

PHYSICS 2P51: Assignment 4 - Due: Wed., February 8, 2017

1. What is the vergence of light at a distance of 48 cm in front of an image point, (that is before it reaches the image).
2. Light coming out of a pinhole of a box into air has as vergence of -20 diopters. What is the vergence when it is 75 cm further away?
3. A glass sphere is used to form an image of a distant object. If the image is found to be located on the thick (back) surface, what is the refractive index of the glass.
4. A biconcave lens has a focal length of -20 cm. If the two surfaces have radii of curvature of 50 cm each, what is the index of refraction of the glass?
5.
 - (a) A meniscus lens is one that has one concave surface, and one convex surface. A *positive* meniscus lens is a converging lens. A *negative* meniscus lens is a diverging lens. Determine the condition on $|\frac{R_1}{R_2}|$ in order to produce a positive meniscus lens.
 - (b) A lens made of glass of $n=1.6$ has focal length of 20 cm. If the radius of curvature of the back surface is -40 cm, what is the radius of the front surface? Do your calculations agree with your calculation in (a)
6.
 - (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 4.0 cm to the right of the first lens. Calculate the location of the final image.
 - (e) Check that your result for (d) is correct by using graphical ray tracing to find the final image. [You may use the same diagram as in part (c)]

7. If an object is placed 45 cm in front of a -3.00 diopter lens, what is the transverse magnification of the image?
8. The object is a transparent cube, each edge 5mm in length, place 70 cm in front of a lens of a +25 cm focal length. What is the transverse magnification of the rear surface of the cube (the face closer to the lens)?