Measuring the Focal Length of a Lens PAG 13th Sept 2016

For a lens 1/u + 1/f = 1/v which means a graph of 1/u vs 1/v will have x and y intercepts of 1/f the power of the lens. Additionally for each pair of measurements, the power 1/f = 1/v – 1/u. By measuring a series of u and v values the power and focal length can be established.

Set up a lamp, lens in a lens holder and a screen aligned along a pair of meter rules. Use the lamp’s filament as your object. Collect a series of u and v values that give a sharp image. The basic method will be demonstrated to you. Record your measurements to a suitable number of significant figures in an appropriate table. Include columns in your table to record the results of your calculations of 1/v, 1/u, P

and f.

For each pair of measurements calculate a value for the power, P of the lens and f, its focal length. Record the answers in your table. Plot a graph of 1/u vs 1/v and establish the x and y intercepts. Use these to calculate the focal length. Make your working clear. Estimate the uncertainty in your value for f and justify this estimate.

This practical will provide evidence for your practical endorsement. You will be assessed on the criteria listed below.

**Use and application of scientific methods and practices**

(b) safely and correctly use a range of practical equipment and materials

(c) follow written instructions

(d) make and record observations/measurements

(e) keep appropriate records of experimental activities

(f) present information and data in a scientific way

(g) use appropriate software and tools to process data, carry out research and report findings (If you use Excel)

**1.2.2 Use of apparatus and techniques**

(a) use of appropriate analogue apparatus to record a range of measurements (to include length/ distance, temperature, pressure, force, angles and volume) and to interpolate between scale markings

(c) use of methods to increase accuracy of measurements, such as timing over multiple oscillations, or use of fiduciary marker, set square or plumb line

Common Practical Assessment Criteria, CPAC

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| (1) Follows written procedures | a) Correctly follows instructions to carry out experimental techniques or procedures. |
| (3) Safely uses a range of practical equipment and materials | a) Identifies hazards and assesses risks associated with these hazards, making safety adjustments as necessary, when carrying out experimental techniques and procedures in the lab or field.  b) Uses appropriate safety equipment and approaches to minimise risks with minimal prompting. |
| (4) Makes and records observations | a) Makes accurate observations relevant to the experimental or investigative procedure. |