

## Experiment: To Set Up an Astronomical Telescope and determine its magnifying power experimentally.

**Background:** An Astronomical Telescope consists of two lenses,

- (1) Objective lens with long focal length
- (2) Eye lens with short focal length.

When using converging lenses, you should remember that if an object is far away from the lens, a real image is formed near the focus. If an object is placed inside the focus, the image is virtual and enlarged.

The telescope uses both of these principles. The Objective lens is pointed at the distant object. It forms an image which is real, and near the focus. This (intermediate) image is used as the object for the eye lens. The eye lens is placed so that the distance between the lenses is nearly equal to the sum of the focal lengths. This will cause the intermediate image to be near (or inside) the focus of the eye lens.

### Procedure:

1. Determine the focal length of each of the two lenses by using the method of focusing a distant object.
2. Adjust both lenses on the optical bench such that the distance between them is equal to the sum of their focal lengths.
3. Look through the eye lens (shorter focal length), and adjust the separation of the lenses until the far distant object is in clear focus.
4. Look at a regular surface (such as a brick wall), look through the telescope with one eye, while looking with the other eye unaided at the same time. With a little practice, you will simultaneously see two images, of different sizes. Try to estimate how many times any one dimension (for example: length) is magnified by the telescope.

### Conclusion:

1. The focal length of the objective lens (# \_\_\_\_\_) was found to be \_\_\_\_\_.
2. The focal length of the eye lens (# \_\_\_\_\_) was found to be \_\_\_\_\_.
3. The magnification was judged to be \_\_\_\_\_ times.

