Shooting Glasses Notes

6/17/2013: I want to document the process for testing shooting glasses lenses. The optics involved are nicely described here:

http://www.physics1.howard.edu/Old_Website/School/Labs/GenLab2/9_focal_length.pdf

The key formula is the lens equation:

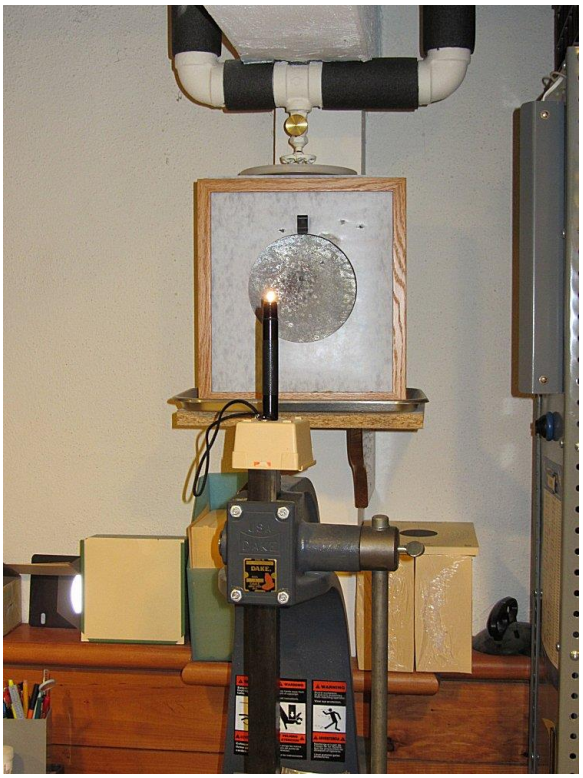
$$\frac{1}{f} = \frac{1}{o} + \frac{1}{i}$$

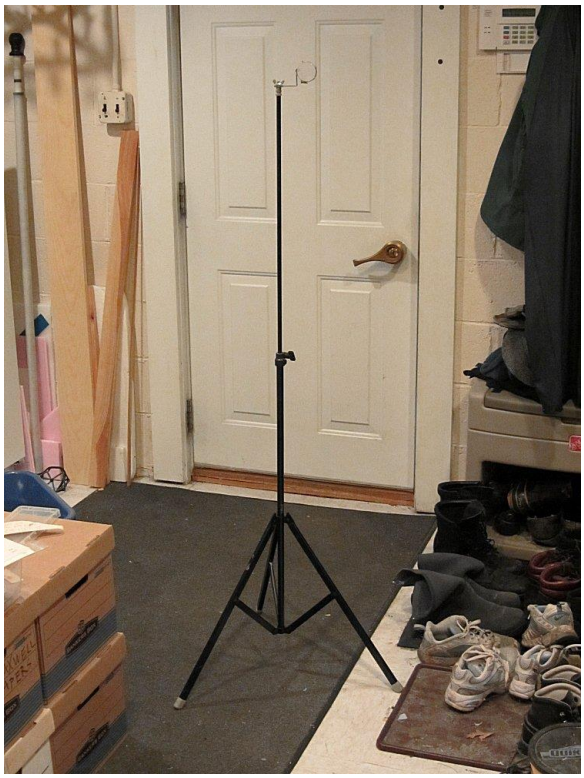
where f is the focal length, o is the distance from the light to the lens, and i is the distance from the lens to the image. If the focal length is calculated in meters, the strength of the lens in diopters is one over the focal length, so:

$$D = \frac{1}{o} + \frac{1}{i}$$

Where everything is measured in meters.

The setup consists of a bright point source at a good distance from the lens, and then a screen to focus on. I used a small Maglite with the reflector removed, and a white sheet of paper near the door to the garage. The lens is held in a holder mounted on top of one of the black fold-up stands for the Oehler chronograph screens.





Shooting Glasses Notes

The lens holder arrangement is a little precarious, but it works OK. If I had more lenses to test, Iôd rig up something more permanent.

Once the light is set up, you can hold the lens and move it until you get a small focused spot on the white door. If you set up the stand to hold the lens a little bit closer to the light, you can leave that in a fixed location, and move a white piece of paper back & forth to get a more precise distance for ñiò.

If the stand is parked on one of the seams between the floor tiles, it makes getting ñoò easier. The distance from the top of the arbor press where the light can be placed to the tile seam just at the door is 21 feet. A typical distance from there to the lens stand is 15 feet. That puts the focus of a 1 diopter lens pretty close to the door.

As an example, I measured an image distance, ñiò of 57 inches (60.5ò to the door, minus ~ 3.5 inches back to where the best focus appeared on a sheet of paper). With the light 36 feet from the lens, that works out to:

$$D = \left(\frac{1}{57\text{in}} + \frac{1}{12 \times 36\text{ft}} \right) \times 39.37\text{in/m} = 0.01986 \times 39.37 = 0.78\text{D}$$

To mark the lenses, I use 1/4ò black-on-clear marking tape, with the font size set to ñ1ò.