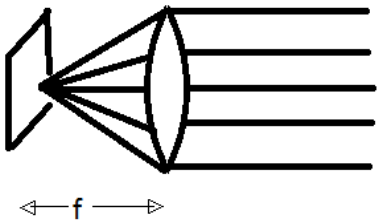
Distant object method



Focus object far away from ground

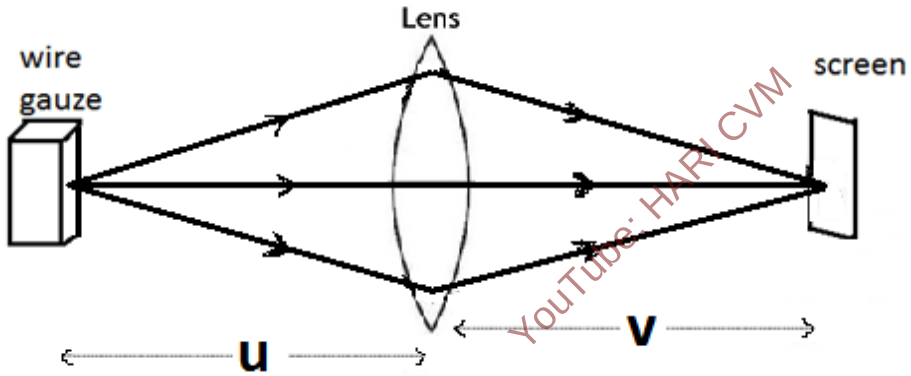
Trial No.	Distance from Lens to screen f in cm
1	
2	

Mean **f** =……cm
……..m

u - v method

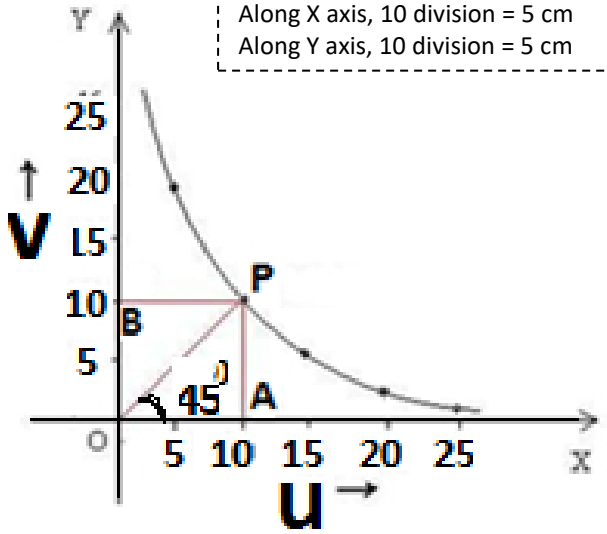
chose **suitable values for u** between 1.5*f and 2.5*f
example if f=10 cm then 1.5x10 = 15cm and 2.5x10 = 25 cm
then u can be 16,18,20,22,24

u - v method



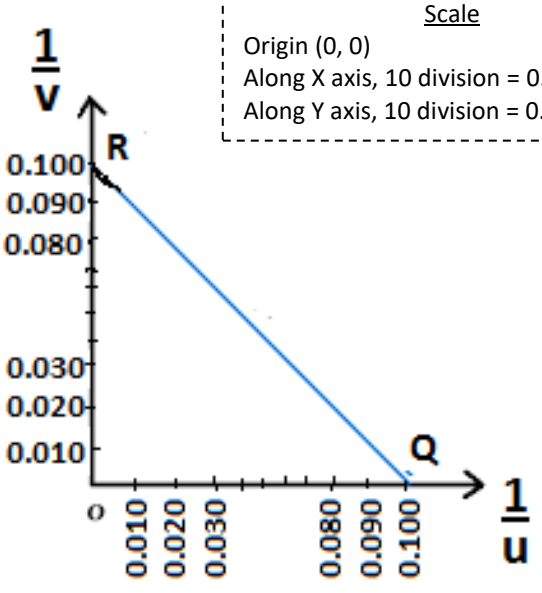
u -v graph

Scale
Origin (0, 0)
Along X axis, 10 division = 5 cm
Along Y axis, 10 division = 5 cm



$\frac{1}{u} - \frac{1}{v}$ **graph**

Scale
Origin (0, 0)
Along X axis, 10 division = 0.010 cm^{-1}
Along Y axis, 10 division = 0.010 cm^{-1}



CONVEX LENS

AIM

1. To find the focal length of a convex lens by
   a) Distant object method
   b) **u** - **v** method
   c) from **u** - **v** graph
   d) from $\frac{1}{u} - \frac{1}{v}$ graph
2. To determine the Power of lens

APPARATUS

Convex lens, Illuminated wire gauze, meter scale , lens stand, white screen.

THEORY

Distant object method: When object is placed at infinity, image is formed at focus. The distance between lens and the screen gives focal length.

u - v method:

chose suitable values for u between 1.5 times f and 2.5 times f

If **u** is the object distance and **v** is the image distance then focal length of the convex lens is given by

From **u** - **v** method , $\mathbf{f} = \frac{uv}{(u+v)}$

Where **u** = object distance between wire gauge and mirror

v = the image distance

While drawing **u** - **v** graph and $\frac{1}{u} - \frac{1}{v}$ graph, same scale and origin chosen from both the axis. The focal length can be find out by using the equation.

Observations and Calculation

Trail No	Object Distance u in cm	Image distance v in cm	f = $\frac{uv}{(u+v)}$	Mean f in cm	Round off to 3 decimal places	
					$\frac{1}{u}$	$\frac{1}{v}$
1 2 3 4 5 6				f = ……cm		

focal length of the convex lens is given by , **f** = …… cm
= …….. m

Power of lens **P** = $\frac{1}{f}$ = …….. D

(substitute f in meter)

From **u** - **v** graph,

$f = \frac{(OA+OB)}{4}$ = …….. cm = …….. m

From $\frac{1}{u} - \frac{1}{v}$ graph,

$f = \frac{2}{(OQ+OR)}$ = …….. cm = …….. m

From **u** - **v** graph,

$$f = \frac{(OA + OB)}{4}$$

From $\frac{1}{u} - \frac{1}{v}$ graph,

$$f = \frac{2}{(OQ + OR)}$$

Power of lens, **P** = $\frac{1}{f}$

PROCRDURE

Distant object method: Lens is placed on a stand and focus an object at large distance (a tree far away from window) to form an image on screen. By varying distance between lens and screen, clear image is formed at focus. The distance between lens and the screen gives focal length.

u-v method: Lens is placed at a distance (u) from the wire gauze, then by adjusting screen clear image is formed on the screen. Now image distance (v) is measured. Using this focal length is calculated. This method is repeated for different value of (u),then mean focal length is calculated. Then **u** - **v** graph and $\frac{1}{u} - \frac{1}{v}$ graph is plotted. Focal length from the graph is can be calculated.

RESULT

1. Focal length of convex lens
   a) Distance object method = ……. m
   b) **u** - **v** method =……. m
   c) From **u** - **v** graph =……. m
   d) From $\frac{1}{u} - \frac{1}{v}$ graph =……. m
2. Power of lens = ……. D