

Physics 2P51 Assignment 2

Due: Friday, February 2, 2018 in drop box across from MC B210a by 12:00 noon.

1. A lens made of glass of $n = 1.5$ has, when in air, +10.00 Diopters power. What is its power when immersed in a liquid of $n = 1.58$?
2.
 - (a) When an object is placed 15 cm in front of a thin lens, a virtual image is formed 5.0 cm away from the lens. What is the focal length of the lens?
 - (b) What is the transverse magnification of the object?
 - (c) Make an accurate ray diagram to show that your results of (a) and (b) are correct.
 - (d) A converging lens with a focal length of magnitude 6 cm is placed 4 cm to the right of the first lens. Calculate the location of the final image.
 - (e) Check that your result for part (d) is correct by using graphical ray tracing to find the final image. [You may use the same diagram as in part (c)].
3. The image projected by a thin equiconvex lens ($n=1.70$) of a frog 5.0 cm tall and 0.60 m from the screen is to be 25 cm high. What are the necessary radii of curvature of the lens surfaces?
4.
 - (a) A 10.6 mm thick lens has +16.00 Diopter front surface power and -6.00 Diopter back surface power. If the lens is made of spectacle crown ($n = 1.523$), what is its back vertex power?
 - (b) What are the radii of curvature of the two surfaces?
 - (c) Make a scale diagram of the lens and locate on the diagram its second focal point.
5. Two thin lenses of +5.00 diopters each are separated by a distance of 6.00 cm.
 - (a) Use the matrix method to find the location of the second principal plane of the system.
 - (b) If an object is placed 15.0 cm in front of the first principal plane, where is its image located?