

Determination of the focal point of converging lenses – Optics lab

PURPOSE:

To experimentally determine the focal point of multiple lenses by optically viewing the “impossible image” in the lens. The impossible image stems from the lens equation as shown below:

$$\frac{1}{d_i} + \frac{1}{d_o} = \frac{1}{f}$$

if $f = d_o$ then we can rewrite it as:

$$\frac{1}{d_i} + \frac{1}{f} = \frac{1}{f} \Rightarrow \frac{1}{d_i} = 0 \Rightarrow d_i = \frac{1}{0}$$

Since anything divided by zero is impossible, it means the image will not exist and therefore cannot be seen. The focal point is the distance the lens is from the object where it is impossible to see the object.

METHODS:

You will have three lenses and have a piece of paper with a large letter written on it (such as the letter A). You will then have a group member hold a meter stick touching the paper and another group member will be holding the lens above the letter. You will adjust the lens until it is impossible to see the image. Record this height and move onto the next lens. Everyone MUST make measurements and have an active participation.

You will work in groups of 2-3 and everyone must measure as follows. If the group members are A, B, and C, then you will split up the task as follows:

Trial	Holding the meter stick	Holding the lens	Reading the meter stick
1	A	B	C
2	C	A	B
3	B	C	A

REPORT:

You will write an introduction, methods, and results section but you must include all data points and all the statistical tests we have talked about to examine the experimentally determined focal point (percent error, standard deviation, average, percent relative standard deviation)