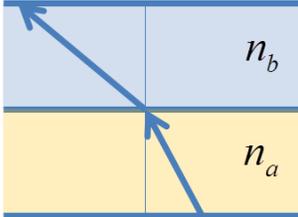


Physics 1214, Homework #8 (due 10/31 – boo!)

M1 A ray of light going from one material into another follows the path shown below. What can you conclude about the relative indexes of refraction of these two materials?

- A. $n_a \geq n_b$.
- B. $n_a > n_b$.
- C. $n_a < n_b$.
- D. $n_a \leq n_b$.



M2 A thin lens has a focal length f in air. If you now make a lens of identical shape, using glass having twice the refractive index of the original glass, the focal length of the new lens will be

- A. $f/2$.
- B. less than $f/2$.
- C. $2f$.
- D. greater than $2f$.

M3 A double-convex lens and a double-concave lens are made of the same glass, and the magnitude of the radii of curvature of both faces is R for each of the lenses. If the convex lens has a focal length of f , the focal length of the diverging lens is

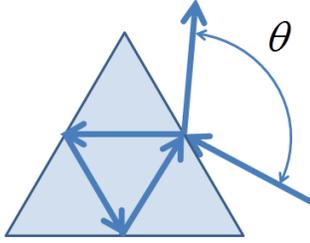
- A. $-2f$.
- B. $-f$.
- C. $-f/2$.
- D. 0.

M4 An object lies outside the focal point of a converging lens. Which of the following statements about the image formed by this lens must be true? (There may be more than one correct choice.)

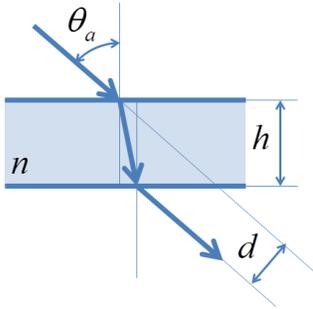
- A. The image is always real and inverted.
- B. The image could be real or virtual, depending on how far the object is past the focal point.
- C. The image could be erect or inverted, depending on how far the object is past the focal point.
- D. The image is always on the opposite side of the lens from the object.

Problems

- P1 A ray of light enters an equilateral triangular prism ($n = 1.66$), undergoes two reflections, and leaves the prism at the same point. What is the angle between the incoming and outgoing rays?



- P2 A ray of light is incident at angle $\theta_a = 60^\circ$ on the upper surface of a transparent plate of thickness $h = 1$ cm and refraction index $n = 1.732$. The ray goes through the plate and emerges on the other side. What is the lateral displacement d of the outgoing ray with respect to the incident ray?



- P3 A converging lens has the focal length $f = 1$ cm. At which distance one has to place the object to obtain the lateral magnification $m = -2$?
- P4 Two converging lenses with the same focal length $f = 1$ cm are placed at a distance of 2 cm from each other. What is the distance between the object and the image formed by the system if the object is placed at (a) 0.5 cm, (b) 1 cm, (c) 1.5 cm in front of the first lens?