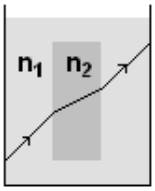
PHYS 2426 - Practice Final Problems

Problem 1



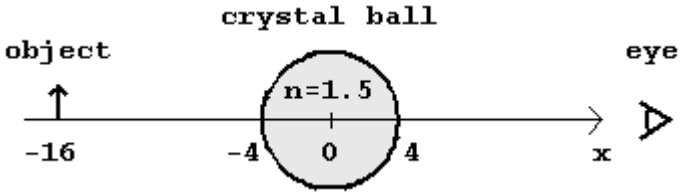
_____ [i] The diagram shows a light ray passing through a slab with index of refraction n_2 submerged in a liquid with an index n_1. What are the relative values of these indices?
(a) $n_1 < n_2$ (b) $n_1 = n_2$ (c) $n_1 > n_2$ (d) cannot be determined

_____ [ii] Which color listed below light travels fastest through a prism?
(a) green (b) blue (c) orange (d) violet (e) cannot be determined

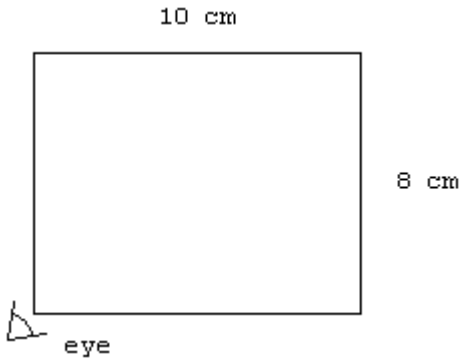
Problem 2

(a) What is the minimum thickness of a soap bubble film (n = 1.46) on which light of wavelength 500 nm shines so that one observes constructive interference of the reflected light?

(b) A fortuneteller looks through her crystal (n = 1.50) ball with a 4 cm radius centered at x = 0. An object at x = -16 cm is viewed from some position down the positive x-axis. Where does she see the image? Give the x-coordinate of the image position. (8 points)



(c) A plastic rectangular solid has dimensions 2cm×8cm×10cm. If one places an eye at the center of the short edge one can see the opposite edge through one face but not through the other. What does this imply about the refractive index of the solid?



Problem 3 (6 points each)

(a) Light of wavelength 540 nm falls on a single slit of width 0.15 mm. On a screen a distance of 8 m away what is the width of the central bright fringe?

(b) When light of wavelength λ passes through as a diffraction grating the highest order bright fringe that is seen is m=7. What does this imply about the slit spacing, d, in the grating?

(c) A slide projector is used to project a 35 mm wide slide to fill a 1.4 m wide screen. If the projector uses a converging lens with a 10 cm focal length, then relative to the lens where must the slide and screen be placed?

(d) Unpolarized light of intensity $1000 W/m^2$ passes through 2 polarizing filters. The first has an axis that is 40° from vertical and the second is 70° from vertical. What is the intensity of the light between the filters and after the second filter?