Reflection and Refraction Lab Instructions

Part I: Reflection - Concave and Convex Mirrors

Objective: To investigate the images formed in curved mirrors, and to describe the characteristics of those images.

Theory: You can refer to your already purchased lab manual for the theory, as well as these YouTube videos:

1. Specular Reflection: https://www.youtube.com/watch?v=2cFvJkc4pQk&feature=youtu.be
2. Ray Diagrams: https://www.youtube.com/watch?v=xrMvnjOgsig&feature=youtu.be

Procedure:

1. Open the simulation page on oPhysics called “Concave and Convex Mirrors”: http://ophysics.com/l10.html

   Note that this mirror is considered **two-sided**, with both sides being reflective surfaces. The **object** can be moved by dragging the **top point** on the object arrow. The **focus** (focal point) can also be moved. The simulation starts as a **concave mirror**, because the object is on the left. To make the mirror **convex**, move the object to the right side of the mirror.

   Note where everything begins at the start of the simulation. All the information about the object and image will be listed in the bottom right. The type of mirror, and the relation of the object to the focus, will be listed in the top right. Look at the diagram, and confirm that all the information listed is true.

   We will assume the units are centimeters.

2. Use the **Reflection and Refraction Lab Template** file and answer the questions, putting your answers wherever there is red text. (you can change the entire document text color to black before turning in)

3. When answering the questions, you can show your work by typing it out clearly, or writing it down on a piece of paper and uploading a picture of your calculations.

4. When asked to reproduce the diagrams, you can take a screen shot (**Mac**: https://support.apple.com/en-us/HT201361; **Windows**: use “Snipping tool”:

https://support.microsoft.com/en-us/help/13776/windows-10-use-snipping-tool-to-capture-screenshots), or you can sketch out on paper and upload a picture of your sketch.

Abbreviations/symbols:

'f' is the focal spot of the mirror.

'cc' is the center of curvature of the mirror.

'do' is the object distance from the mirror.
'di' is the image distance from the mirror.

'ho' is the height of the object.
'hi' is the height of the image.

Part II: Refraction

Objective: To investigate how different materials, including prisms and lenses, cause the refraction of light by determining the reflected and refracted angles.

Theory: Again, refer to your lab manual as well as the following video:

1. Refraction of Light: https://www.youtube.com/watch?v=DR-8ZRCHCXI&feature=youtu.be

Procedure:

1. Go to https://phet.colorado.edu/en/simulation/bending-light

2. Open the Bending Light Sim. Click on **"Intro".**

3. Move the protractor and line it up with the surface of the interface between the two materials.

4. Press the red button to turn on the laser.

5. For each scenario, select the top and bottom material as specified for each data table in the lab template. Record the index of refraction, n, for each material in the data table.

6. Choose two incident angles between 5° – 85° for each scenario, and record the incident, reflected, and refracted angles in the table.

7. After filing in the table, draw the rays (or include a screenshot) as they are in the sim where indicated in the template.