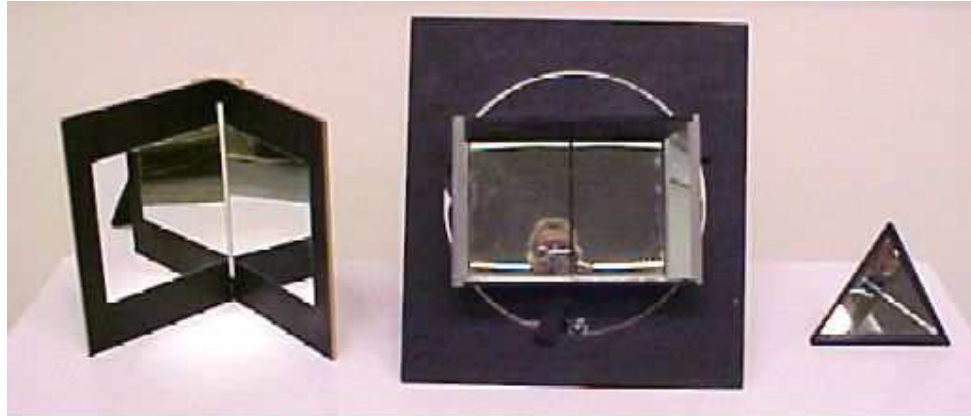# Confusing mirrors.

Aim: To show just plane mirrors in which the images are rather complicated.

Subjects: 6A10 (Reflection From Flat Surfaces)

Diagram:

Hinged double mirror   Revolving double mirror   Corner cube

Equipment:
- Planar mirror.
- Two hinged planar mirrors.
- Revolving double mirror; the mirrors stand perpemdicular to each other.
- Three planar mirrors arranged as a corner cube.

Confusing mirrors.

Presentation:
1. Look into the planar mirror.
   As is known very well, the image of the left hand is a right hand. But why are top and down not interchanged?.
2. Look into the hinged double mirror (see Figure1), the angle between the two mirrors (α is larger than 90°. Moving your eyes you see left and right an image of your head (Figure 1A). Left/right is interchanged in the images.
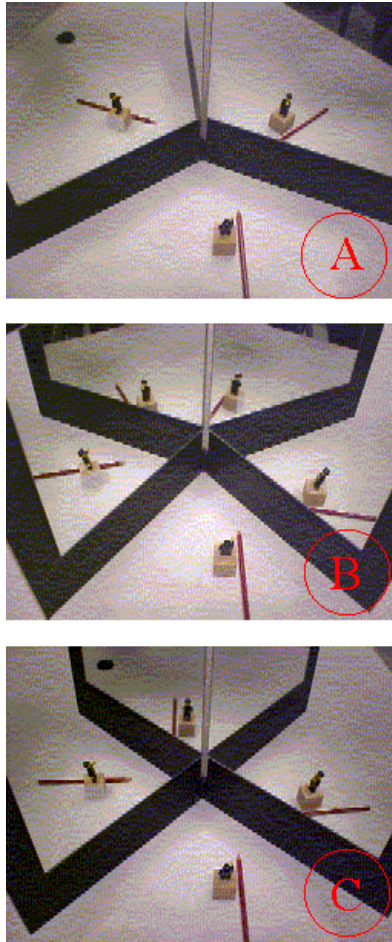
Figure 1

Now make the α smaller than 90°. At around $\alpha=60^o$ you see four images (see Figure1B): The image in the left mirror is again imaged in the right mirror and viceversa.
Slowly the α is made smaller and the two imaged images fall together (at $\alpha=90^o$) (see Figure1C). Move your head on one side to observe this particular image and see that in this image left is still left.

3. Look at the revolving double mirror (see Figure2A). Turn it round slowly and observe that you are upside down (your image is rotated 180° when the mirror

Confusing mirrors.

is turned only 90° (see Figure2B and -2C).
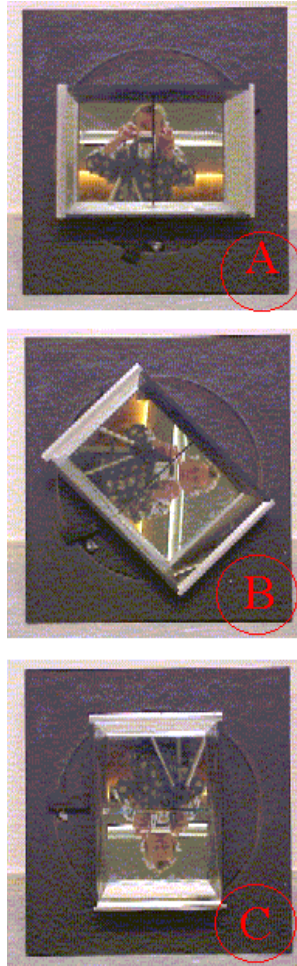

Figure 2

4. Look (close one eye) into the arrangement of three planar mirrors (see Figure3).
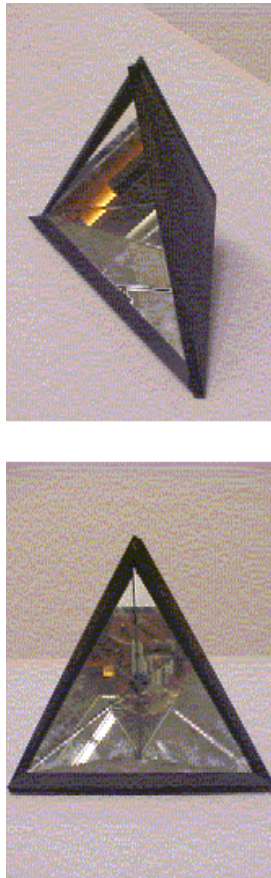
Confusing mirrors.

Figure 3

Observe:
-left remains left and up becomes down;
-your eye remains caught in the middle of the arrangement; it won't help moving your head up-down/right-left.

Explanation: For explanation see the demonstration "Corner cube" in this database.

Sources:
- Hecht, Eugene, Optics, pag. 178-180 and 195
- Stewart, J, Calculus, pag. 791 and 796

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