

$$d_i = 11 \text{ cm}$$

$$\begin{aligned} M &= \frac{d_i}{d_o} \\ &= \frac{11 \text{ cm}}{11 \text{ cm}} \\ &= 1.0 \end{aligned}$$

$$\begin{aligned} 7. \quad \frac{1}{f} &= \frac{1}{d_o} + \frac{1}{d_i} \\ \frac{1}{d_o} &= \frac{1}{f} - \frac{1}{d_i} \\ &= \frac{1}{6.0 \text{ cm}} - \frac{1}{2.5 \text{ cm}} \end{aligned}$$

$$d_o = 4.3 \text{ cm}$$

$$\begin{aligned} 8. \quad \frac{1}{f} &= \frac{1}{d_o} + \frac{1}{d_i} \\ \frac{1}{d_i} &= \frac{1}{f} - \frac{1}{d_o} \\ &= \frac{1}{-4.0 \text{ cm}} - \frac{1}{8.0 \text{ cm}} \end{aligned}$$

$$d_i = -2.67 \text{ cm}$$

$$\begin{aligned} M &= \frac{d_i}{d_o} \\ &= \frac{-2.67 \text{ cm}}{8.0 \text{ cm}} \\ &= 0.33 \end{aligned}$$

$$9. \quad M = \frac{d_i}{d_o}$$

$$\begin{aligned} d_i &= (M)(d_o) \\ &= (2)(7.0 \text{ cm}) \\ &= 14 \text{ cm} \end{aligned}$$

$$\begin{aligned} \frac{1}{f} &= \frac{1}{d_o} + \frac{1}{d_i} \\ &= \frac{1}{7.0 \text{ cm}} + \frac{1}{14 \text{ cm}} \end{aligned}$$

$$f = 4.7 \text{ cm}$$

$$\begin{aligned} 10. \quad \frac{h_i}{h_o} &= -\frac{d_i}{d_o} \\ \frac{-6.0 \text{ cm}}{4.0 \text{ cm}} &= -\frac{d_i}{9.0 \text{ cm}} \end{aligned}$$

$$d_i = 13.5 \text{ cm}$$

$$\begin{aligned} \frac{1}{f} &= \frac{1}{d_o} + \frac{1}{d_i} \\ &= \frac{1}{9.0 \text{ cm}} + \frac{1}{13.5 \text{ cm}} \\ f &= 5.4 \text{ cm} \end{aligned}$$

$$\begin{aligned} 11. \quad \frac{h_i}{h_o} &= -\frac{d_i}{d_o} \\ \frac{6.0 \text{ cm}}{3.0 \text{ cm}} &= -\frac{d_i}{7.0 \text{ cm}} \end{aligned}$$

$$d_i = -14 \text{ cm}$$

$$\begin{aligned} \frac{1}{f} &= \frac{1}{d_o} + \frac{1}{d_i} \\ &= \frac{1}{7.0 \text{ cm}} + \frac{1}{-14 \text{ cm}} \end{aligned}$$

$$f = 14 \text{ cm}$$

$$\begin{aligned} 12. \quad \frac{h_i}{h_o} &= -\frac{d_i}{d_o} \\ \frac{2.0 \text{ cm}}{3.0 \text{ cm}} &= -\frac{-3.0 \text{ cm}}{d_o} \end{aligned}$$

$$d_o = 4.5 \text{ cm}$$

$$\begin{aligned} \frac{1}{f} &= \frac{1}{d_o} + \frac{1}{d_i} \\ &= \frac{1}{4.5 \text{ cm}} + \frac{1}{-3.0 \text{ cm}} \end{aligned}$$

$$f = -9.0 \text{ cm}$$

concave

$$\begin{aligned} 13. \quad \frac{1}{f} &= \frac{1}{d_o} + \frac{1}{d_i} \\ \frac{1}{d_o} &= \frac{1}{f} - \frac{1}{d_i} \\ &= \frac{1}{4.0 \text{ cm}} - \frac{1}{-6.0 \text{ cm}} \end{aligned}$$