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

Magnification

The ratio of the size of the image, h_i, to the size of the object, h_o, is called the **magnification** (m):

magnification → $m = \frac{h_i}{h_o}$ or $m = \frac{-d_i}{d_o}$ ← the negative sign is necessary because of the sign convention.

If d_i and d_o are both positive (both are on the same side of the mirror), then both m and h_i are **negative**. This means the image is **inverted**.

Mirror Equation

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

f = focal length

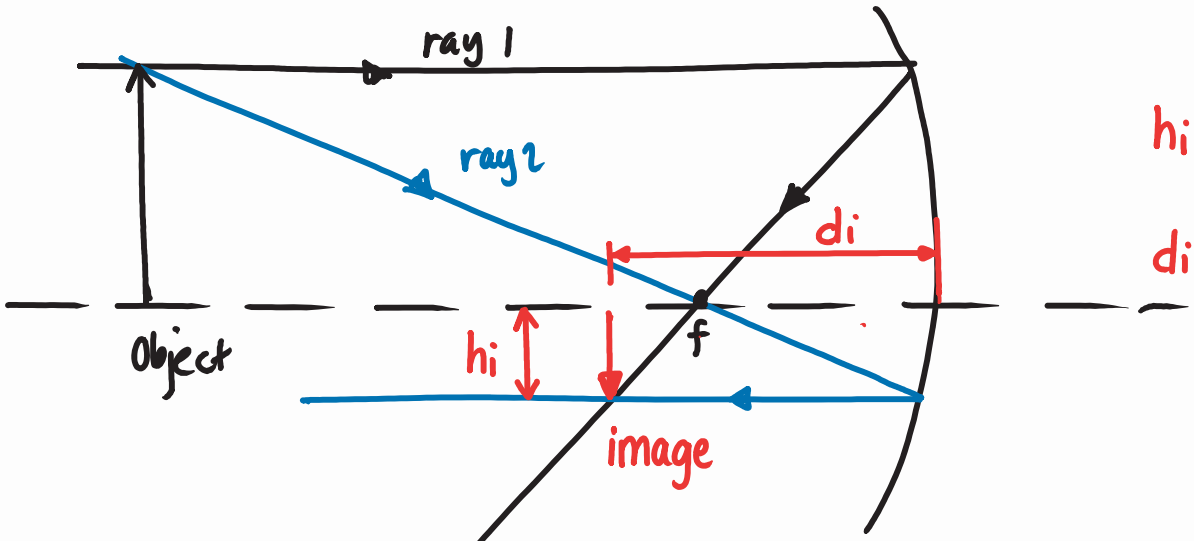
d_o = distance of object

d_i = distance of image

Example: An object 3.00 cm tall is placed 10.0 cm in front of a concave mirror that has a focal length of 3.0 cm. Find the characteristics (location, size, orientation, type) of the image produced by:

a) drawing a ray diagram
b) using the mirror equation

d_i h_i → inverted → real



h_i = 1.1~1.2 cm

d_i = 4.1-4.2 cm

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

$\frac{1}{3.0} = \frac{1}{10.0} + \frac{1}{d_i}$

$\frac{-1}{10.0}$ $\frac{-1}{10.0}$

$d_i(0.23333) = \frac{1}{d_i}(d_i)$

$\frac{d_i(0.23333)}{0.23333} = \frac{1}{0.23333}$

d_i = 4.3 cm

positive means image is real.

image is real.

or $(0.23333)^{-1} = \left(\frac{1}{d_i}\right)^{-1}$

4.3 cm = d_i

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

$$\frac{h_i}{3.0} = \frac{-(4.3)(3.0)}{10.0}$$

$h_i = -1.3$ cm

negative – so the image is inverted

p. 374 # 2, 3 → use millimeters

p. 376 # 5-8

p. 377 # 9-11