1. An object is placed 30 cm to the left of a converging lens of focal length

*f*1= + 20 cm. A second lens sits 40 cm to the right of the first lens. The

two- lens system produces an overall magnification of *M*= + 2.0.

What is the focal length (*f*2) of the second lens?

1. A person looks straight ahead at the left-hand edge of a 1.0m wide mirror

mounted on the wall in front of them (see the diagram below). If the person

is standing 3.0maway from the mirrored wall and 4.0mfromawall behind

them, what length of the wall behind them is visible in the mirror?



1. You are given an eyepiece lens of focal length *f*e= +5.0 cm and a paper

towel tube, 28.0 cm in length.

a. What focal length would you need for the objective lens to make an

astronomical telescope?

b. What is the telescope’s magnification for a relaxed eye?

1. A microscope of length *L* = 12.0 cm has a 33× eyepiece lens. If the objective

lens has a focal length of 1.1 cm, find the overall magnification of the

microscope. Assume a normal relaxed eye.

1. Monochromatic light of wavelength1 = 500 nm falls on two narrow slits.

A first order (*m*= 1) maximum is detected at an angle of 5.3from the

Central maximum on a screen, 1.8maway. If the light source is changed to

2 = 630 nm, what distance does the*m*= 1maximum move on the screen?

1. A single slit illuminated by light of wavelength 610 nm produces a diffraction pattern with its first minimum at 3.5 mm from the central maximum.  
   a) Find the slit width

(a)  
wavelength of light used (Λ)=610nm=610\*10-9m  
first minimum distance (d) = 3.5mm=3.5\*10-3m  
slight width = ?

tan Θ = d/L  🡪 (1)

sin Θ = Λ /a 🡪 (2)

Λ is the wavelength of light used,

a is the slit width

L is the distance from silt to screen

d  is the distance for first minimum

Θ is the angle for first minimum

sin Θ = tan Θ = Θ 🡪 (3)

Combine equations 1, 2, 3

We get    d/L= Λ / a

(a)   3.5\*10-3m /L= 610\*10-9m / a

I’m stuck because I don’t have L

1. A light beam in air is incident on a glass surface at an angle of 60.00.

The narrow beam contains both blue light that travels at a speed of

2.023 × 108m/s in the glass, and red light that travels at 2.034 × 108 m/s .

Assume both colours travel at *c* = 2.998 × 108 m/s in air. How far must the

blue and red beams travel in the glass before they are separated by 1.0 cm?

1. The line spectrum of sodium includes a yellow line with 1 = 589.00 nm.

A certain diffraction grating produces this line, in first order, at1 = 25.00

from the central maximum. A second distinct line has2 = 589.59 nm.

What is the angular separation between these two lines?

1. Light passes through a first polaroid, producing a beam of intensity *I*o that

is 100% polarized in the vertical direction. The beam then passes through a

second polaroid with axis at 30 to the vertical, and a third polaroid at 90

to the vertical. What fraction of *I*o emerges from the three polaroids?

1. Atoms in a crystal are spaced *d* = 0.145 nm apart, forming an exactly square

lattice. When x- rays of wave length = 0.100 nm strike the horizontal planes

of atoms, as shown in the diagram below, diffraction maxima are formed at

certain angles. In addition, atoms joined by the diagonal line also form

planes and produce maxima. Ifis varied from 0to 90, find the angles

where diffraction maxima are produced by the diagonal (dashed) plane.

