Workshop module 13 - Physics 142, Fall 2008

1. Two thin lenses with a focal length of magnitude 10.0 cm, the first converging and the second diverging, are placed 8.0 cm apart. An object 2.00 mm tall is placed 18.0 cm to the left of the first (converging) lens. A) How far from this first lens is the final image formed? B) Is the final image real or virtual? C) Is the final image erect or inverted? What is the height of the image?

2. When a converging lens is immersed in water, does its focal length increase or decrease in comparison with the value in air? Explain and make a drawing showing how the angles of the rays at the interfaces vary in the two cases.

3. Where is the near point of an eye for which a contact lens with a power of +2.75 diopter is prescribed?

4. If you have normal vision, you can't see clearly underwater without a mask or goggles. Why is this? Why can you see clearly with a mask or goggles? Instead of goggles, could you just wear eyeglasses? If so, should the lenses of the eyeglasses be converging or diverging?

5. The focal length of the eyepiece of a certain microscope is 2.50 cm. The focal length of the objective is 16.0 mm. The distance between objective and eyepiece is 22.6 cm. The final image formed by the eyepiece is at infinity. Treat all lenses as thin. a) What is the distance from the objective to the object being viewed? B) What is the magnitude of the linear magnification produced by the objective? C) What is the overall magnification of the microscope?

6. You hold two thin, converging lenses. One is thicker in the middle than the other. Which has the longer focal length? Explain.

7. Two mirrors face each other across a square room. An infinite series of reflections can be seen. Why do the images that seem further away also seem dimmer?

8. An object is placed 16.0 cm from a screen. A) At what two points between object and screen may a converging lens with a 3.50-cm focal length be placed to obtain an image on the screen? B) What is the magnification of the image for each position of the lens?