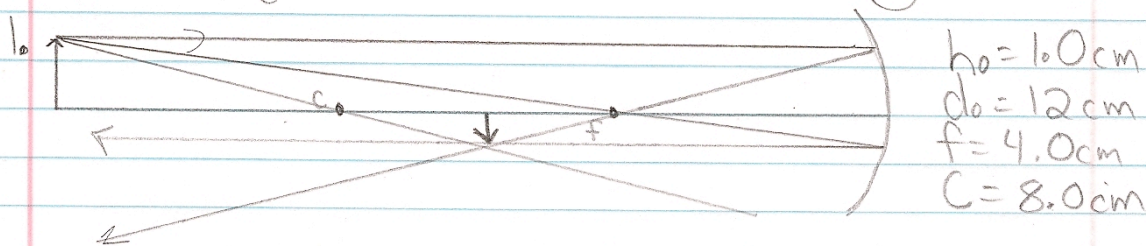


Converging Mirror Assignment - Key



a) $d_i = ?$

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$$

$$\frac{1}{4.0\text{cm}} = \frac{1}{d_i} + \frac{1}{12\text{cm}}$$

$$0.25 = \frac{1}{d_i} + 0.0833$$

$$0.1666 = \frac{1}{d_i}$$

$$d_i = 6.0\text{cm}$$

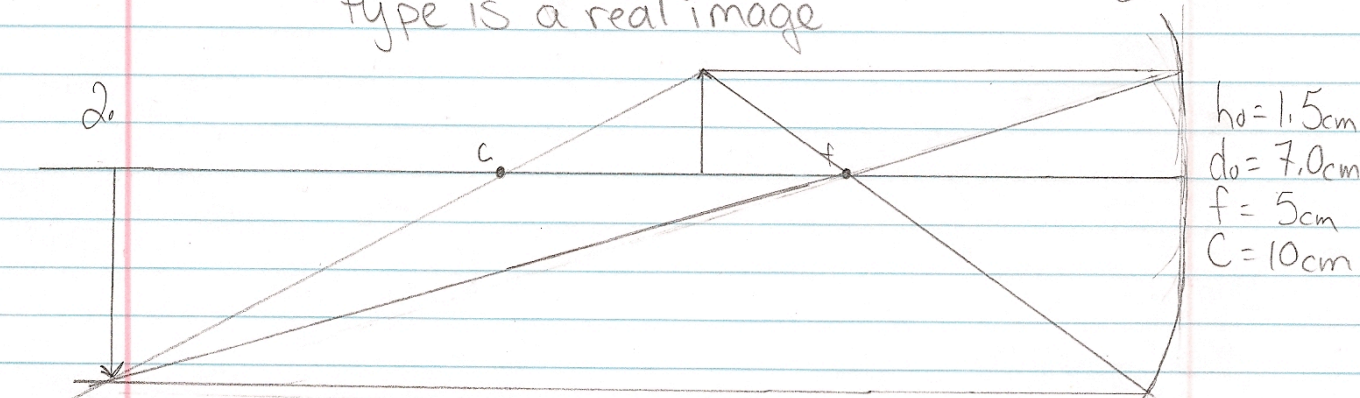
b) $h_i = ?$

$$M = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$$

$$\frac{h_i}{1.0\text{cm}} = -\frac{6.0\text{cm}}{12\text{cm}}$$

$$h_i = -0.50\text{cm}$$

c) image location is between C and f (6.0cm in front of mirror)
 orientation is inverted
 size is 0.50cm; smaller than the object
 type is a real image



a) $d_i = ?$

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$$

$$\frac{1}{5\text{cm}} = \frac{1}{d_i} + \frac{1}{7.0\text{cm}}$$

$$0.2 = \frac{1}{d_i} + 0.1429$$

$$0.0571 = \frac{1}{d_i}$$

$$d_i = 17.5\text{cm}$$

b) $h_i = ?$

$$\frac{h_i}{h_o} = -\frac{d_i}{d_o}$$

$$\frac{h_i}{1.5\text{cm}} = -\frac{17.5\text{cm}}{7.0\text{cm}}$$

$$h_i = -2.5\text{cm}$$

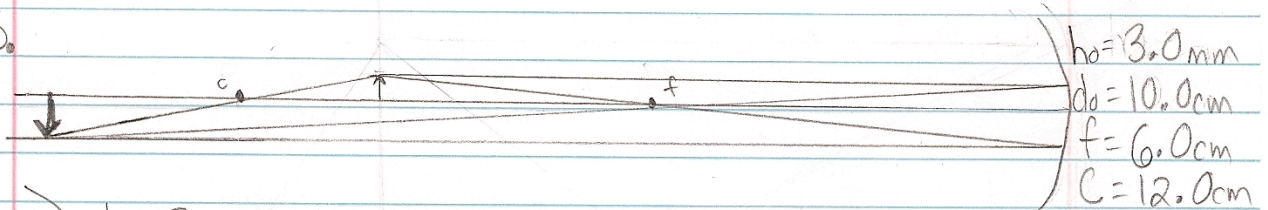
$$h_i = -3.75\text{cm}$$

$$\frac{h_i}{1.5\text{cm}} = -2.5$$

$$h_i = -4\text{cm}$$

c) image is behind C (20cm from mirror)
 inverted, larger (4cm) and is real.

3.



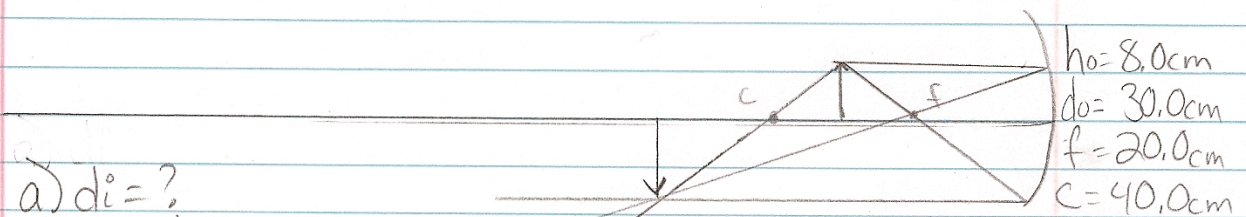
a) $d_i = ?$ $\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$ $\frac{1}{6.0 \text{ cm}} = \frac{1}{d_i} + \frac{1}{10.0 \text{ cm}}$
 $0.16666 = \frac{1}{d_i} + 0.10$
 $0.0666 = \frac{1}{d_i}$

$d_i = 15 \text{ cm}$

b) $M = \frac{d_i}{d_o}$ $M = \frac{15 \text{ cm}}{10.0 \text{ cm}}$ $M = 1.5$

c) $h_i = ?$ $M = \frac{h_i}{h_o}$ $1.5 = \frac{h_i}{3.0 \text{ mm}}$ $h_i = 4.5 \text{ mm}$

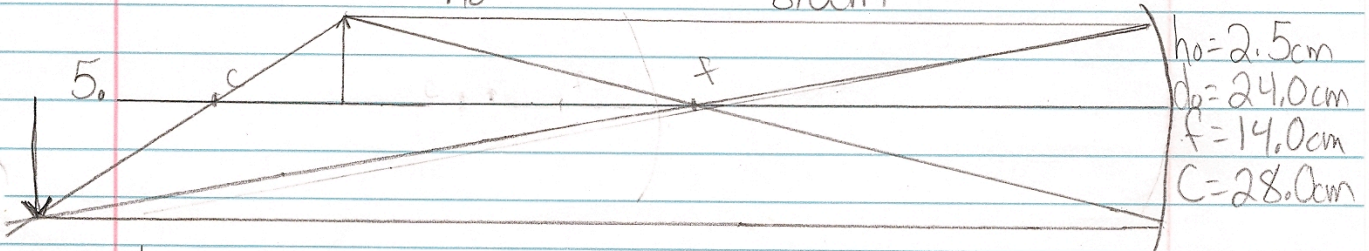
4.



a) $d_i = ?$ $\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$ $\frac{1}{20.0 \text{ cm}} = \frac{1}{d_i} + \frac{1}{30.0 \text{ cm}}$
 $0.05 = \frac{1}{d_i} + 0.0333$ $0.016666 = \frac{1}{d_i}$ $d_i = 60.0 \text{ cm}$

b) $M = \frac{d_i}{d_o} = \frac{60.0 \text{ cm}}{30.0 \text{ cm}} = 2.00$

c) $h_i = ?$ $M = \frac{h_i}{h_o}$ $2.00 = \frac{h_i}{8.0 \text{ cm}}$ $h_i = 16 \text{ cm}$



$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$ $\frac{1}{14.0 \text{ cm}} = \frac{1}{d_i} + \frac{1}{24.0 \text{ cm}}$ $0.0714 = \frac{1}{d_i} + 0.04167$
 $0.0298 = \frac{1}{d_i}$ $d_i = 33.6 \text{ cm}$

6. $\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$ $d_i = 30.0 \text{ cm}$ $C = 20.0 \text{ cm}$
 $f = C \div 2 = 10.0 \text{ cm}$
 $\frac{1}{10.0 \text{ cm}} = \frac{1}{30.0 \text{ cm}} + \frac{1}{d_o}$ $\frac{1}{10.0} - \frac{1}{30.0} = \frac{1}{d_o}$
 $0.1 - 0.0\overline{3} = \frac{1}{d_o}$ $0.0\overline{6} = \frac{1}{d_o}$
 $d_o = 15.0 \text{ cm}$

7. $f = 12.0 \text{ cm}$ $h_i = -15.0 \text{ cm}$ $d_i = 30.0 \text{ cm}$
 find d_o $\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$ $\frac{1}{12.0 \text{ cm}} = \frac{1}{30.0 \text{ cm}} + \frac{1}{d_o}$
 $0.08\overline{3} = 0.0\overline{3} + \frac{1}{d_o}$
 $0.05 = \frac{1}{d_o}$ $d_o = 20.0 \text{ cm}$
 find h_o $\frac{h_o}{h_i} = -\frac{d_o}{d_i}$ $h_o = -h_i \left(\frac{d_o}{d_i} \right) = -(-15.0 \text{ cm}) \left(\frac{20.0 \text{ cm}}{30.0 \text{ cm}} \right)$
 $h_o = 10.0 \text{ cm}$

8. $h_o = 7.00 \text{ cm}$ $d_o = 20.0 \text{ cm}$ $d_i = 80.0 \text{ cm}$
 find f $\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$
 $\frac{1}{f} = \frac{1}{20.0 \text{ cm}} + \frac{1}{80.0 \text{ cm}}$
 $\frac{1}{f} = 0.05 + 0.0125$
 $\frac{1}{f} = 0.0625$
 $f = 16.0 \text{ cm}$