Optical Instruments

Focal Lengths:

1. Obtain lenses A, B, & C
2. Determine the focal lengths of each by placing them in a lens holder at the 100 cm mark of a 2.0 m stick. Place a candle in a holder no closer than 20.0 cm from the lens and project an image onto a glass screen. Determine the object and image distances and use the equation: **1/f = 1/do + 1/di**

Simple Magnifier

1. Place one lens at the 50.0 cm mark of the 2.0 m stick.
2. Place a piece of graph paper on the ground glass screen and shade a diagonal half of it.
3. Starting with the screen close to the lens, observe the shaded half and verify that the image is not inverted or reversed.
4. Move the screen until 2 perceived squares match with 3 normal squares viewed near the edge of the lens. Measure and record di.
5. Calculate the magnification of the lens.
6. Repeat the procedure with the other two lenses.

Compound Microscope

1. Calculate the power of each of the lenses using: **P = 1/f(m)**
2. Place the larger power lens (A) at the 5.0 cm mark of the 2.0 m stick.
3. Place the smaller power lens (B) at the 45.0 cm mark.
4. Place the screen with the graph paper approximately 40 cm from the smaller power lens and move it back and forth to bring it into focus. Estimate the magnification. Measure the object distance from the center of the small power lens.
5. Place a candle at the position where the graph paper came into clear focus and locate the image formed by the smaller lens.
6. Repeat the procedure using lenses B & C

Optical Instruments

Astronomical Telescope

1. Use lens C as the objective and lens A as the ocular. The best position for the eye will be some distance from the ocular.
2. Observe the image of an object at some distance and describe its characteristics.
3. Calculate the magnification of the telescope using: $M = - f_o/f_e$

Galilean (Terrestrial) Telescope

1. Use lens C as the objective and lens D as the ocular.
2. Measure the lens separation.
3. Describe the image characteristics.
4. Determine the magnification of the telescope.