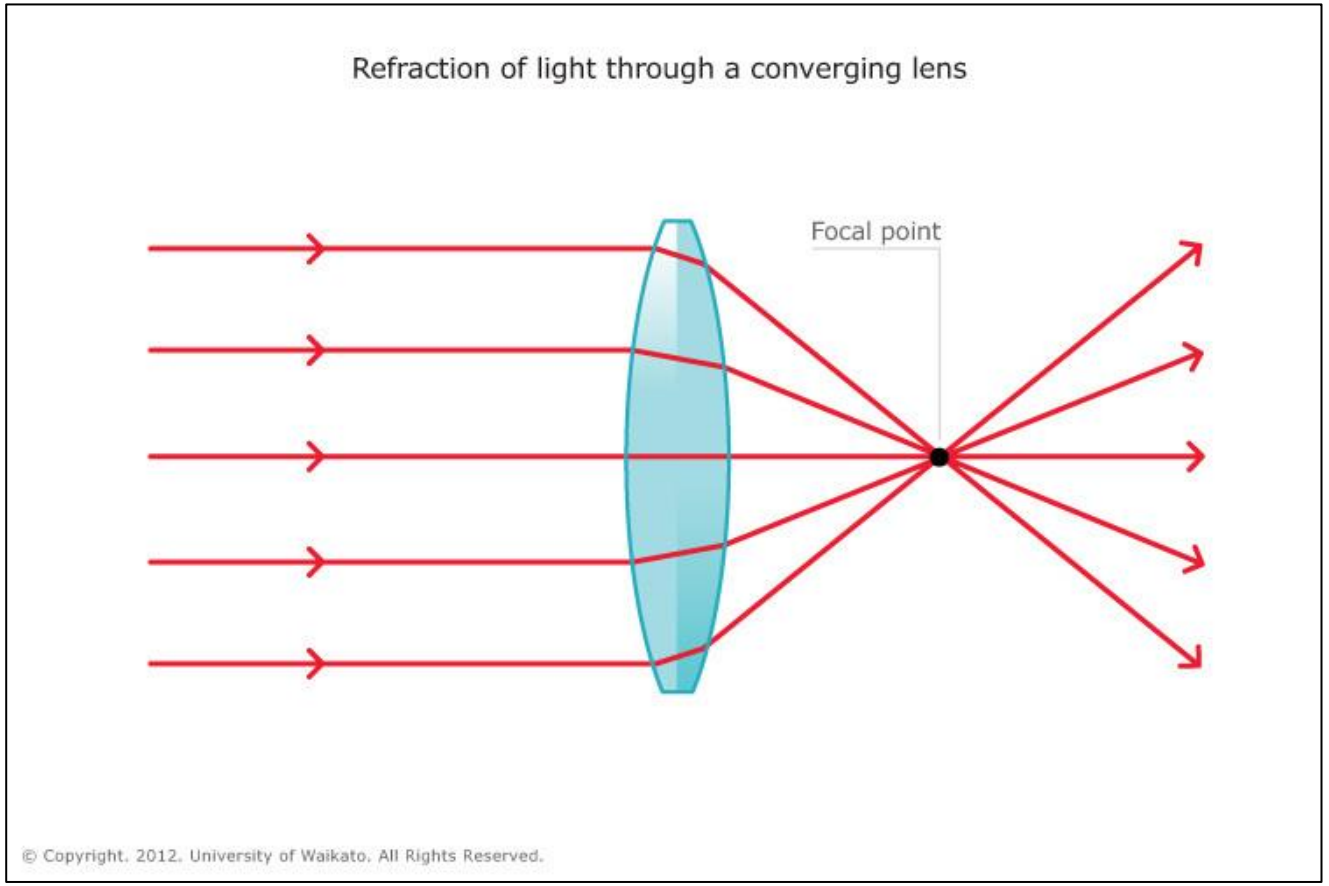
- A biconvex lens is called a converging lens because rays parallel to the principal axis converge at the focal point.
- the chief ray (1) through the center of the lens passes straight through. A ray parallel (2) to the principal axis is refracted in such a way that it goes through the focal point on the far side of the lens.
- If the image is formed on the side of the lens opposite to the object, it is real and can be observed on a screen.
- However, if the image is on the same side of the lens as the object, it is virtual and cannot be seen on a screen.



Purpose :

- To determine the focal length of the converging lens by using:

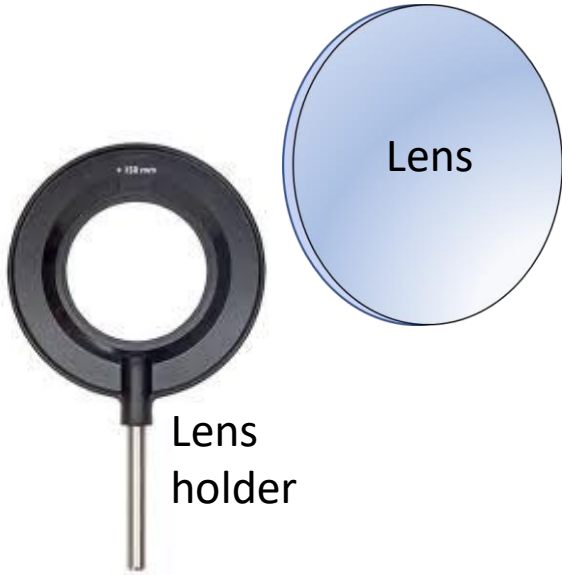
1. Far object
2. Graph method

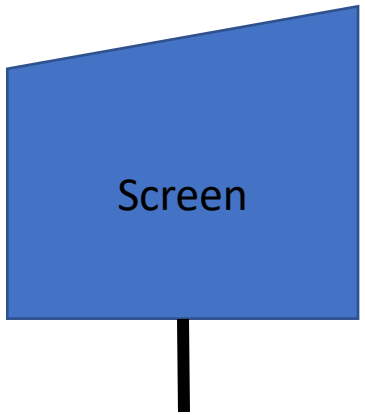


Apparatus :

1. Converging lens (Convex lens).
2. Holder.
3. Meter scale.
4. Mounted pin (object).
5. Screen

Meter Scale



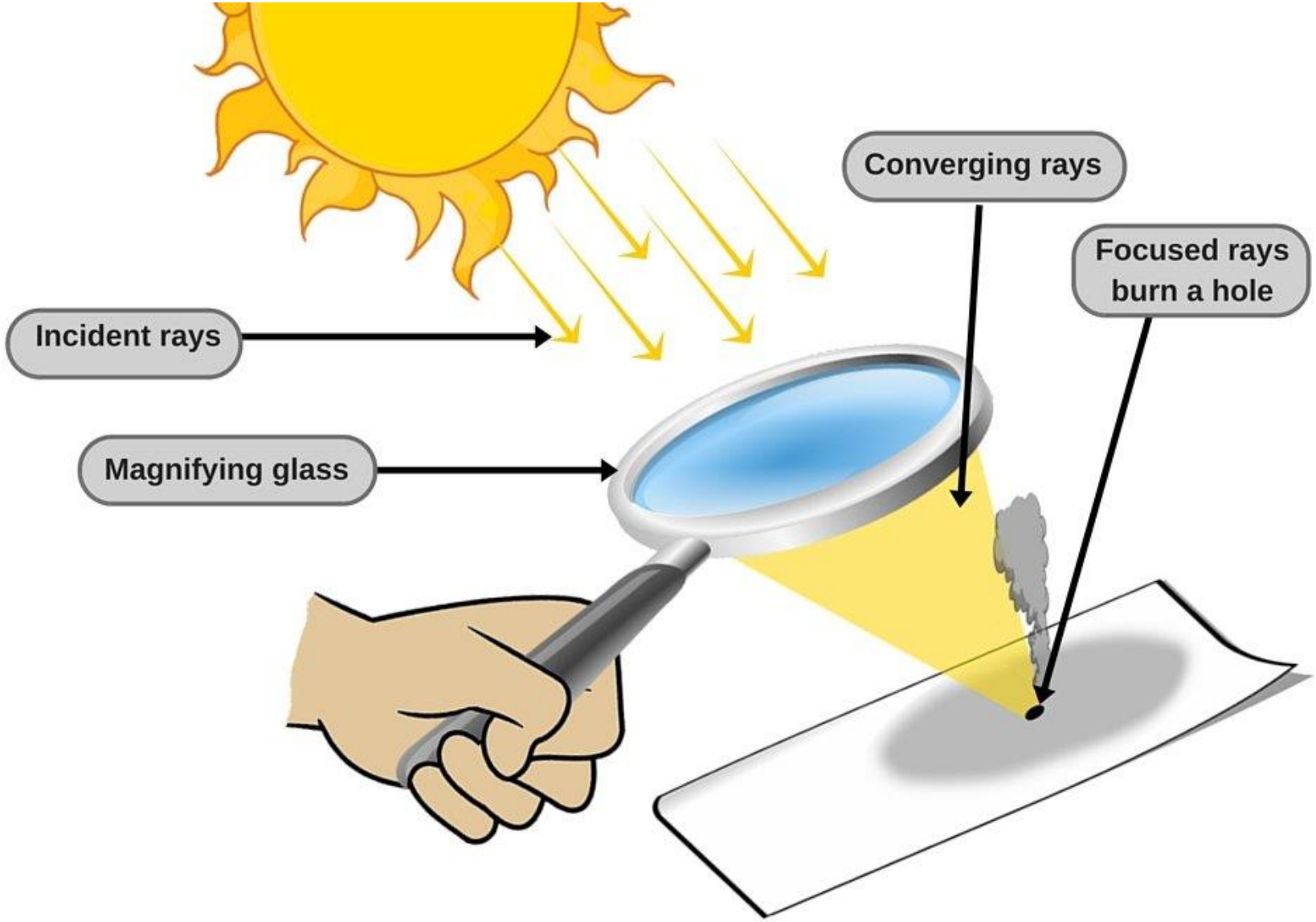


Procedure : Part 1

- 1. Obtain a rough value F´ for the focal length of the lens by focusing the image of the window on a screen.
- 2. Measure the distance between the lens and the image (F´ **)**
- 3. Repeat two times at different places along the optical bench or scale and take the mean of the results.
- F´ = rough value for the focal length of the lens .

https://youtu.be/-B8N3EW9370 يرجى متابعة هذا الفيديو التعليمي لهذا الجزء من التجربة

Procedure : Part 1

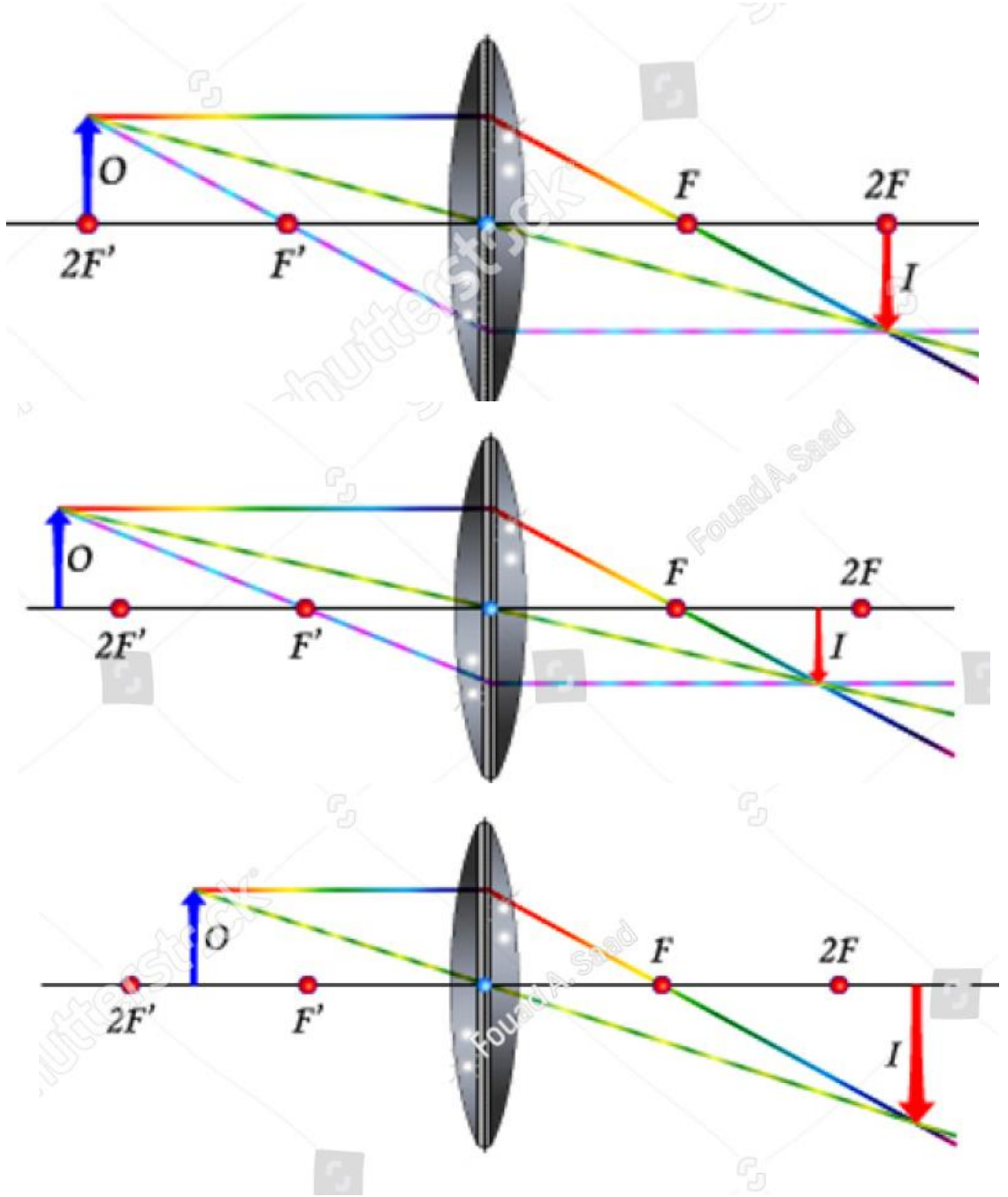


Procedure : Part 2

1. place an object pin at a distance from the lens equal to 2 F´. Measure the distance between the object and lens , which is called (U).

2. Locate the position of is real image on the other side of the lens, by using a screen .Measure the distance between the image and lens , Which is called (V) .

3. Move the object to other position both nearer to and farther away from the lens, locating the new position of the image each time .

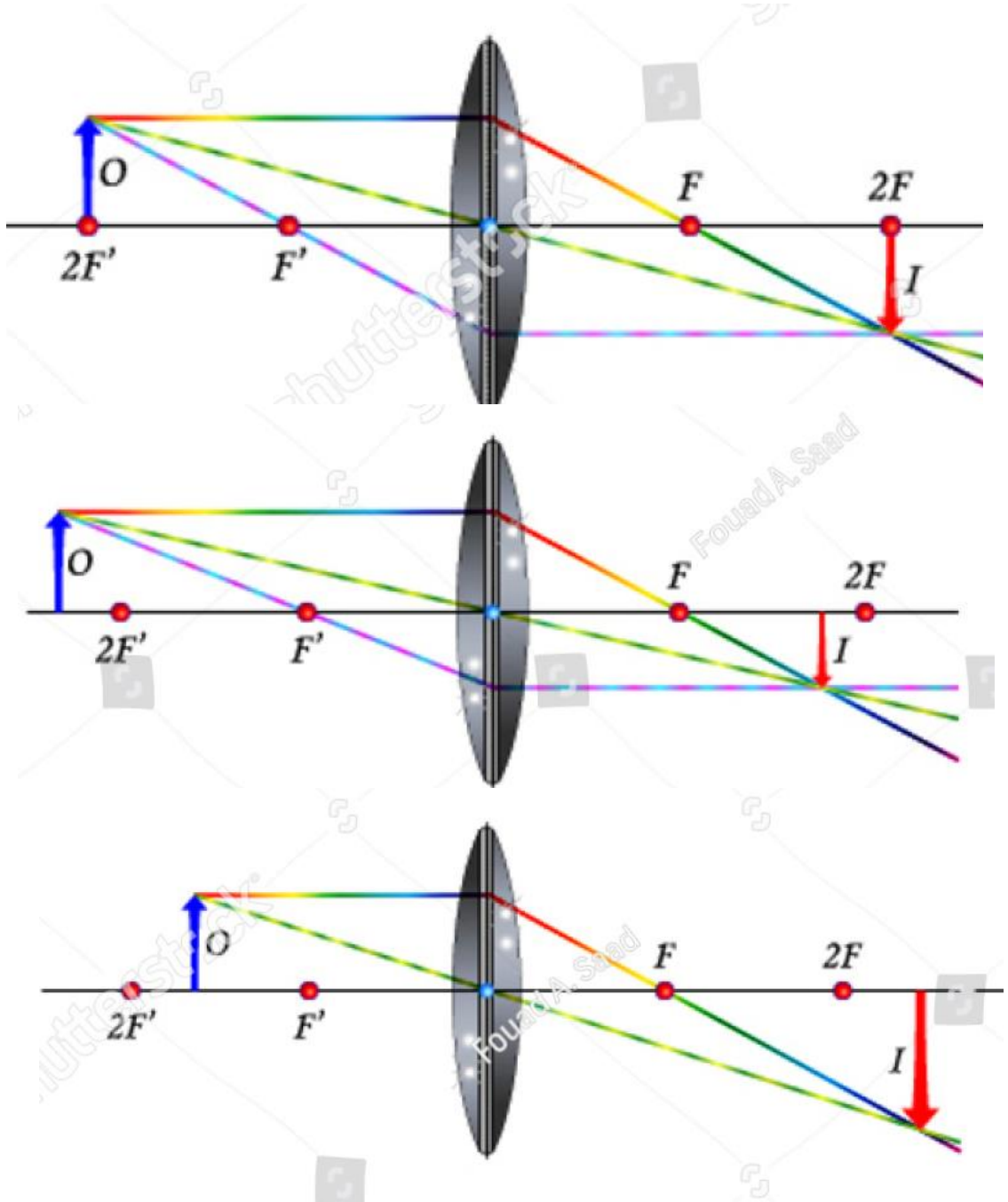


Procedure : Part 2

Reading :

Distance of object from lens (U) cm	Distance of image from lens (V) cm	1/U (cm^{-1})	1/V (cm^{-1})

يرجى متابعة هذا الفيديو التعليمي لهذا الجزء من التجربة
https://youtu.be/kin02cA4sgo



Procedure : Part 2

1. Plot a graph of 1/U against 1/V .
2. Drow the straight line through the pointed and produce it to intersect both axes .

Theory and calculation :

$1/F = 1/U + 1/V$

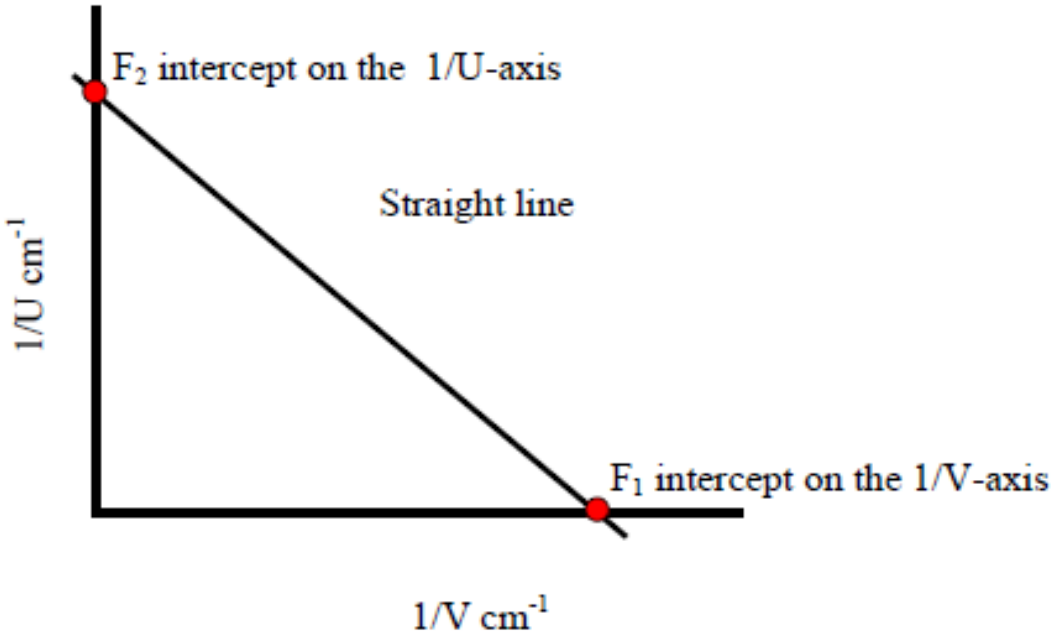
1. A straight line inclined at 45° o each axis is obtained.
2. The intercept on the 1/V axis is the numerical value for which $1/U = 0$.

$1/F_1 = 1/U + 1/V = 0 + 1/V$

$\longrightarrow F_1 = V$ ..... (1)

3. Similarity for the intercept on the 1/V axis . $F_2 = U$
4. Take the mean value of the two intercepts .

$$F = \frac{F_1 + F_2}{2} = (\ldots\ldots) \text{ cm}$$



Human eye: