

## Homework 2

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

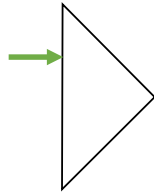
### 1. Tunnel Diagrams

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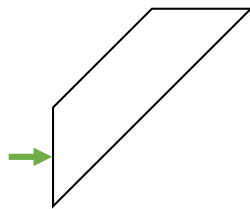
The following question concerns 3 popular prisms.

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

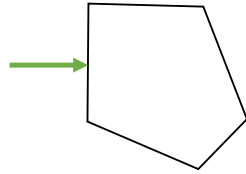
i. Right-Angle Prism



ii. Dove Prism



iii. Pentaprism

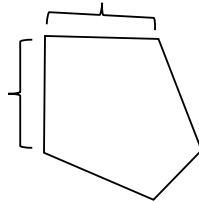


- (b) Show how the Dove Prism might be used equivalently to a Right-Angle Prism.

## 2. Fermat's Principle

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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  $90^\circ$ . 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?