

## Solutions

### Chapter 14

#### Problem 1

##### Part a

$$s = 30.0 - (5.00 + 10.0) = 15.0 \text{ cm.}$$

##### Part b

As the image due to the objective is just inside the eyepiece lens focal point, the image distance due to the objective is  $i = f_o + s$ . Then, using the *imaging formula* for the objective lens:

$$\frac{1}{p} + \frac{1}{f_o + s} = \frac{1}{f_o}$$

This gives

$$p = 6.67 \text{ cm.}$$

##### Part c

$$m = \frac{-i}{p} = \frac{-(5.00 + 15.0)}{6.67} = -3.00$$

##### Part d

$$m_\theta = 25.0/f_e = 25.0/10.0 = 2.50$$

##### Part e

$$M = mm_\theta = -7.50$$

## Problem 2

Magnification is given by

$$m = f_o/f_e$$

Hence,

$$f_o = mf_e = 500 \text{ cm.}$$