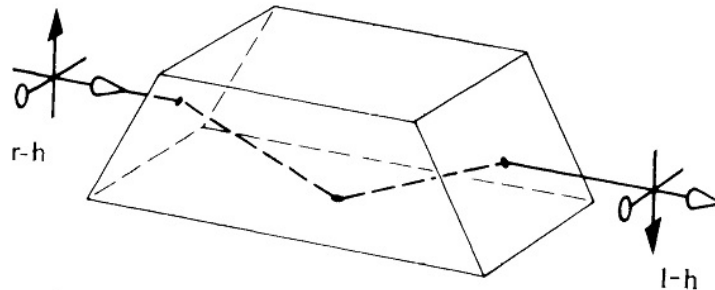


### 1 Problem

Referring to the dove prism in the following, rotate it through 90 deg about an axis along the ray direction. Sketch the new configuration and determine the angle through which the image is rotated.



### 2 Problem

Determine the numerical aperture of a single clad optical fiber, given that the core has an index of 1.62 and the clad 1.52. When immersed in air, what is its maximum acceptance angle? What would happen to a ray incident at, say, 45 deg?

### 3 Problem

Given a fused silica fiber with an attenuation of  $0.2\text{dB}/\text{km}$ , how far can a signal travel along it before the power level drops by half?

### 4 Problem

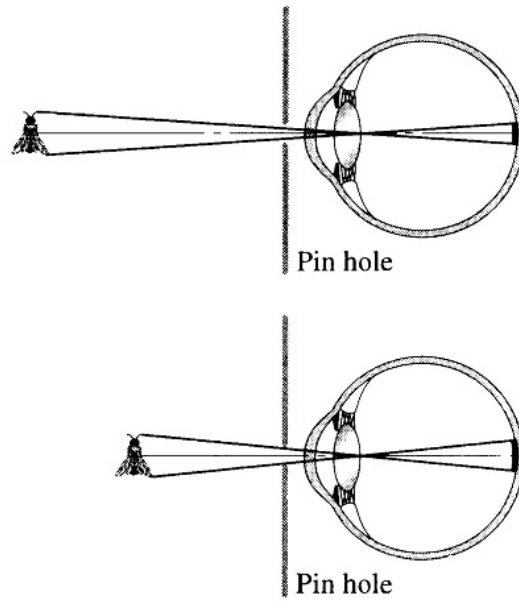
Determine the intermodal delay (in ns/km) for a stepped index fiber with a cladding of index 1.485 and a core of index 1.500.

### 5 Problem

The following figure which purports to show an erecting lens system, is taken from an old, out-of-print optics text. What is wrong with it?

### 6 Problem

If a photograph of a simple two-element astronomical telescope, but blurred, at  $\frac{1}{30}$  s and  $f/11$ , what must the diaphragm setting be if the shutter speed is raised to  $1/120$  s in order to "stop" the motion?



## 7 Problem

Suppose we wish to make a microscope (that can be used with a relaxed eye) out of two positive lenses, both with a focal length of  $25\text{mm}$ . Assuming the object is positioned  $27\text{mm}$  from the objective, (a) how far apart should the lenses be, and (b) what magnification can we expect?

## Reference

E. Echt, *Optics*, Fifth edition (Oldenburg, München, 2009).