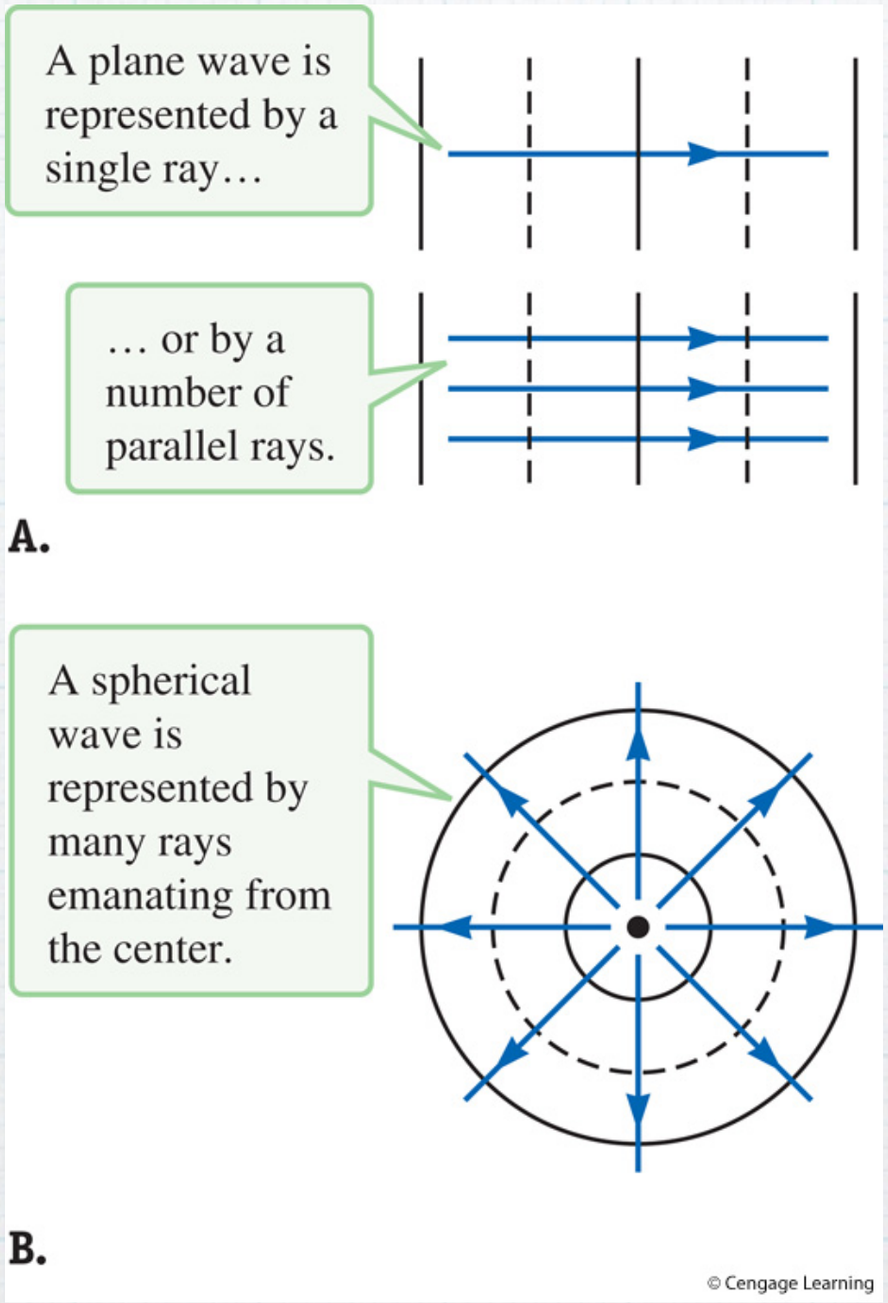
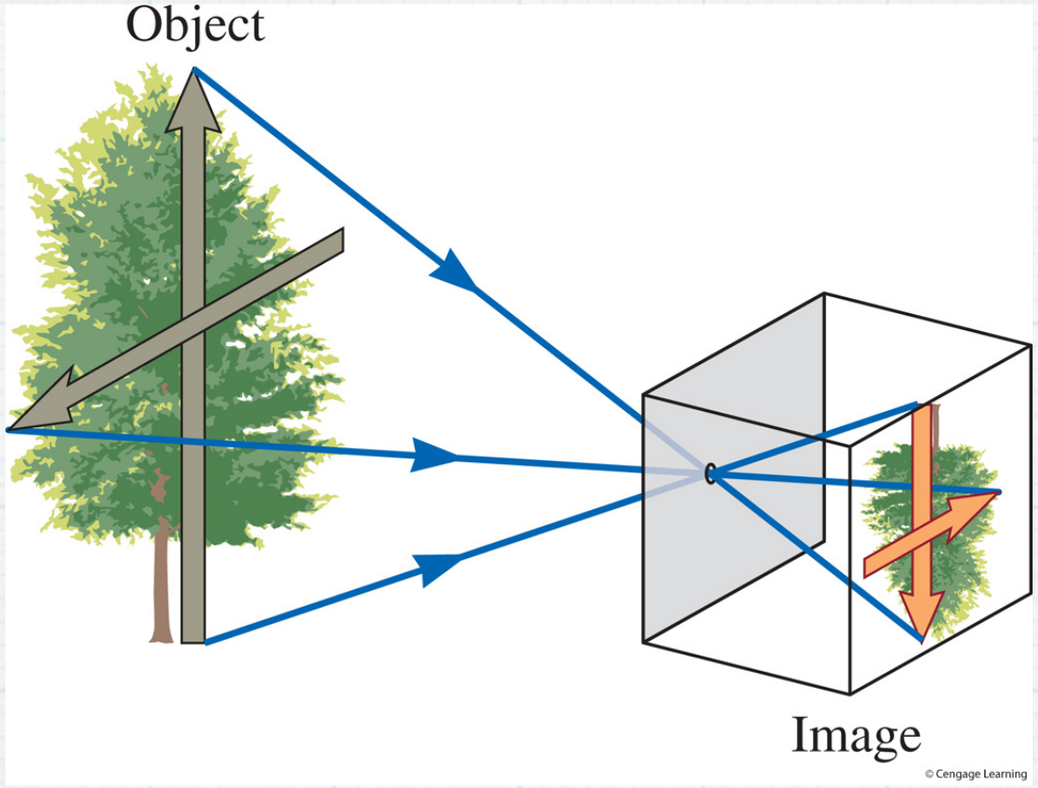
Reflection and Images Formed by Reflection

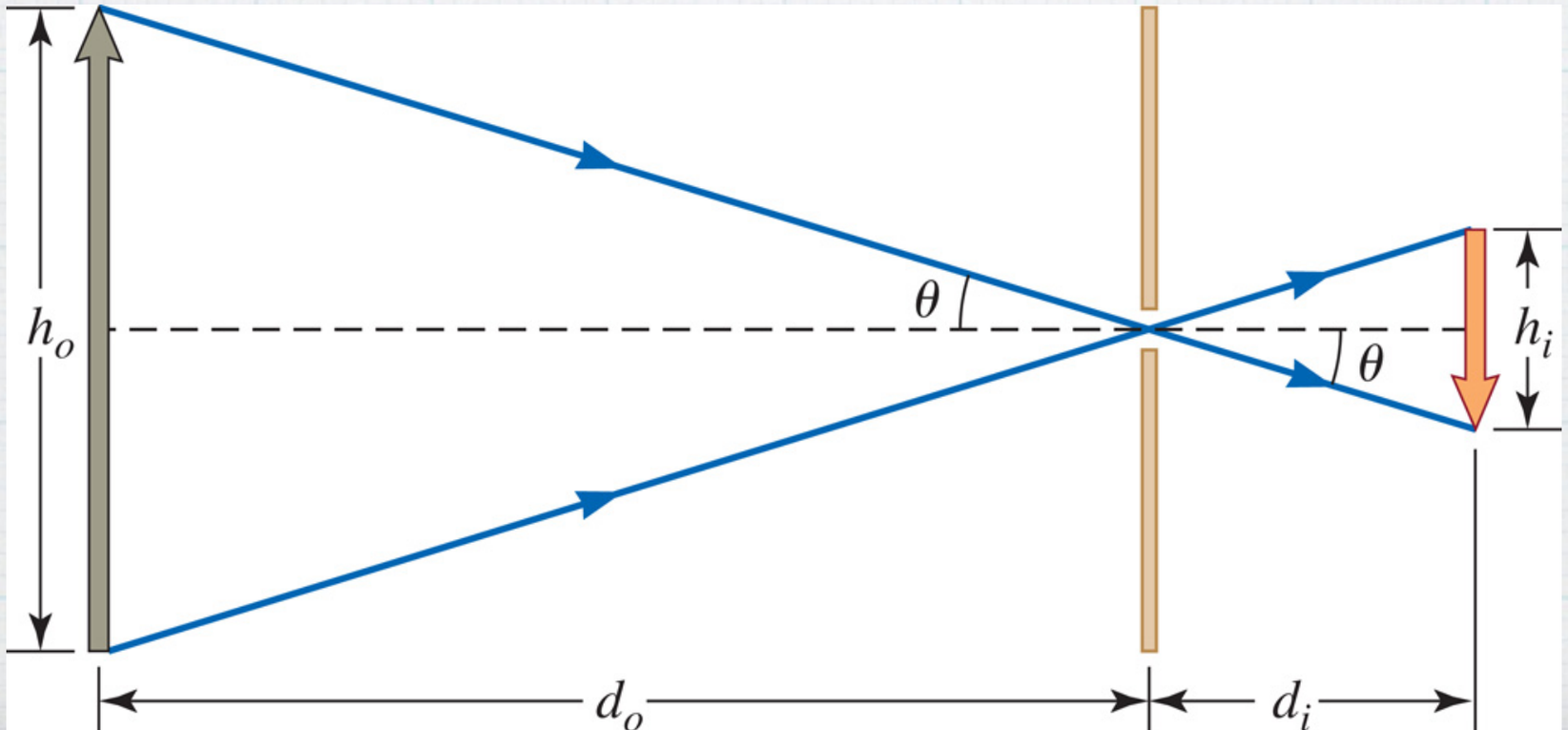
Geometric Optics and the Ray approximation



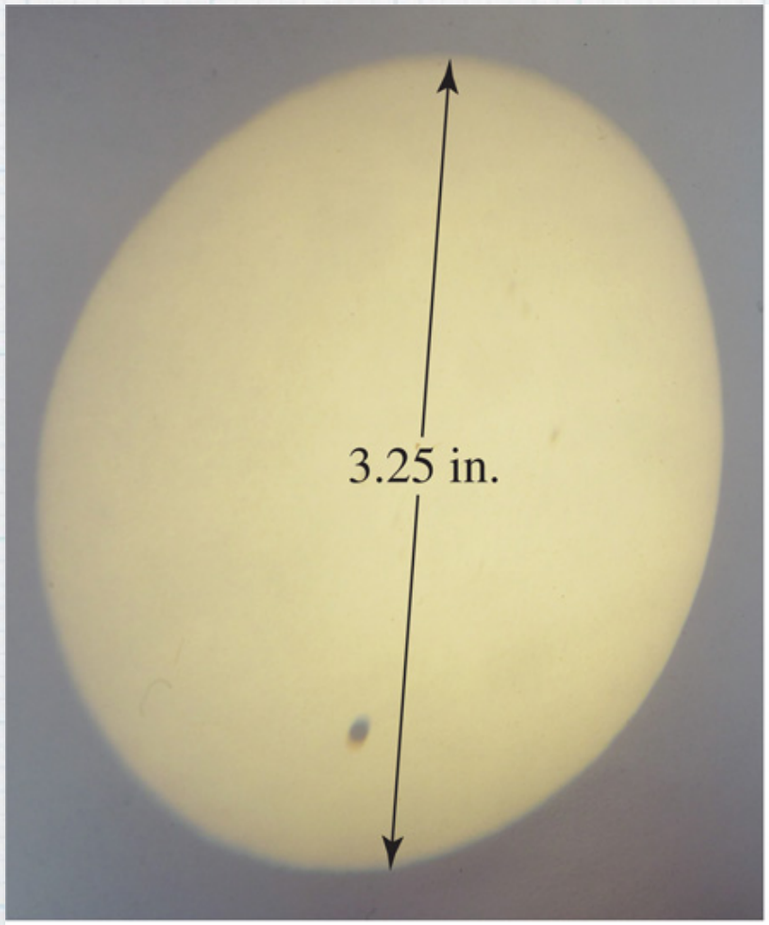
Pinhole Camera



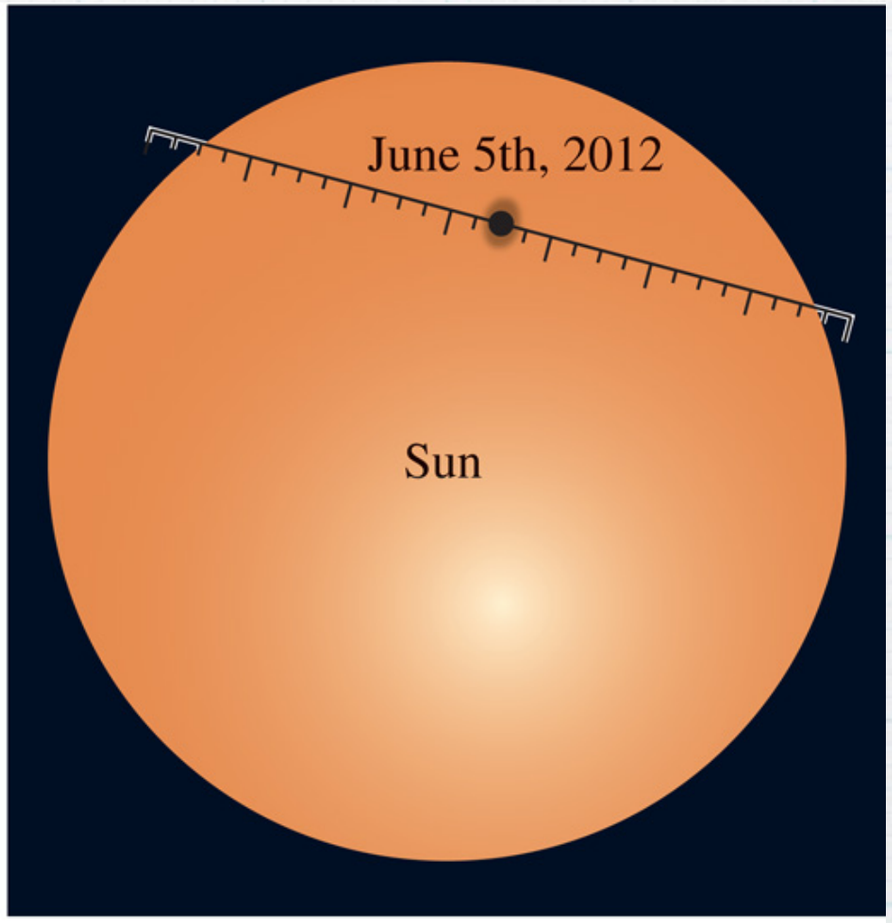
$$M = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$$



Example - Sun and pinhole



A.

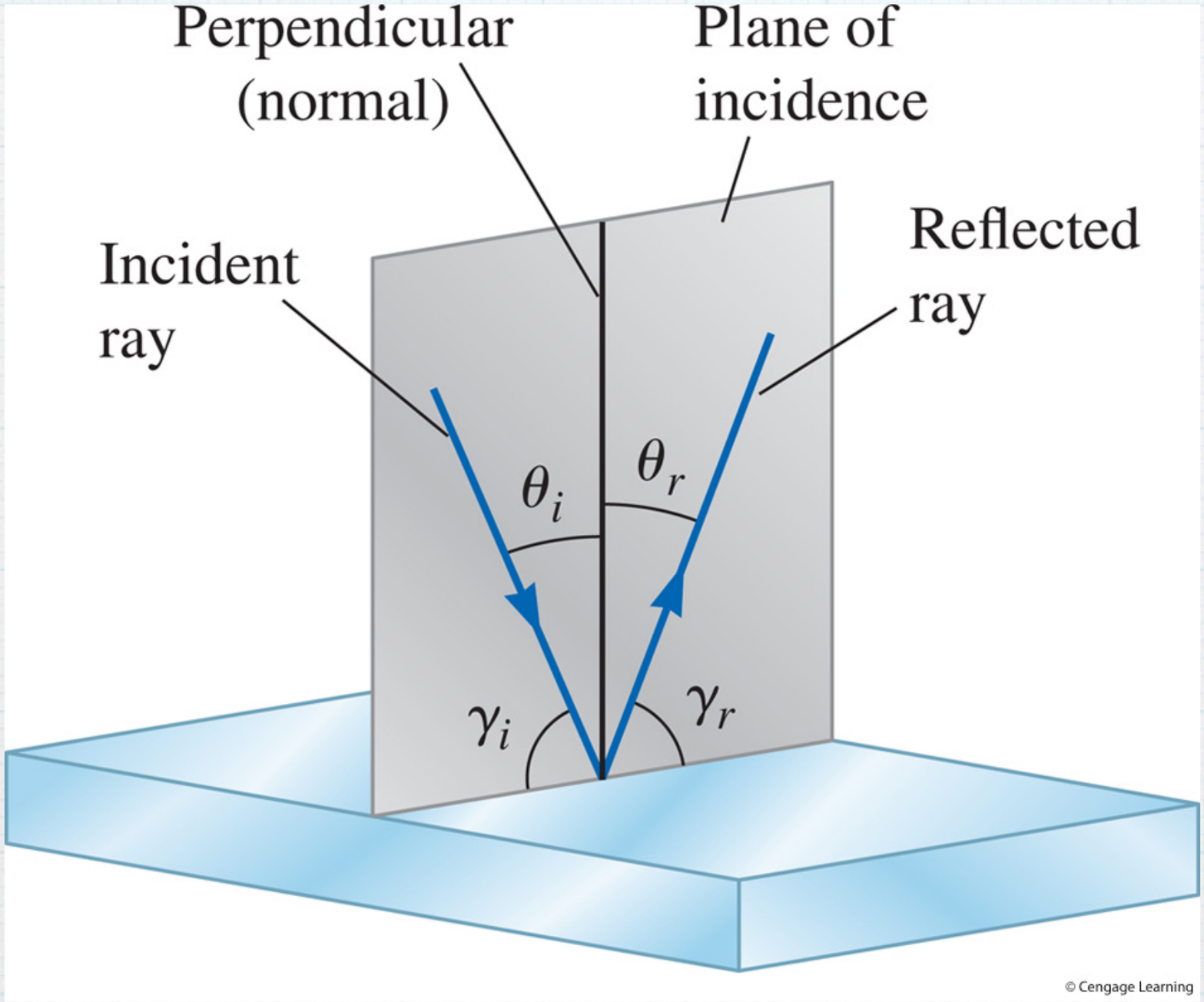


B.

a) Debora Katz; b) © Cengage Learning

Law of Reflection

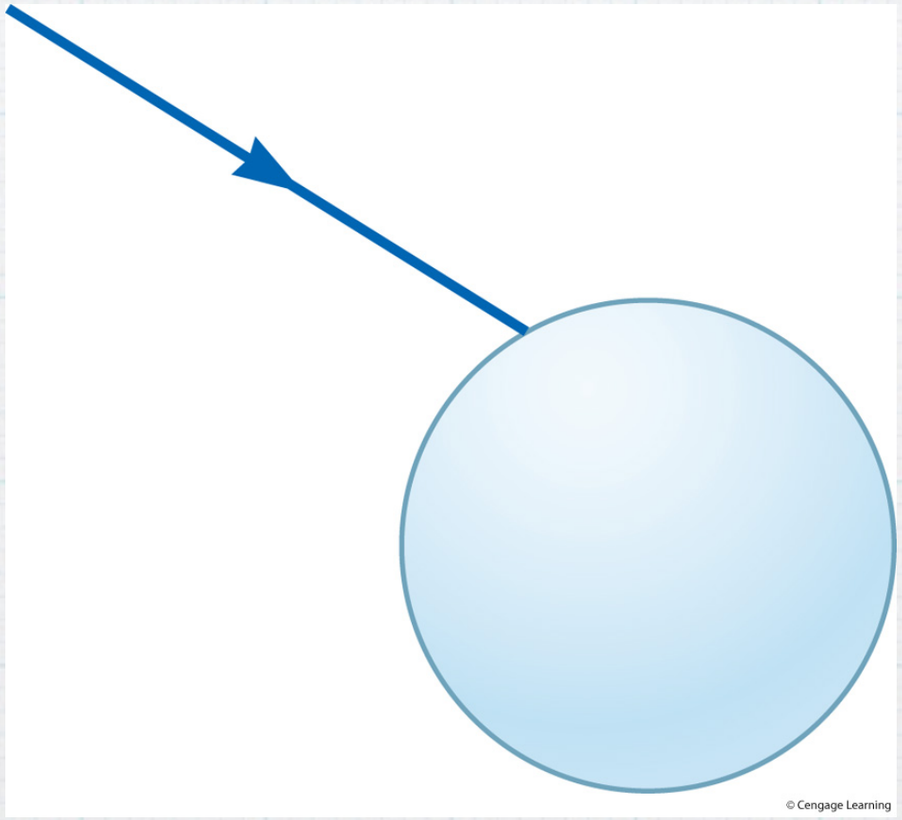
$$\theta_i = \theta_r$$



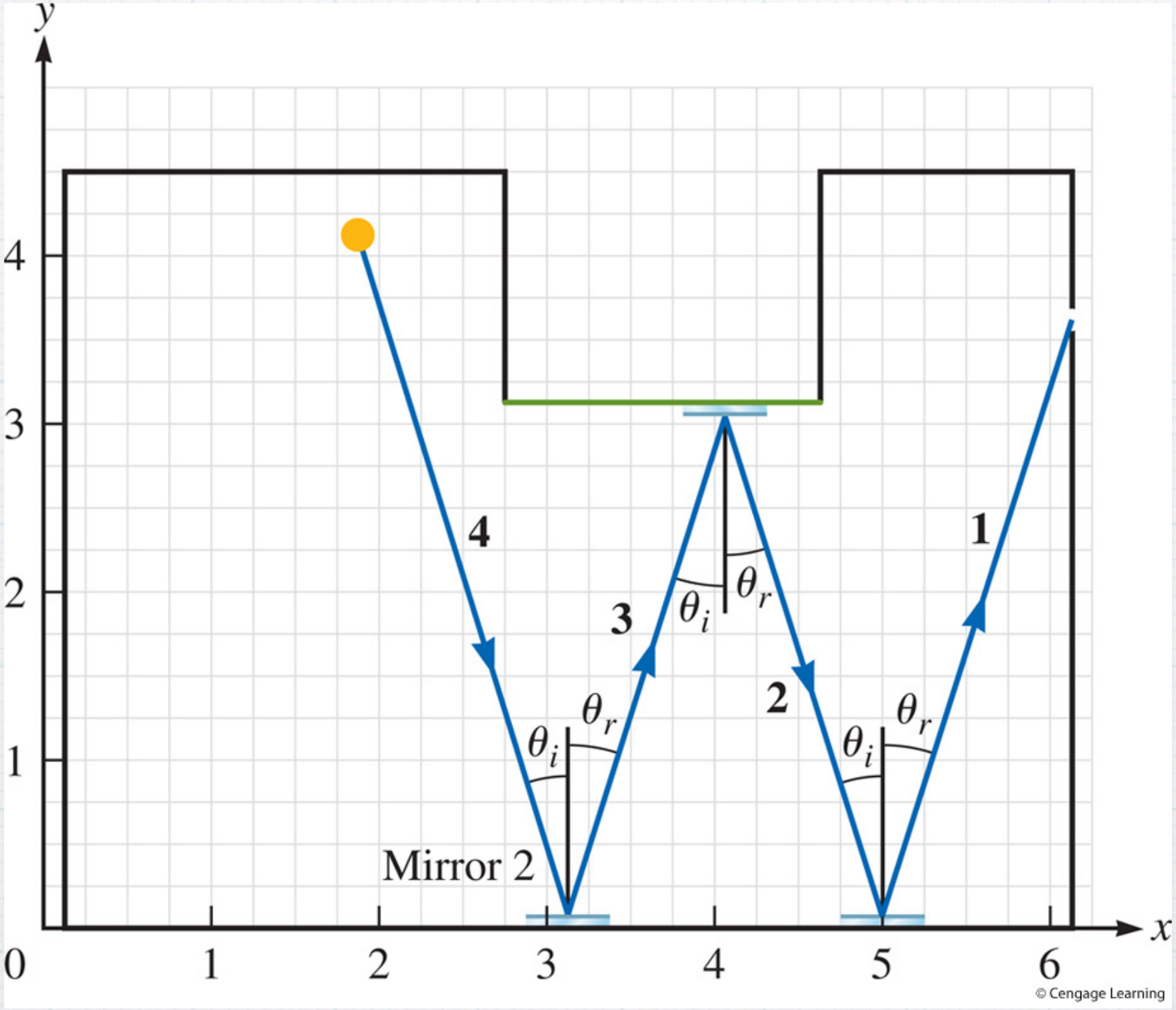
That's it

Do You Understand it?

Let's make sure we all understand the concept of the "Normal", its NOT the Normal force

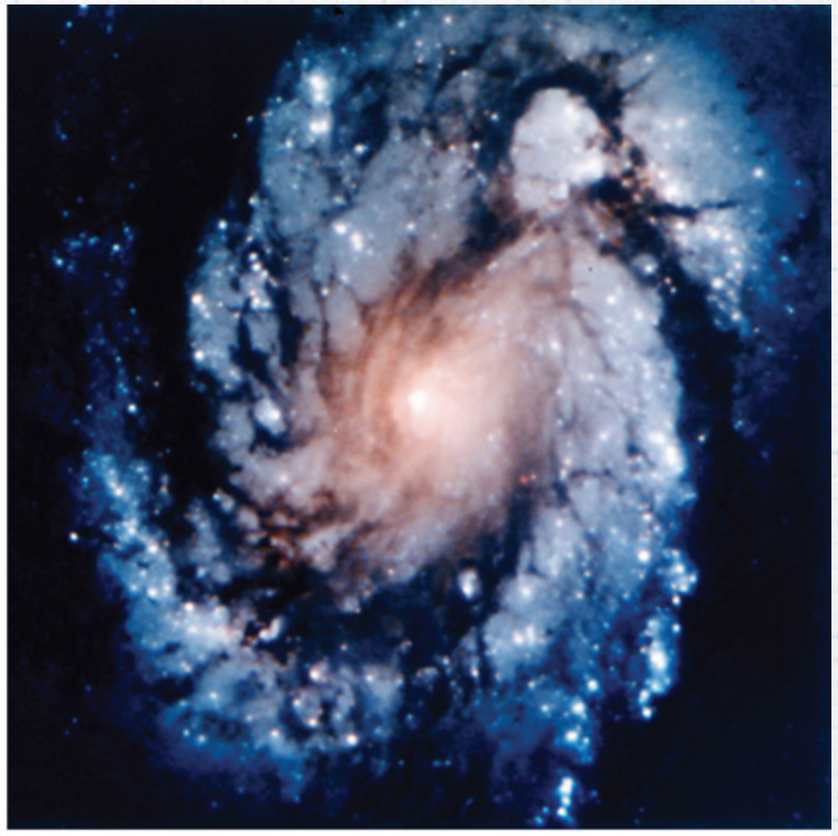


Want to see the light?



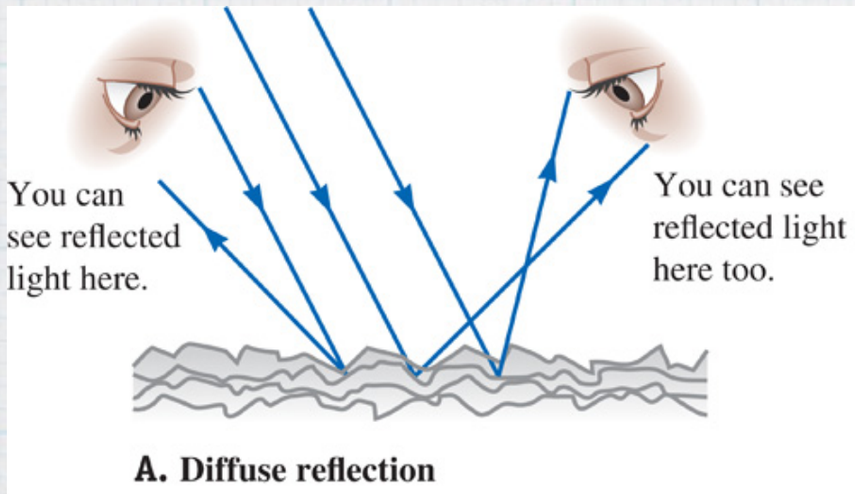
Images Formed by Reflection

A.

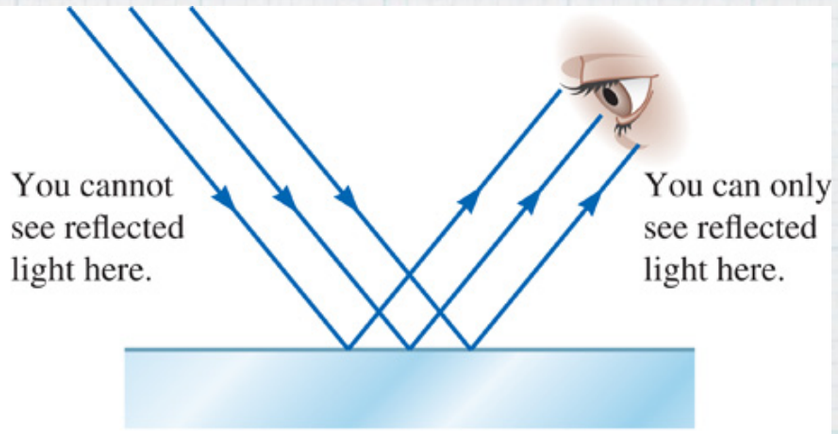


B.

NASA

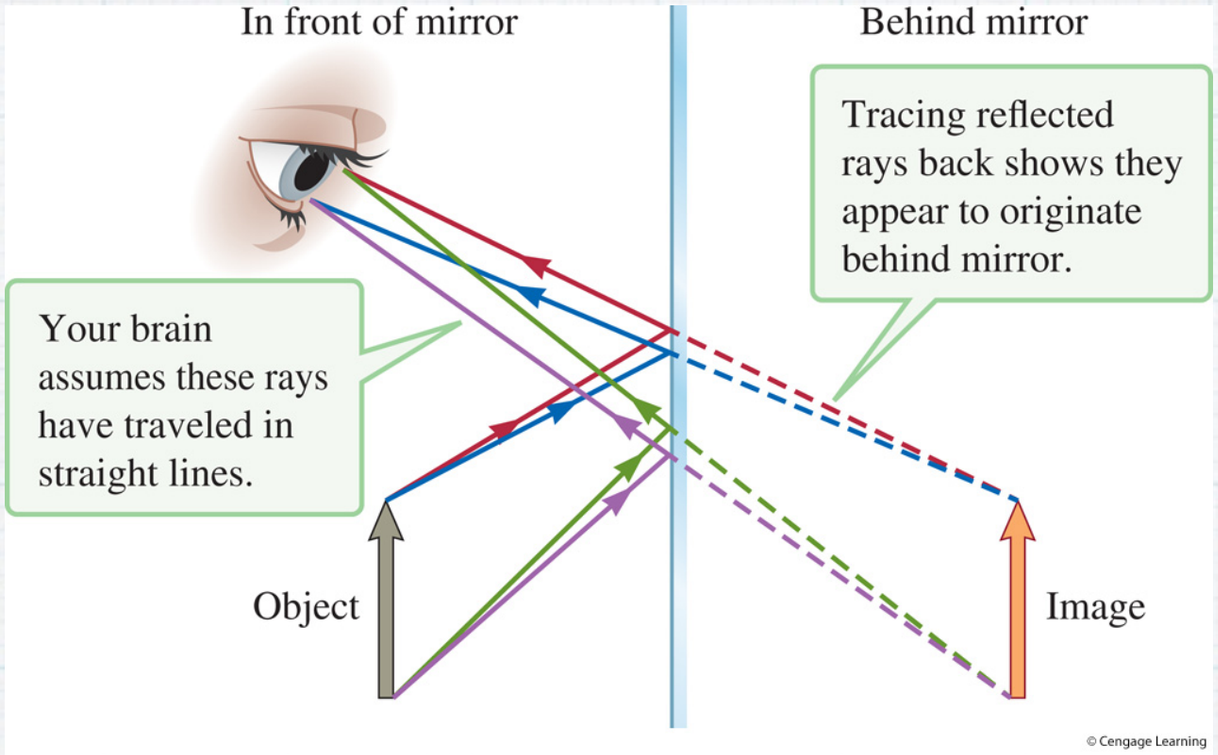


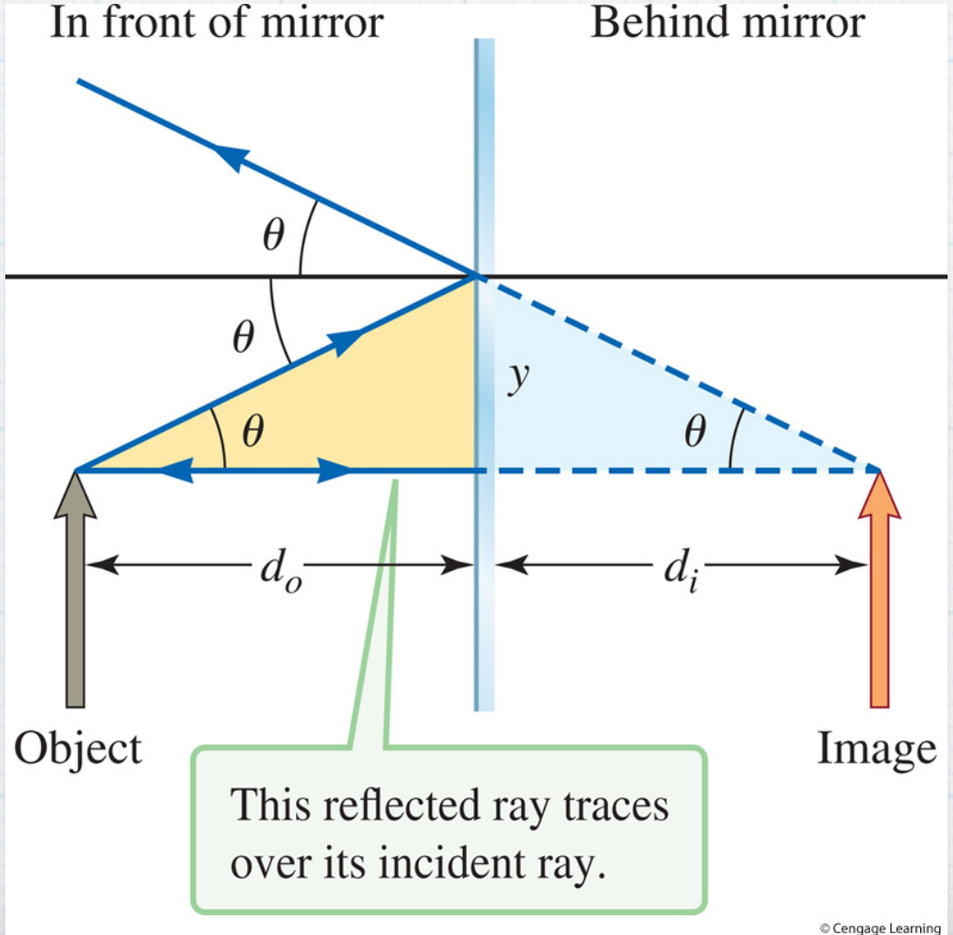
A. Diffuse reflection



B. Specular reflection

Plane Mirrors





$$M = 1$$

$$d_i = d_0$$

Upright

No Magnification

Virtual

Reverses left and right

Virtual vs Real

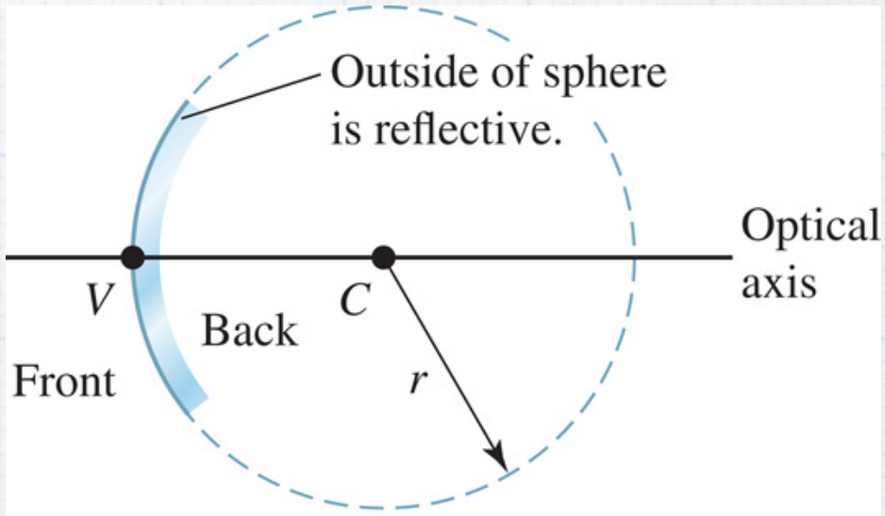
Demo

How big a mirror do you need to see your feet?

Spherical Mirrors

M.C. Escher's "Hand with Reflecting Sphere" 2014 The M.C. Escher Company-The Netherlands. All rights reserved. www.mcescher.com

Definitions
V = Principle axis
r=radius of curvature
C=center of curvature



A. Convex mirror

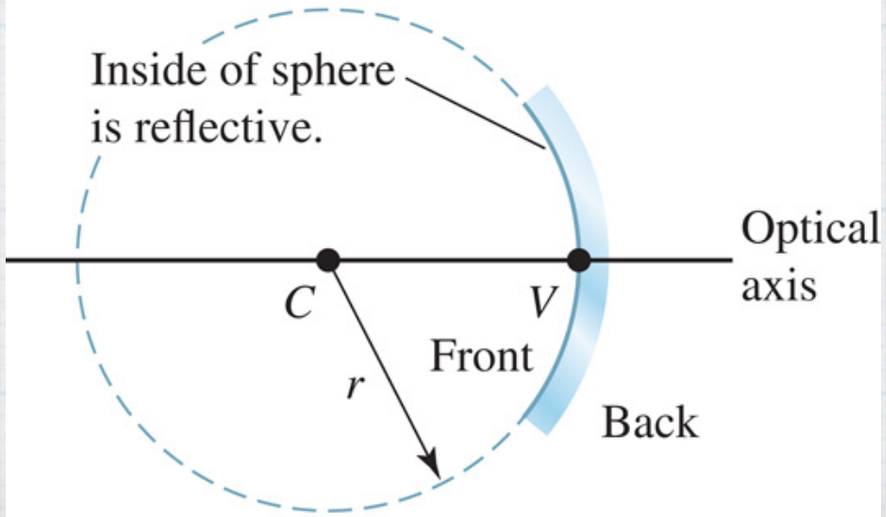
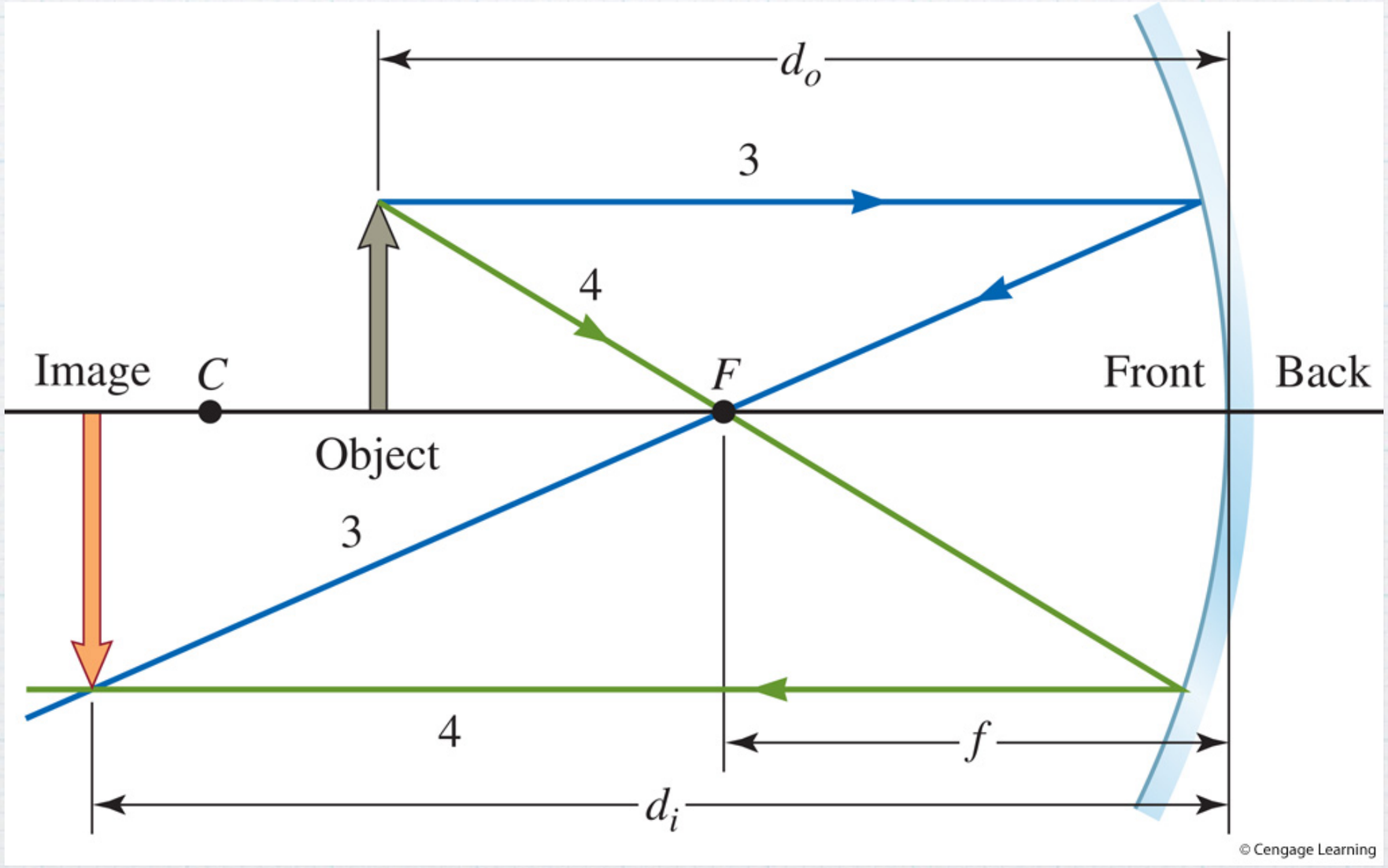


Image Formation by Principle Rays

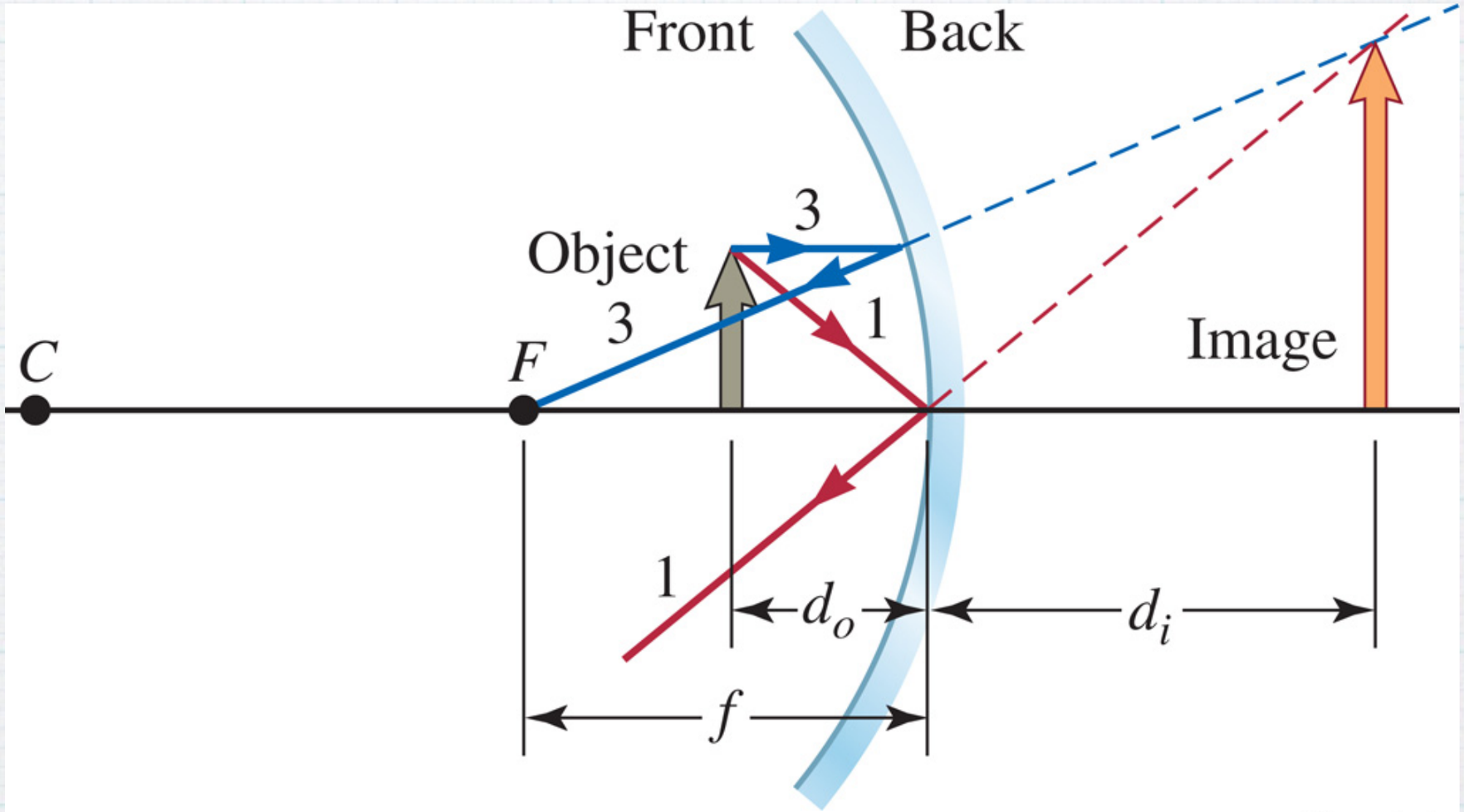
I'll define the focal point later, for now, f=r/2

object behind of the focal point



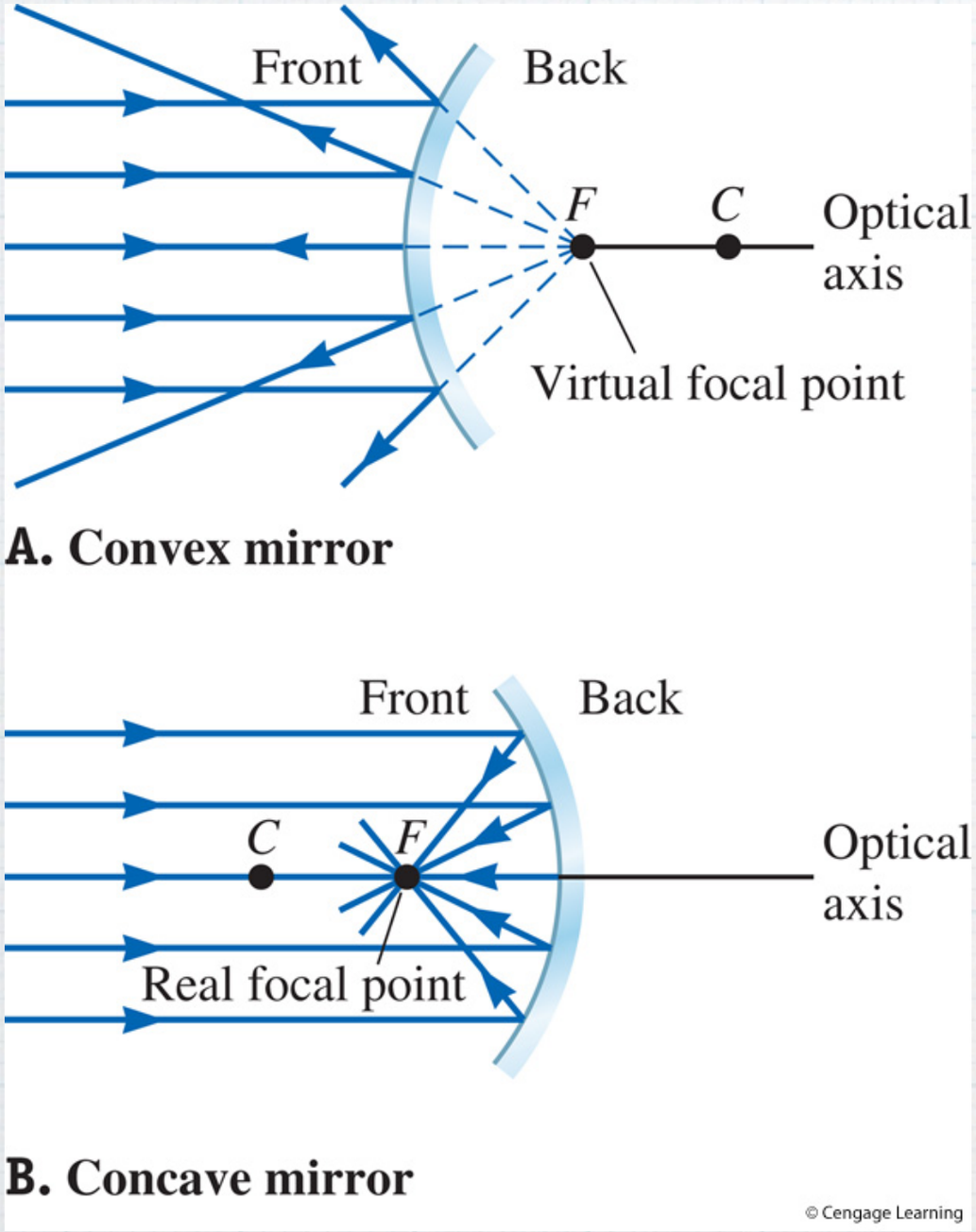
Concave

object in front of the focal point



Concave

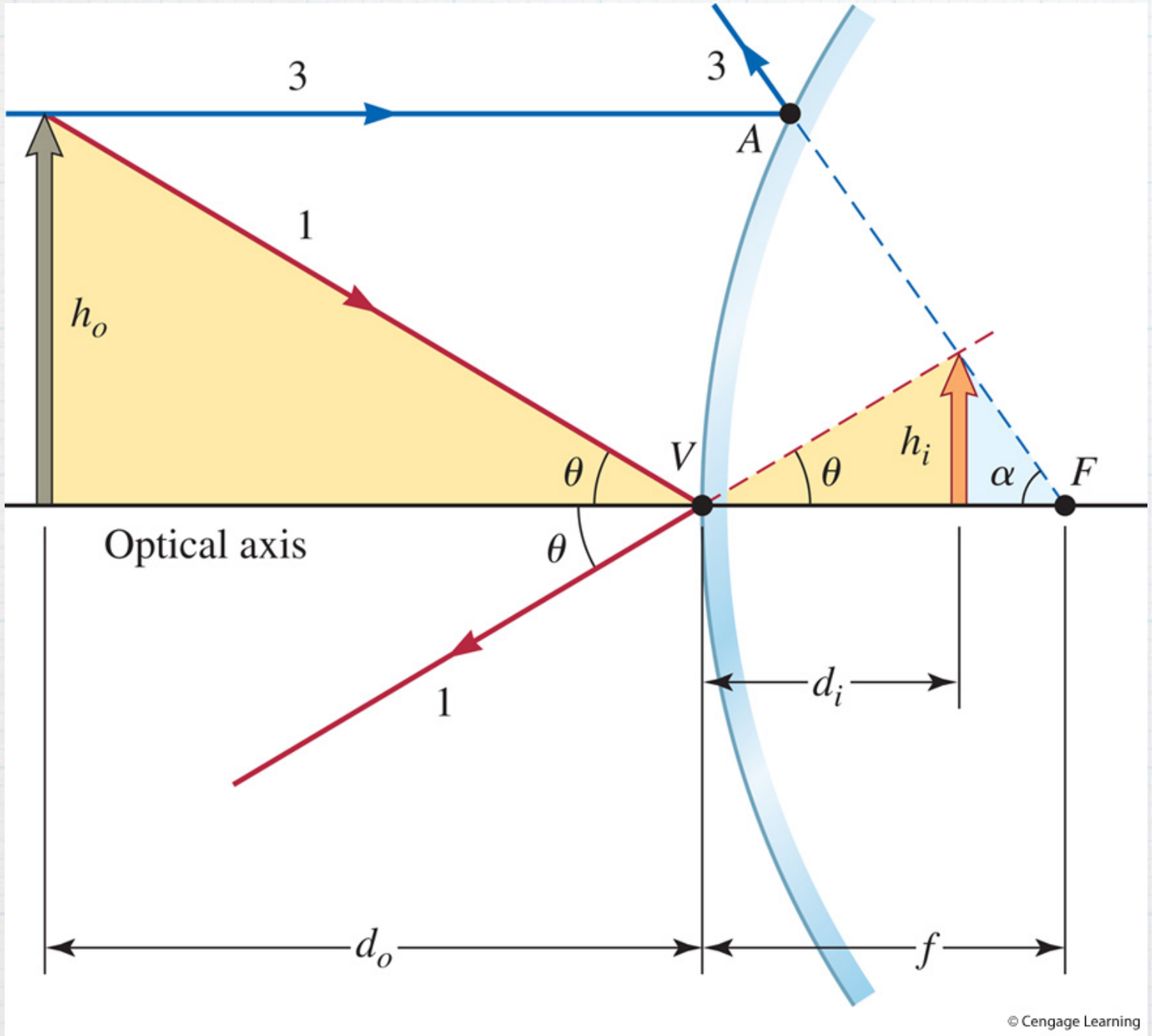
Focal Point



rays from infinity

f=r/2

How to get Numbers



Convex

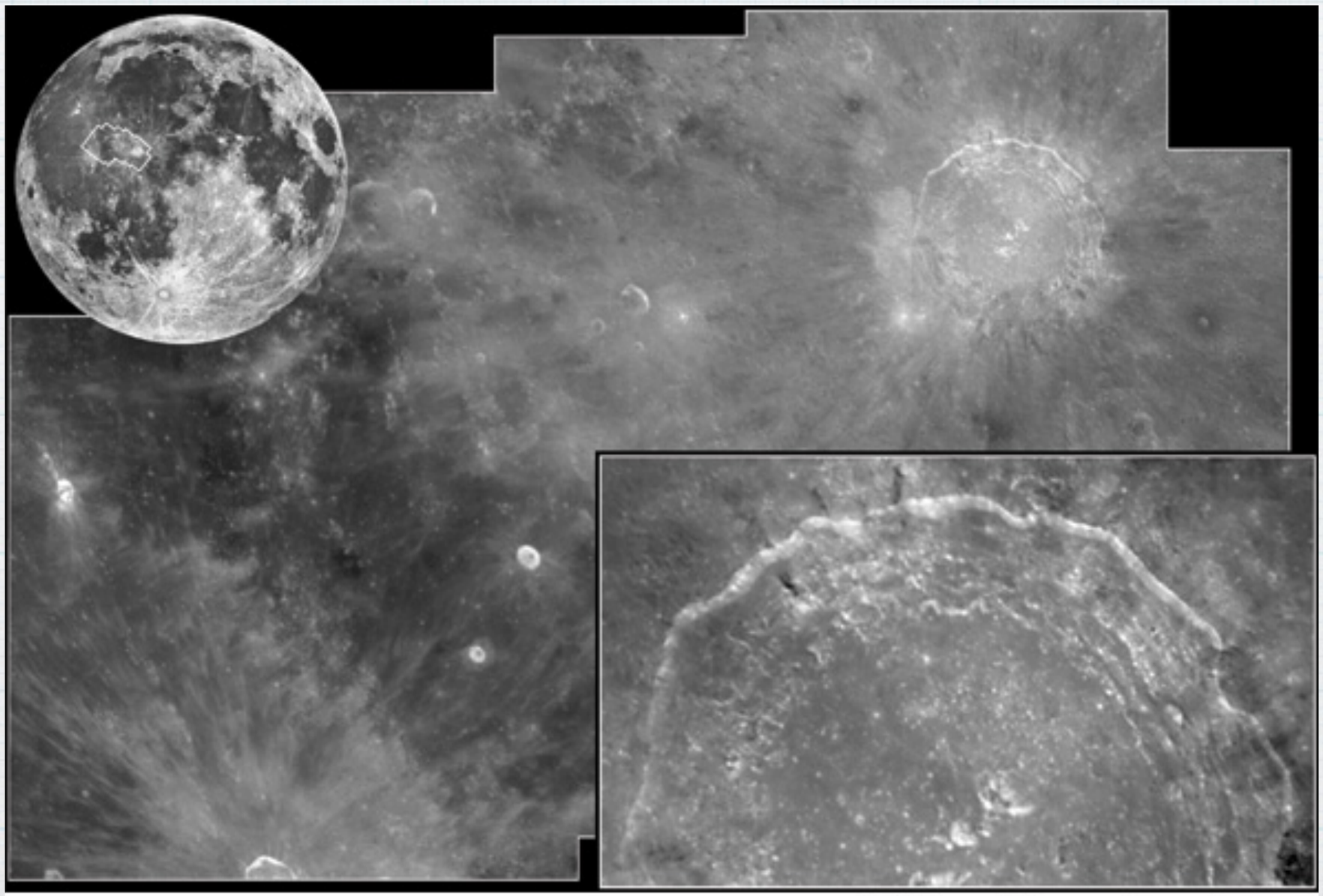
$$M = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$$

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

works for both concave and convex

Example's

Also, what does sign of image distance mean?
It's positive if a real image is formed there



STSCI (Space Telescope Science Institute)