Mirrors

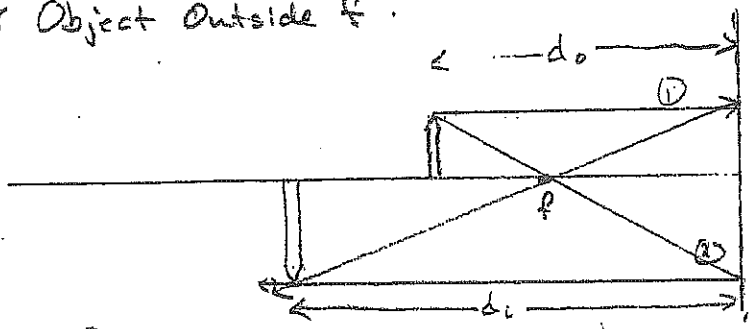
$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i} \qquad \frac{d_o}{d_i} = -\frac{h_o}{h_i}$$

Concave Mirror +f

+f	-f
$+d_o$	$-d_i$
$+d_i$	

$$M = \frac{d_i}{d_o}$$

★ Object Outside f.

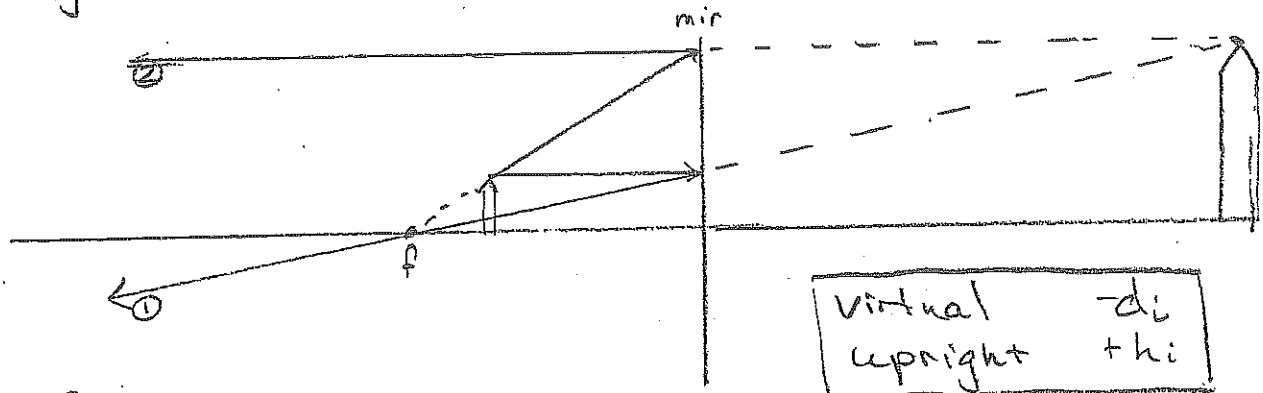


real $+d_i$
inverted $-h_i$

Ray 1 - Horizontally to mirror then reflects thru f
Ray 2 - Thru f to mirror, reflects horiz

★ Object Inside f

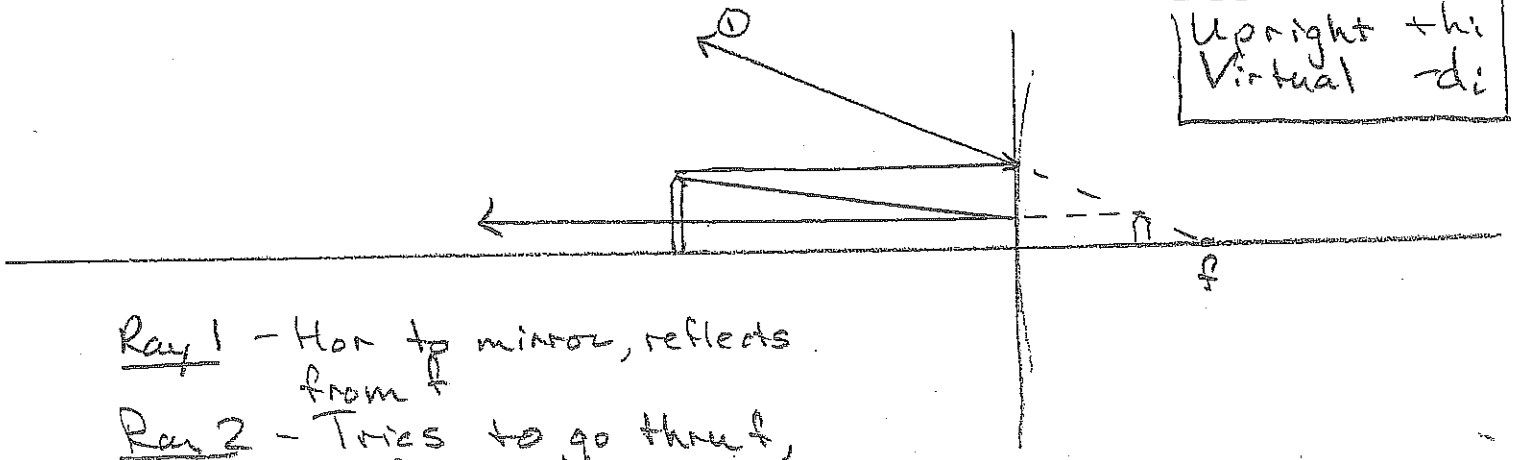
Virtual = Opp Side
$-d_i$ = Same Side



Virtual $-d_i$
upright $+h_i$

Ray 1 - same as above
Ray 2 - line up f & top of object - draw to mirror reflect horizontally

Convex Mirror -f



Upright $+h_i$
Virtual $-d_i$

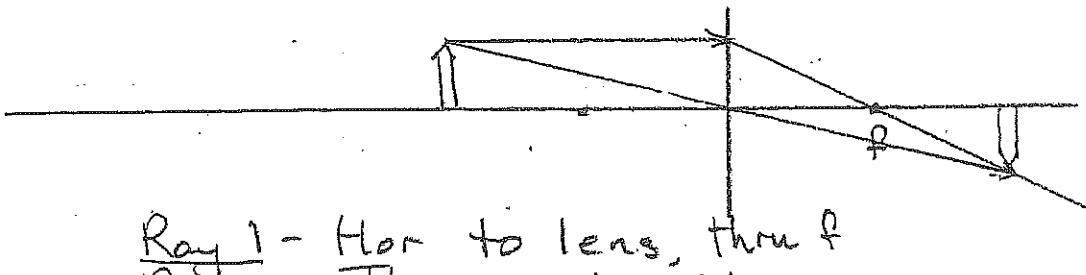
Ray 1 - Hor to mirror, reflects from f
Ray 2 - Tries to go thru f, reflects horiz

Lenses

$-f$	$+f$
$+d_o$	$-d_o$
$-d_i$	$+d_i$

Convex Lens / Converging Lens $+f$

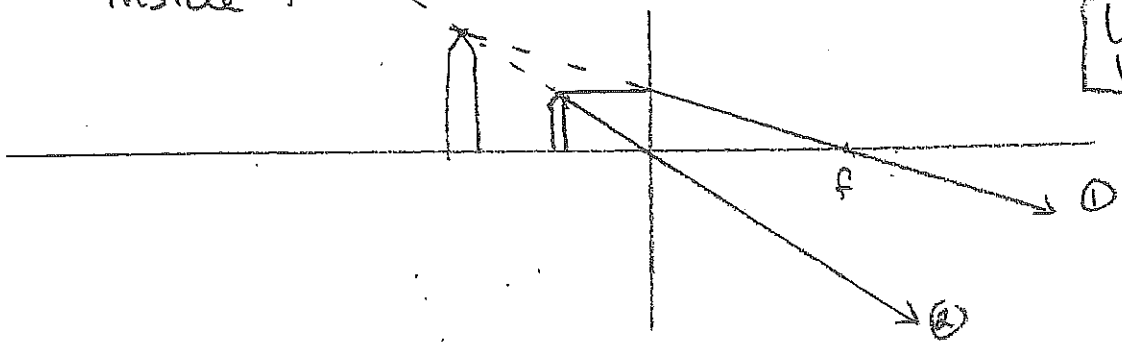
Outside f



Real
Inverted
$+d_i$
$-h_i$

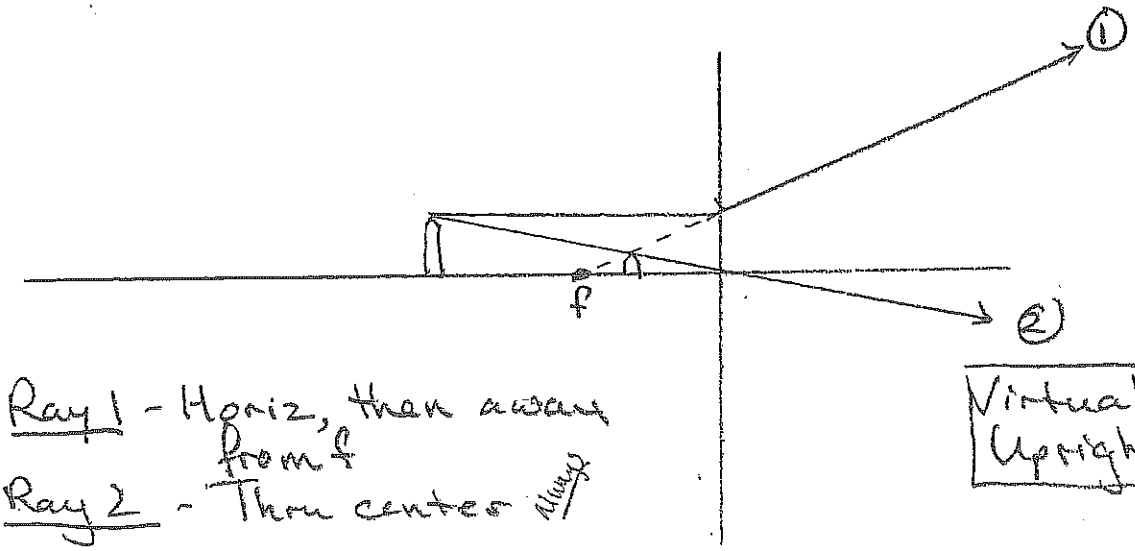
Ray 1 - Hor to lens, thru f
Ray 2 - Thru center of lens

Inside f



Upright
Virtual
$-d_i$
$+h_i$

Concave Lens Diverging $-f$)(



Ray 1 - Horiz, then away from f
Ray 2 - Thru center always

Virtual $-d_i$
Upright $+h_i$

Virtual = Same Side
Real = Opp Side