

## Answer #298

The answers are:

View "look"

- (1) (a)
- (2) (a)
- (3) (b)
- (4) (b)
- (5) (a)
- (6) (a)
- (7) (c)
- (8) (c)
- (9) (a)

The set of photographs below compare the results from Question #297, where a layer of *air* separates OTTO from the plexiglass block, and Question #298, where a layer of *water* separates OTTO from the plexiglass block. The difference in the optical properties of the system is that, because water has very nearly the same index of refraction as plexiglass, light rays pass in virtually a straight line from OTT into the plexiglass cube.

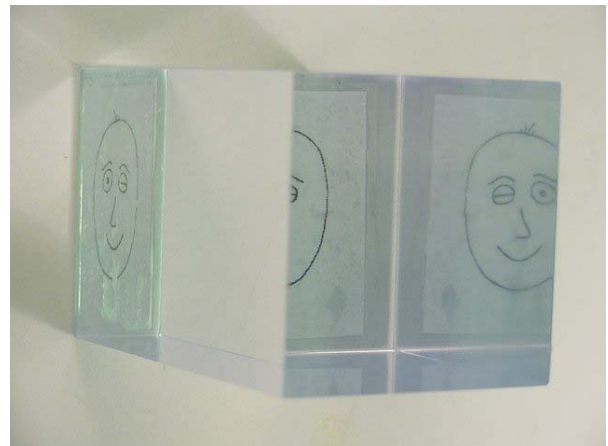
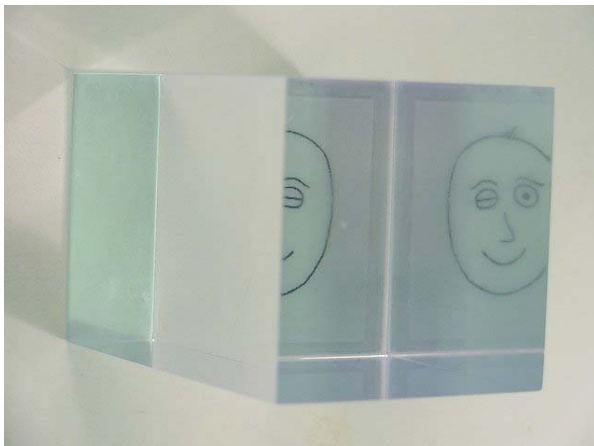
Dry

Wet

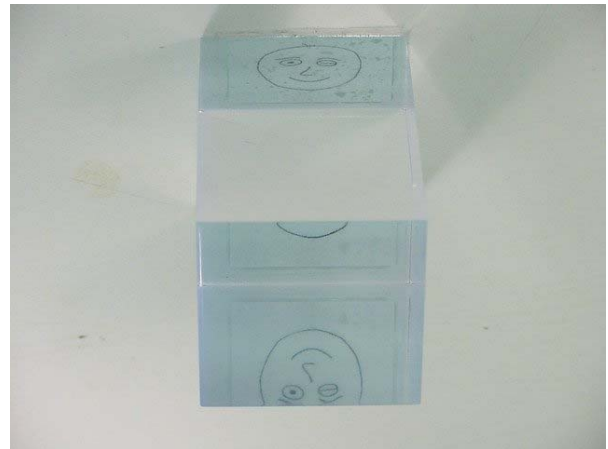
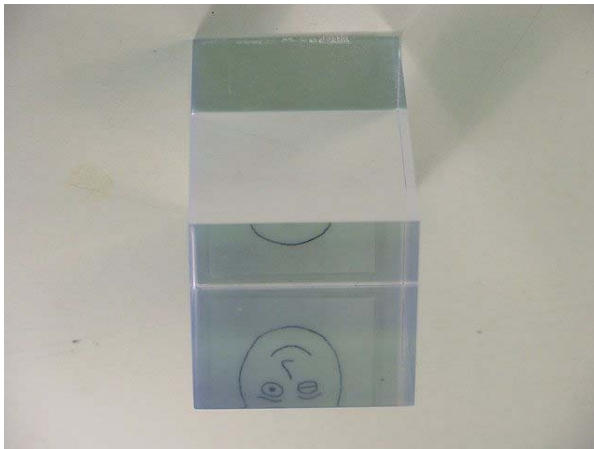
Front:  
views  
(6)  
and  
(7).



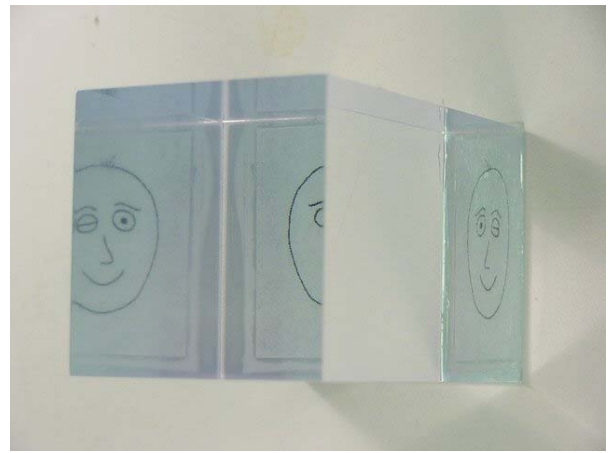
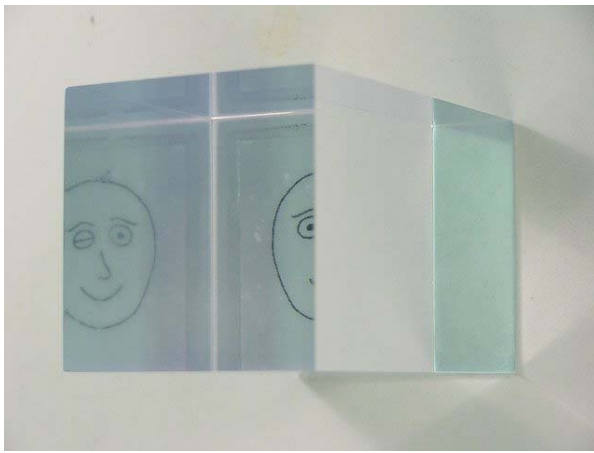
Left:  
views  
(2)  
and  
(3).



Back:  
views  
(8)  
and  
(9).



Right:  
views  
(4)  
and  
(5).



Note that the layer of water allows light rays to pass from OTTO into the plexiglass block at a large enough angle with respect to the sides of the block that total internal reflection no longer occurs. Both a refracted version of OTTO, leaving the side of the plexiglass block, and an internally reflected version of OTTO, reflecting off the side of the block and leaving through the top surface, will occur simultaneously.

The internally reflected OTT will be basically identical to that of Question 297. The refracted version will be shortened in the direction parallel to the surface through which it refracts, causing the refracted OTTO to be shortened in that direction, as was demonstrated in [Question #100](#).

This experiment can be done very nicely using a penny instead of OTTO, but a penny is harder to photograph so OTTO was kind enough to volunteer after being laminated to prevent water damage.

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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](#).