

(eo211) 7. Concave \square Lens Focal Length Measurement By Self-collimation

Translation by J D White,

1. Purpose

To measure the focal length of a concave (\square) lens using Self-Collimation

2. Basic Theory

A concave lens has no real image so we cannot directly measure its focal length. Thus we need to make use of a convex lens to help with the measurement. In this case, we use the fact that a point source at the focal point will give parallel light. The convex lens creates a virtual point source at position Q1

3. Summary of Experiment

1. Self-Collimation Method to measure the focal length of a lens making use of the reflection by a mirror.

4. Equipment

1. Optical Rail and Laser with 45 degree mirror,
2. Two (2) apertures (with supporting hardware),
3. Spatial filter assembly (pin hole, microscope objective lens)
4. Frosted glass (to scatter laser light)
5. Letter "F"
6. Convex Lens
7. Concave Lens to Test focal length of
8. Mirror

5. Procedure

- a. Align laser beam horizontal to table along the rail using 2 fixed apertures (See previous Experiments)
- b. Adjust Spatial Filter and ensure the light is collimated and continuing down the rails
- c. Lens Focal Length Measurement

6. Results

Image Position (Qo) (no test lens)	Concave Lens Position (L) (cm)	Difference $f = Qo - L$	

Image Position (Q _o) (no test lens)	Concave Lens Position (L) (cm)	Difference f = Q _o - L	
Average:			

7. Questions

7.1 Lesson Topic:

a.

7.2 After-school topics:

a.