

Exp 5 : Focal Length of a Convex Lens

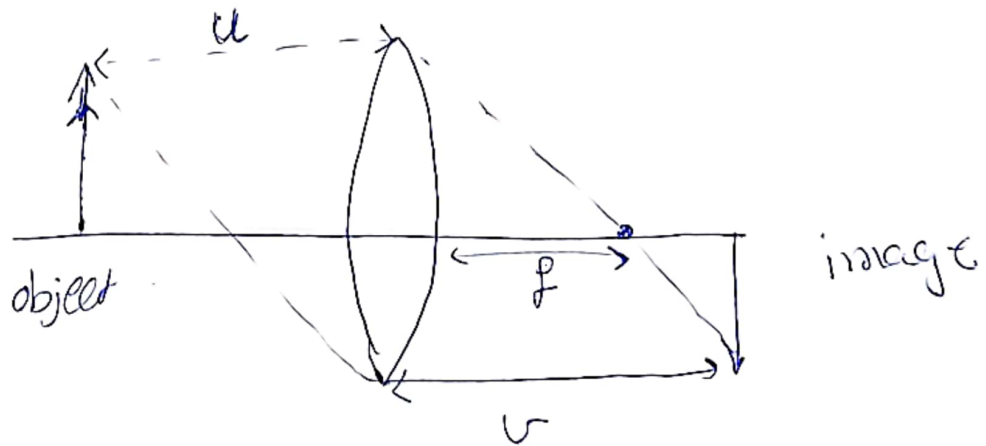
The aim is to find the focal length of a convex lens.

Theory

what is the focal length means:-

it's the distance from the lens to the point of convergence of the light rays coming from the infinity.

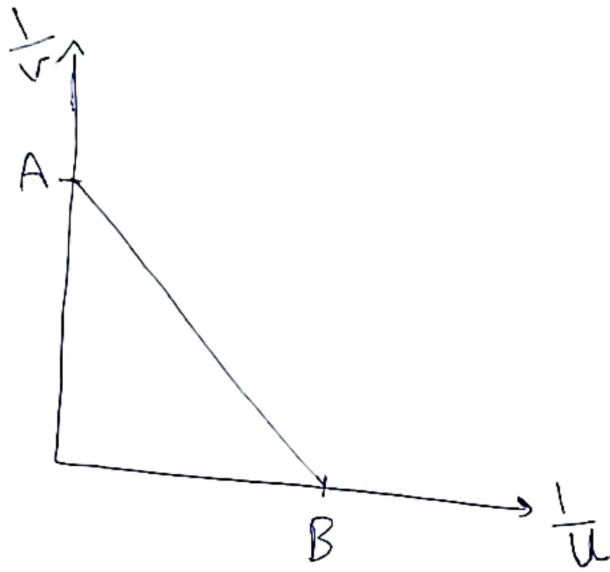
$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$



→ now if $u = \infty$
then the image will be formed at f

$$\frac{1}{v} = \frac{-1}{\infty} + \frac{1}{f} \quad \underline{\underline{v = f}}$$

So: The graph between $\frac{1}{v}$ vs $\frac{1}{u}$ will be straight line with slope = -1



B point \rightarrow when $\frac{1}{v} = \text{zero}$

$$\frac{1}{u} = \frac{1}{f} \Rightarrow \boxed{u = f_1}$$

A point \rightarrow when $\frac{1}{u} = \text{zero}$

$$\frac{1}{v} = \frac{1}{f} \Rightarrow \boxed{v = f_2}$$

$$\boxed{\therefore f = \frac{f_1 + f_2}{2}}$$

$$\Delta f = ??$$

$$\Delta v = \Delta u = 6\text{m}$$

$$\frac{\Delta f}{f^2} = \frac{\Delta u}{u^2} + \frac{\Delta v}{v^2}$$

$u(\text{cm})$							
$v(\text{cm})$							
$\frac{1}{u} \text{ cm}^{-1}$							
$\frac{1}{v} \text{ cm}^{-1}$							

→ as u decreases → v increases → $\frac{v}{u}$ increases

→ The shorter focal length, the wider the angle of shot (

→ The longer focal length, the more zoomed in the shot will be (used for the moon, animal...)