

Homework 2

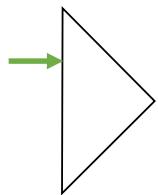
Question 1 (parts a i, ii, iii and b); Question 2 (parts a and b).

1. Tunnel Diagrams

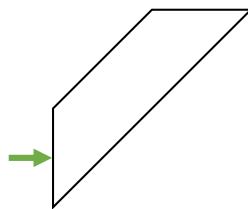
The following question concerns 3 popular prisms.

(a) Please illustrate the tunnel diagrams and note the resulting parity of the image

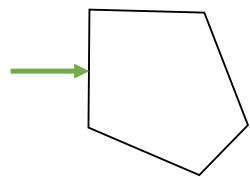
i. Right-Angle Prism



ii. Dove Prism



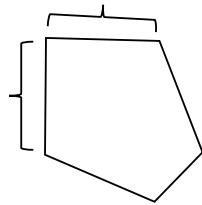
iii. Pentaprism



- (b) Show how the Dove Prism might be used equivalently to a Right-Angle Prism.

2. Fermat's Principle

We have a 100mm focal length lens (the distance from the rear surface of the lens to the image plane can be assumed to be 100mm), and we want to place a pentaprism in the path following the lens to bend the optical axis 90°. The index of the prism $n=1.5$.



- (a) If the image plane is required to be outside the prism, determine the largest value a can be for this pentaprism.
- (b) If $a=40\text{mm}$ and the refractive index of the prism $n=1.66$, where is the image located?