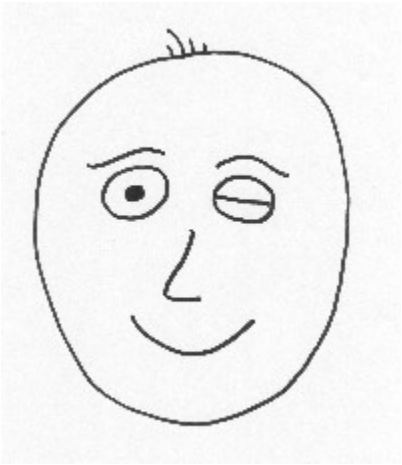
Question #97

This is the first of a series of geometrical optics problems that will be presented at regular intervals for the next indefinite period. Shown in the drawing below is the face of Otto, the object for the optics exercises to follow. By clicking your mouse here for the Background for Face Questions page you may view or print out the array of 28 possible image faces that Otto might create when he positions himself at the appropriate place relative to the optical component under consideration. Over the next several weeks Otto will look into mirrors and through lenses of every conceivable type; your job is to determine the characteristics of the image and answer questions about it. You are to determine how you must view the optical system to directly observe Otto's image, and from that position which of the possible image faces most accurately represents the image that you observe.You may use any available technique, such as ray tracing, calculation, experience, looking it up in a textbook, or even building your own experiment. Each week about three cases will be queried.



You are to determine the following image characteristics for each optical element:

- 1. the orientation and the relative size and shape of the image, by selecting from among the 28 examples given in the page linked above.
- 2. the location from where you must look to see the image.

Other details that you might want to ascertain include:

- 1. the location of the image.
- 2. the magnification.
- 3. whether the image is real or virtual.

The three optical elements for this week are:

- 1. **A plane mirror**: Otto will stand in front of a plane mirror, so that an observer *at the mirror* would see Otto's face as in the photograph above.
- 2. **A spherical convex lens, at a distance of f/2**: Otto will stand at a distance of half the focal length of the lens in front of the lens, so that an observer at the lens would see Otto's face as in the photograph above.
- 3. **A horizontally focusing cylindrical convex lens, at a distance of f/2**: Otto will stand at a distance of one-half the focal distance of a cylindrical lens, that is oriented like a vertical log in

front of Otto. He again faces the lens so that an observer at the lens would see Otto's face as in the photograph above.

Our answers will include the information above as well as a photograph of the image with the object for comparison.

Click here for Answer #97 after December 31, 2001.

Question of the Week

Outreach Index Page

Lecture-Demonstration Home Page

For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.