Interactive Lab Lenses

Name_____ Block____

During this interactive you are going to explore and experiment with how light interacts with different lenses.

1. What about the shape of a lens causes light to bend differently than say a pane of glass?

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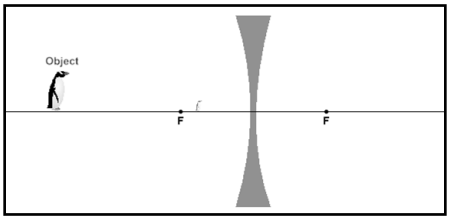
Open the shortcut **IL Lenses A** on one of the lab stations.
Open the simulation contained in this section.
Do Not follow the directions in the simulation follow these instructions.
Play with this simulation changing the object distance and the focal length of the lens.



2. What type of lens is used in this simulation?

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3. What properties of the image changed as you moved the object? Be specific.

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4. What properties of the image changed as you moved the focal point? Be specific.

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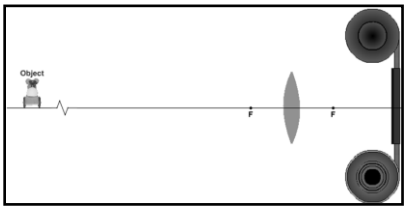
Open the shortcut **IL Lenses B** on one of the lab stations.
Open the simulation contained in this section.
Do Not follow the directions in the simulation follow these instructions.



Just like in a real camera you can move the lens towards and away from the film. You want to take a clear picture of the mouse in the car.
Move the lens and try to get a clear picture. (This is a little difficult.) Ignore the numbers involved until you have tried to get the picture a few times.

5. Were you successful? (If you were record the lens to film distance here.)

The mouse is 5.00 meters from the center of the lens, significantly farther from the lens than the film, a fact that is shown with the zig-zag in the principal axis line. The focal length of the lens is 4.00 cm. Moving the lens does not significantly change the distance to the mouse, so you can treat the 5.00-meter distance as constant.

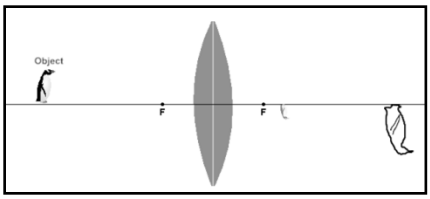
6. Given the values above calculate where the lens should be positioned to take a clear picture. **Show all work and equations including substitution with units.**

Input the value you calculated in #5 into the simulation. You can do this by dragging the lens or using the arrows on the gauge or a combination of these methods.

7. Did your calculated value work? (If it did not work recalculate and try another time.)

In the next simulation you are going to manipulate both the distance to the object and the focal length of the lens. It can be tricky to get the desired image when both are able to be manipulated.

Open the shortcut **IL Lenses C** on one of the lab stations.
Open the simulation contained in this section.
Do Not follow the directions in the simulation follow these instructions.



The image that you want to create is shown as an outline on the right-hand side of the simulation. As you change the focal length and the image distance you will see the image change. Getting the correct image can be a little difficult. Ignore the numbers involved until you have tried to get the image a few times.

8. Were you successful? (If you were record the focal length and the distance to the object here.)

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The image is 13.5 cm tall, and 15.0 cm from the lens. The object is 9.0 cm tall.

9. Calculate the magnification needed to produce the correct image. **Show all work and equations including substitution with units.**

10. Calculate the distance to the object needed for the magnification you calculated in #9. **Show all work and equations including substitution with units.**

11. Using what you have calculated thus far calculate the focal length of the lens required to form the correct image. **Show all work and equations including substitution with units.**

Input the values you calculated into the simulation. You can do this by dragging the focal points of the lens and the object or using the arrows on the gauge or a combination of these methods.

12. Did your calculated value work? (If it did not work recalculate and try another time.)

13. What do you understand better now as compared to before you preformed this interactive?