

# PHY 122/124 EXPERIMENT 7: Reflection, Refraction and Images- Worksheet

## Part I: The Laws of Reflection and Refraction:

### 1. The Law of Reflection:

The angle of incidence on boundary 1 with its estimated uncertainty is \_\_\_\_\_.

The angle of reflection with its estimated uncertainty is \_\_\_\_\_.

Are these two angles equal within uncertainty? \_\_\_\_\_.

### 2. Snell's Law:

The angle of refraction on boundary 1 is \_\_\_\_\_

The index of refraction for boundary 1 is (show work):

\_\_\_\_\_

The angle of refraction on boundary 3 is \_\_\_\_\_

The index of refraction for boundary 3 is (show work):

\_\_\_\_\_

### 3. Dispersion: qualitative only

Which color is bent more, red or blue? Which light has the larger index of refraction, red or blue light (hint: Look at Snell's Law)?

### 4. Total Internal Reflection: qualitative only

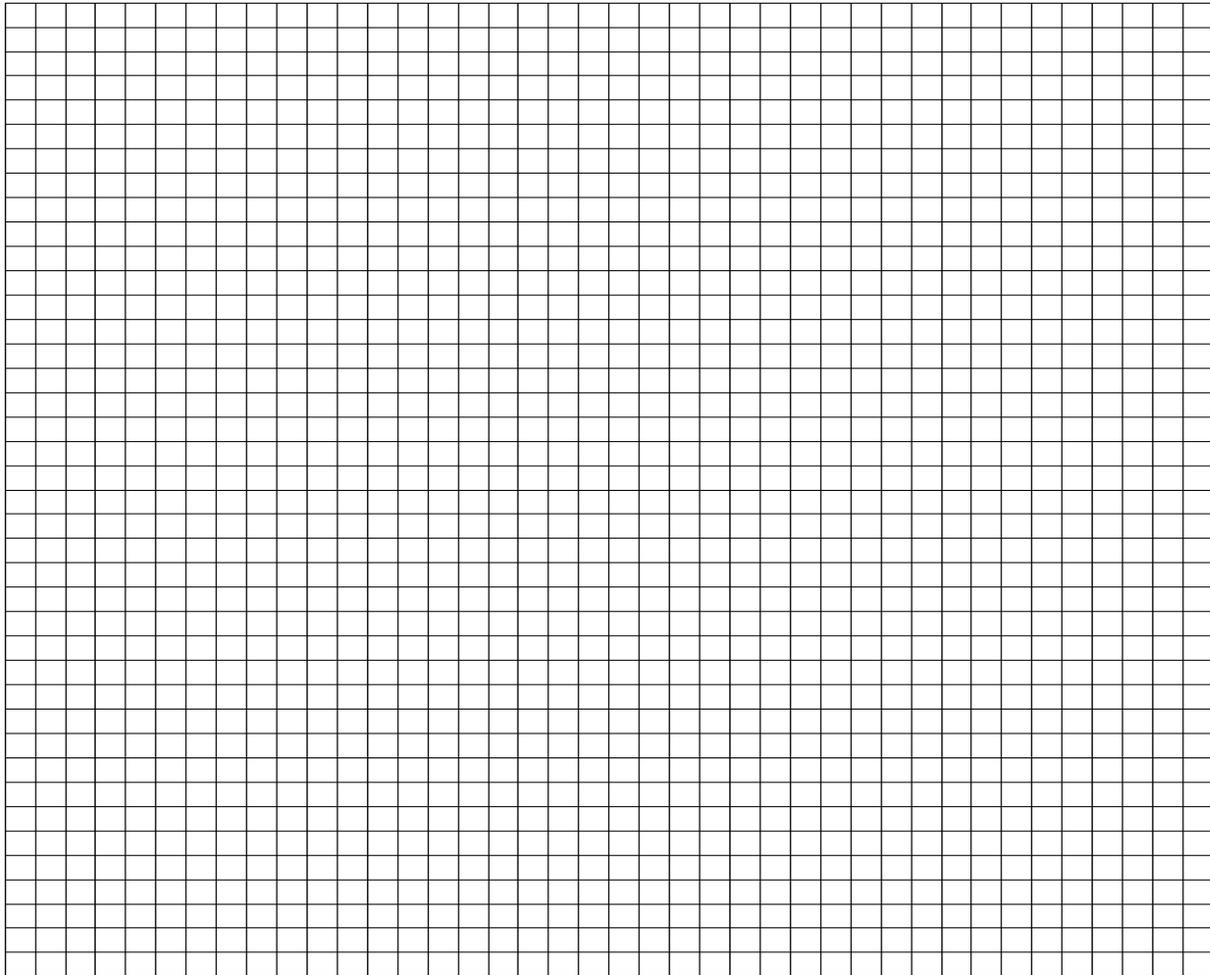
Describe your observations of the intensity of the beam emerging from boundary 2 as you rotate the prism. When the "exit ray" in Fig 2 disappears, is the intensity of the beam emerging from boundary 2 maximal or minimal? On which boundary do you observe total internal reflection?

**Part II: The Imaging Laws for Lenses:**

**Focal length and Magnification for a 5 cm converging (#4 marked on bottom of shaft) lens**

Measured data:

Object distance $o \pm \text{error}$ [   ]	Image distance $i \pm \text{error}$ [   ]	Object size $h_o$ $\pm \text{error}$ [   ]	Image size $h_i$ $\pm \text{error}$ [   ]	Object Orientation	Image Orientation



Focal length calculated from equation (7.3) \_\_\_\_\_ +/- \_\_\_\_\_

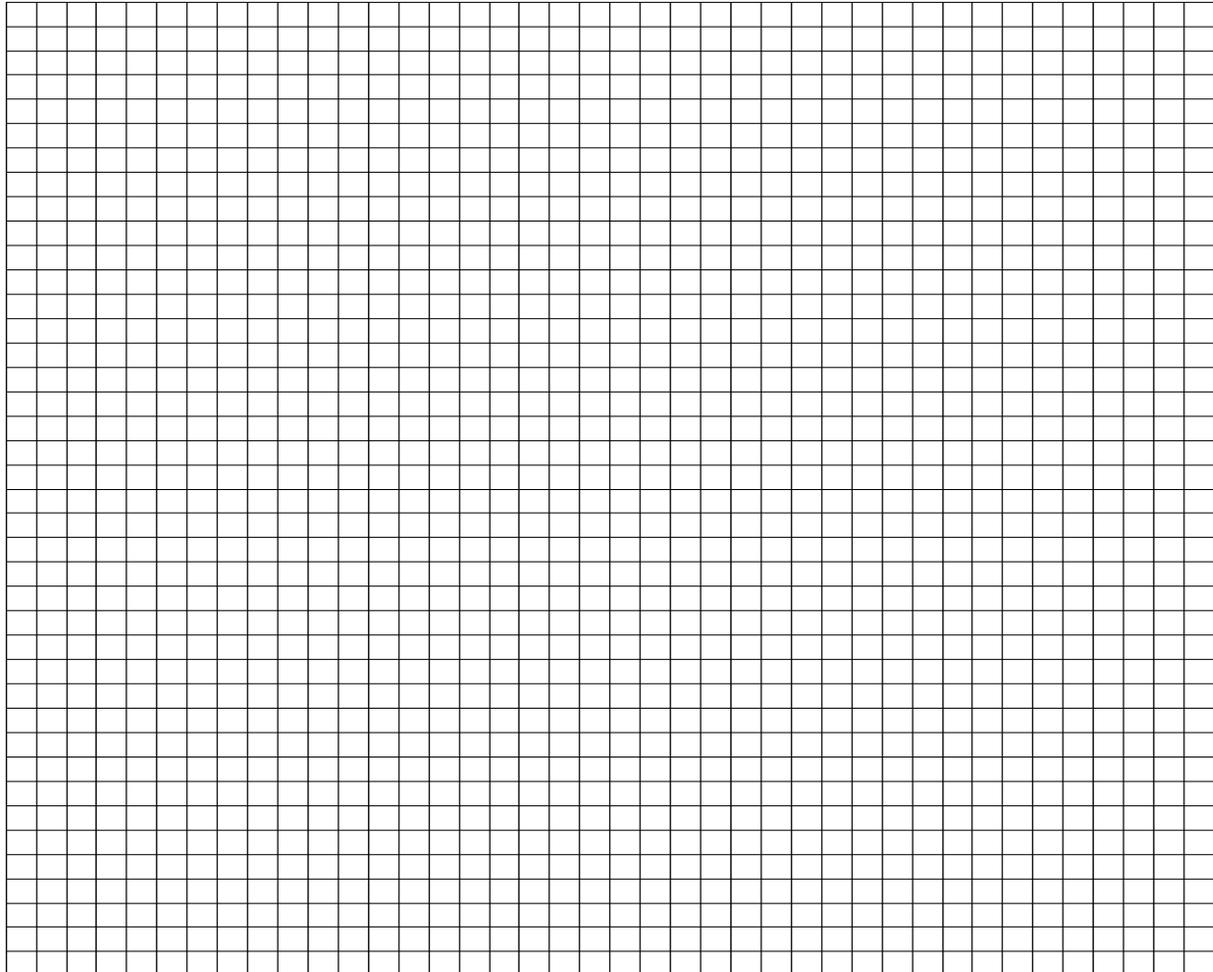
Magnification calculated from sizes of object and image \_\_\_\_\_ +/- \_\_\_\_\_

Magnification calculated from distances of object and image \_\_\_\_\_ +/- \_\_\_\_\_

**Magnification for a 5 cm converging (#4 marked on bottom of shaft) lens at a different position : (no uncertainties needed here)**

Measured data:

Object distance $o$ [   ]	Image distance $i$ [   ]	Object size $h_o$ [   ]	Image size $h_i$ [   ]	Object Orientation	Image Orientation



**Image and Magnification for the 10 cm Diverging (#3 marked on bottom of shaft) Lens:**

Is the image upright or inverted with respect to the original object?

Is the image magnified or demagnified with respect to the original object?

Slide the lens away from the object and state whether the properties of the image, apart from the size, change as you increase the distance of the lens from the object., i.e., is the image for any object distance upright/inverted, magnified/demagnified or do these characteristics change with object distance?

Is the image real or virtual?