A 4.50 cm tall object is located 28.0 cm in front of a spherical mirror. It is desired to produce a virtual image that is upright and 3.50 cm tall.

(a) What type of mirror should be used?

(b) Where is the image located? (c) What is the focal length of the mirror?

\[ h_o = 4.50 \text{ cm} \]
\[ d_o = 28.0 \text{ cm} \]
\[ h_i = 3.50 \text{ cm upright virtual} \]

(a) concave \(\rightarrow\) real or virtual

 convex \(\rightarrow\) virtual, upright, \(\neq\) reduced

(b) \( d_i = ? \)

\[ m = \frac{h_i}{h_o} = \frac{3.50 \text{ cm}}{4.50 \text{ cm}} = 0.78 \]

\[ m = -\frac{d_i}{d_o} \rightarrow d_i = -m \cdot d_o \]

\[ = -(0.78)(28.0 \text{ cm}) \]

\[ d^*_i = -21.8 \text{ cm} \]

(c) \( \frac{1}{d_0} + \frac{1}{d_i} = \frac{1}{f} \rightarrow \frac{1}{f} = \frac{1}{28.0 \text{ cm}} + \frac{1}{-21.8 \text{ cm}} \]

\[ \frac{1}{f} = -0.0102 \text{ cm}^{-1} \rightarrow f = -98 \text{ cm} \]