

State Examination Commission – Physics Higher Level, 2009

Question 2

A student was asked to measure the focal length of a converging lens. The student measured the image distance v for each of three different object distances u . The student recorded the following data.

u/cm	20.0	30.0	40.0
v/cm	65.2	33.3	25.1

Describe how the image distance was measured. (12)

By measuring the distance from the centre of the lens to the screen on which a sharp image of the object had formed.

Give two precautions that should be taken when measuring the image distance. (6)

Measure 1) perpendicular distance to 2) centre of lens from the screen.

Use all of the data to calculate the focal length of the converging lens. (15)

u/cm	20.0	30.0	40.0
v/cm	65.2	33.3	25.1
$1/u/\text{m}^{-1}$	5.00	3.33	2.50
$1/v/\text{m}^{-1}$	1.53	3.00	3.98
$1/f/\text{m}^{-1}$	6.53	6.33	6.48
f/m	0.153	0.158	0.154

$$f_{\text{ave}} = 0.155 \text{ m}$$

What difficulty would arise if the student placed the object 10 cm from the lens? (7)

It would then be inside the focus of the lens and would not form a real image on a screen.