

Mirror Math 😊

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

$+d_i \neq +f \Rightarrow$ in front of mirror

$-d_i \neq -f \Rightarrow$ behind mirror

magnification:

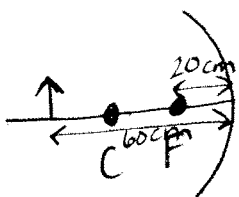
$$\boxed{\frac{h_i}{h_o} = -\frac{d_i}{d_o}}$$

$+h_i$: erect (virtual)

$-h_i$: inverted (real)

Ex

An 4cm tall object is placed 60 centimeters in front of a concave mirror with a focal length of 20 cm. Calculate d_i and h_i . Is the image real or virtual? Upright or inverted? Smaller or larger? In front of or behind mirror?



$h_o = +4\text{cm}$
 $f = +20\text{cm}$
 $d_o = +60\text{cm}$
 $d_i = ?$ $h_i = ?$

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o} \Rightarrow \frac{1}{d_i} = \frac{1}{f} - \frac{1}{d_o} = \frac{1}{20} - \frac{1}{60} = .033$$

$$\frac{1}{d_i} = .033 \Rightarrow \boxed{d_i = +30\text{cm}}$$

In front of
mirror
real

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

$$h_i = \frac{-d_i h_o}{d_o} = \frac{-(+30\text{cm})(+4\text{cm})}{+60\text{cm}} = -2\text{cm}$$

Inverted
smaller

HW: Sublevel 7

ex

Convex Mirror Example:

Locate the image formed by a 4.0 cm tall object placed 60. cm in front of a convex mirror with a focal length of 20. cm. Is the image real or virtual?

Upright or inverted? Smaller or larger? In front of or behind the mirror? Sketch diagram and show your work. (Hint: Convex mirrors have negative focal lengths.)

THIS IS AN IN-CLASS ASSIGNMENT THAT
WAS COLLECTED AT THE END OF CLASS

HW: Sublevel 10