Physics 221

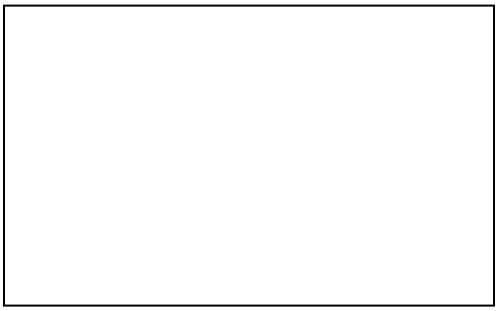
Spherical mirrors

The format for this lab will be similar to last week. Each member of the lab group must complete their own copy -- all copies will be collected.

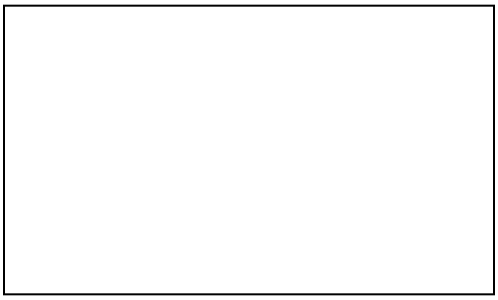
Prediction

Consider converging and diverging mirrors and how they react to parallel incoming beams of light.

1. Draw a **converging mirror** in the space at right. Then sketch in five parallel beams of light coming from the left that travel through the lens.



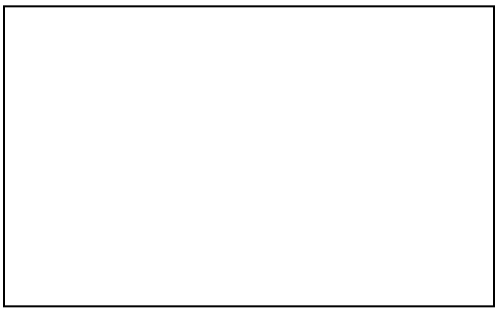
2. Draw a **diverging mirror** in the space at right. Then sketch in five parallel beams of light coming from the left that travel through the lens.



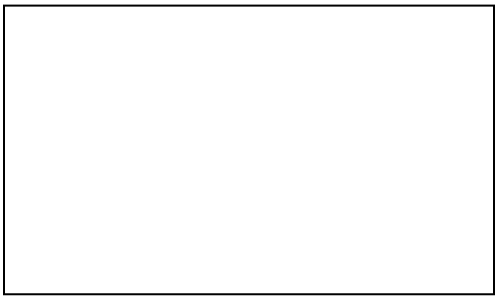
Experiment

Test a converging lens and a diverging lens with the **ray box** set up on the side bench.

3. Draw a **converging mirror** in the space at right. Then sketch in five parallel beams of light coming from the left that travel through the lens.



4. Draw a **diverging mirror** in the space at right. Then sketch in five parallel beams of light coming from the left that travel through the lens.



Investigation

Materials: Converging Mirror (Concave), a Diverging Mirror (Convex), paper, your eyes, very well lit objects.

A. **Can you focus the image formed by a converging mirror onto a screen? Sketch the results below.**

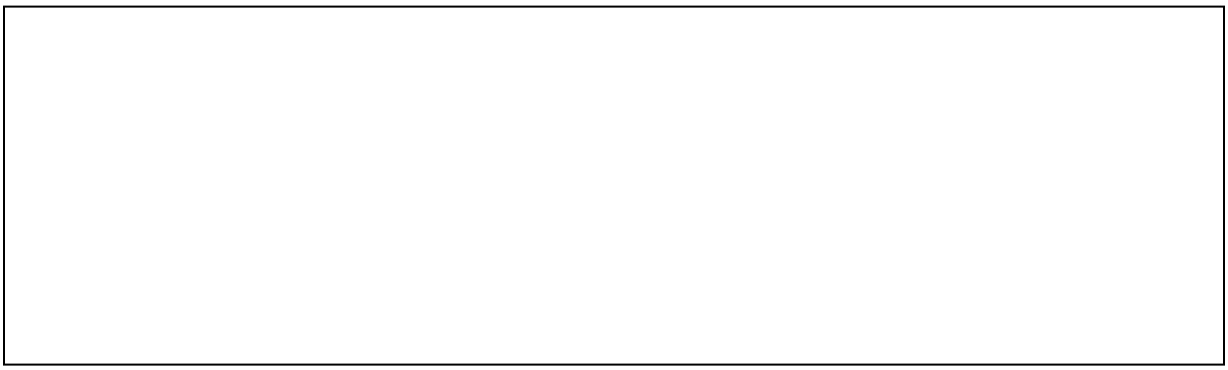
The best way to do this is to pick a well lit object and have your mirror and screen in a room that is dimly lit compared to the object. For example while standing inside, focus objects that are outside onto your screen. Or stand in a room with the lights out and focus objects that are in a nearby lit room onto your screen.

B. **If you don't use a screen and look at the mirror, can you see a clear image of the same object?**

1. Describe the image in both cases A and B. Is it upright or inverted, magnified or reduced and is it real or virtual.

2. For each case A and B, determine if the position of the screen/your eye can vary and still keep a sharply focused image?

3. Draw a ray diagram to show how light moves from an object, to a converging mirror, and forms an image. Label the focal point, the focal distance, *f*, the object and image distances *s* and *s'*, respectively as well as *h* and *h'*. Include all three special rays.



Our model says that you see things when light hits you in the eye. And, we've said, you can find the image (or object) you're looking at by tracing back the lines of light to the point in space where they intersect. (remember the "Mel and Taylor technique?")

4. The diagram you just drew shows light converging at a location in space – where the screen needs to be to focus the image – and then diverging out again from that point. Suppose that light hits someone in the eye after passing the "crossing point." Where would they see that light as coming from?

5. Explain why the results for 2 above are different for a screen and your eye.

II. Diverging mirrors

Repeat all of the steps in A and B above for a diverging mirror.

Final Question

1. Which type of mirror, diverging or converging, is used on the passenger side of modern vehicles (Warning: Objects may be closer than they appear). Use as many diagrams as necessary to defend your choice.