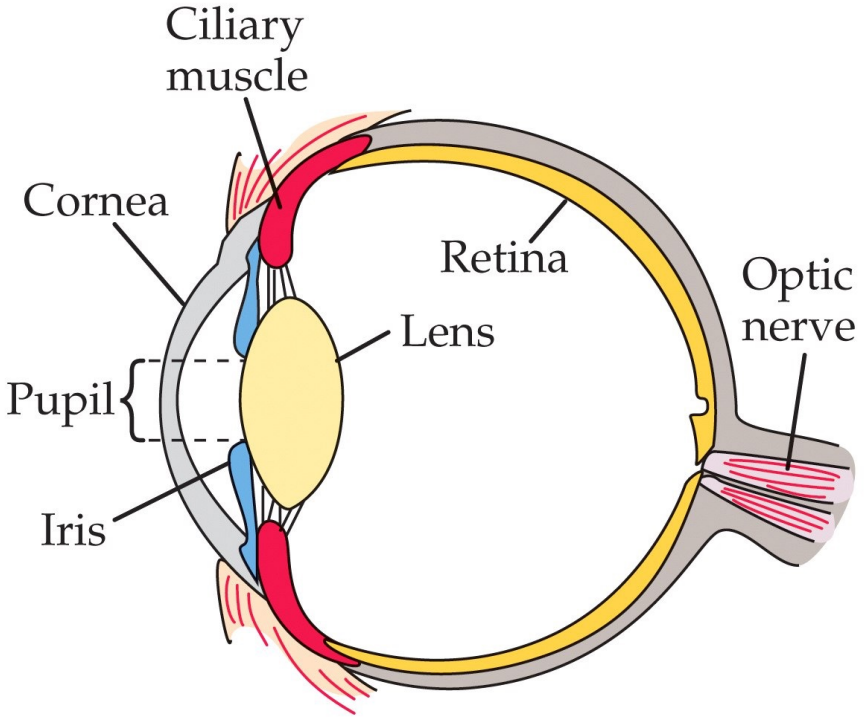
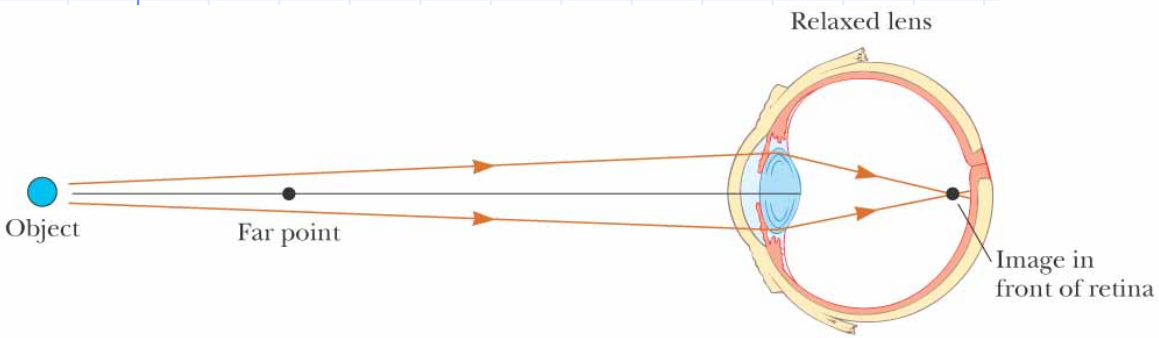
The Eye

- The optical behavior of the eye is similar to that of a camera, but far more complex

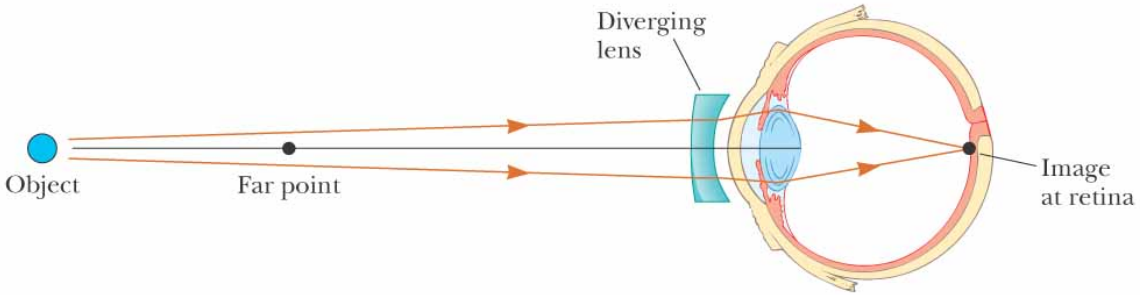


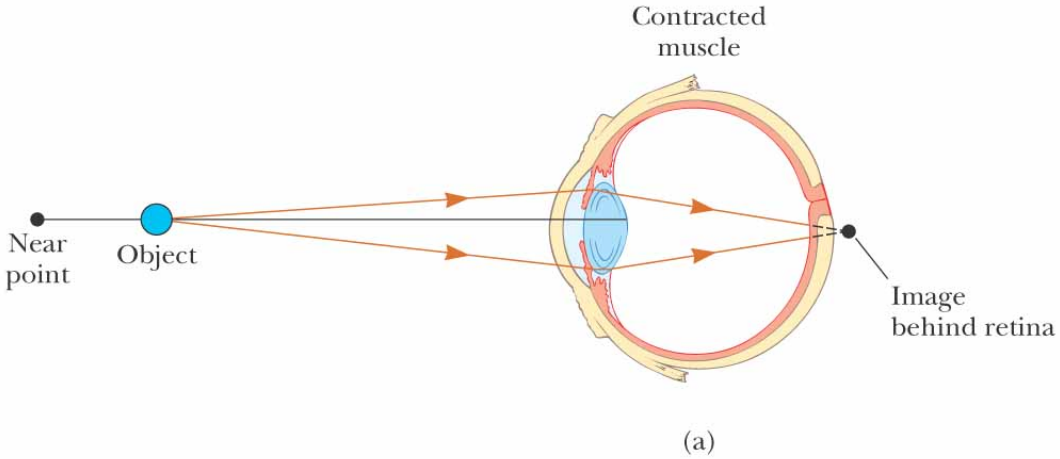
Defects

Nearsightedness

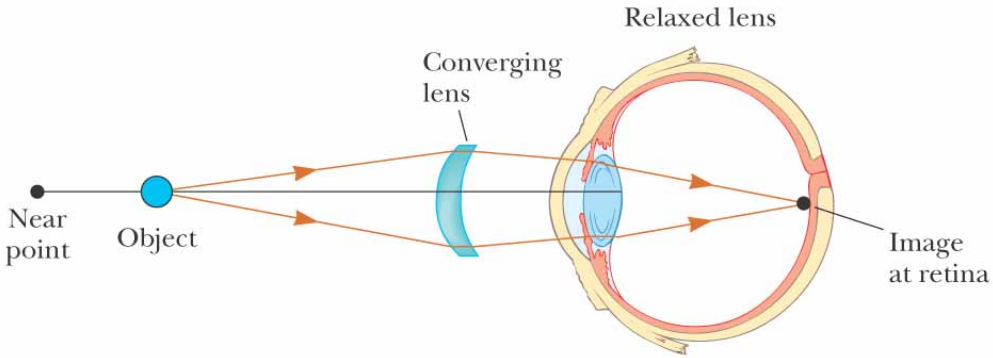


(a)





(a)



(b)

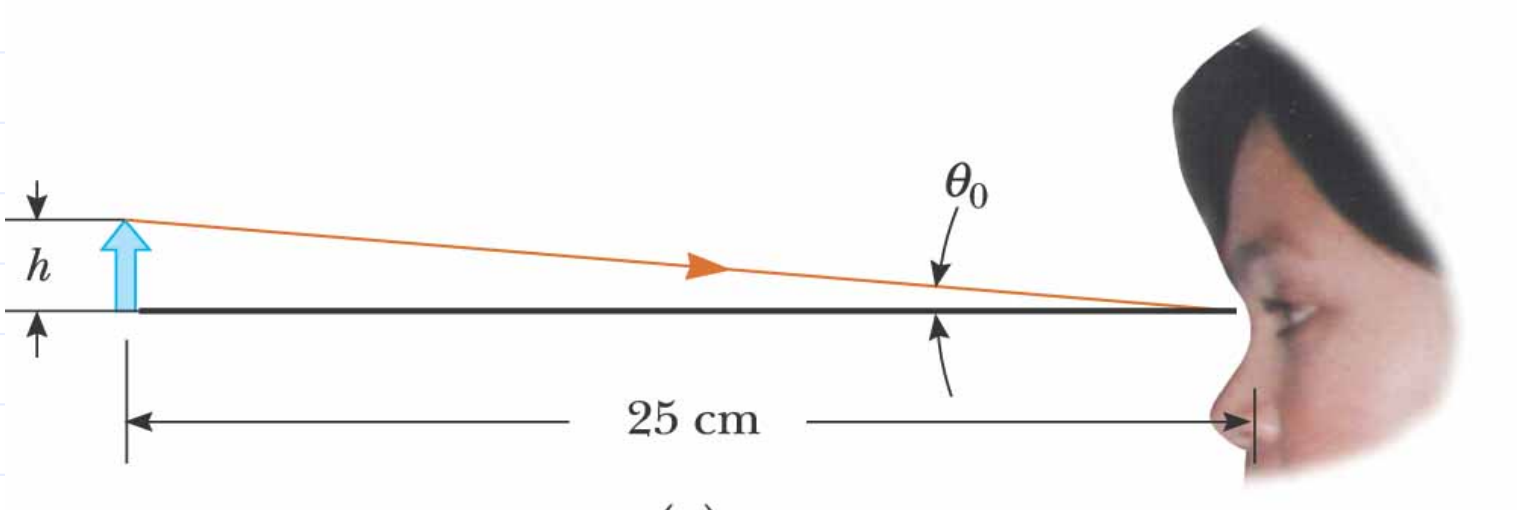
Farsightedness

Example Problem

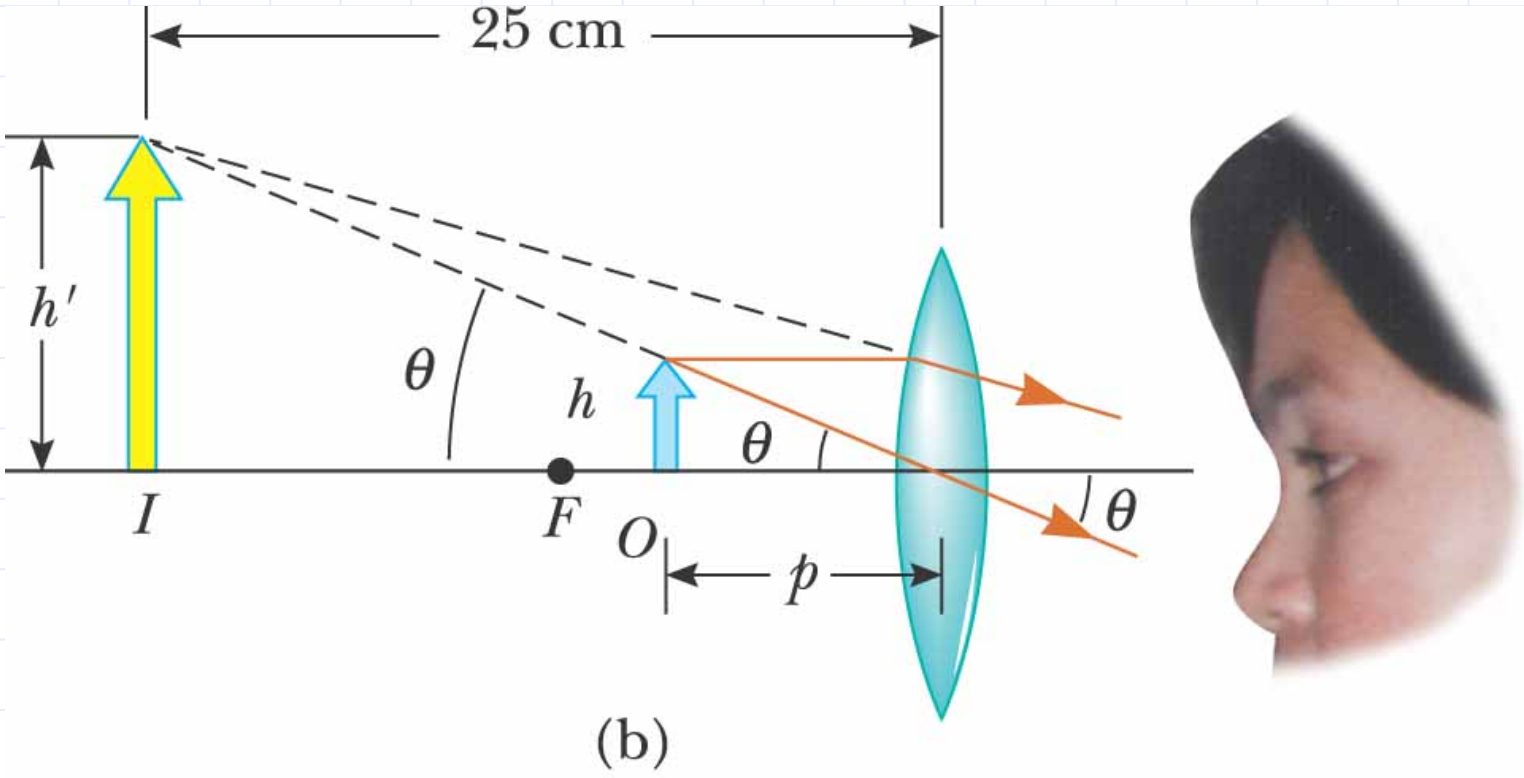
- A person sees clearly when he wears eyeglasses that have a power of -4.00 diopters and sit 2.00 cm in front of his eyes. If the person wants to switch to contact lenses, what lens power should be prescribed?

Magnifying Glasses, Compound Microscopes, and Telescopes

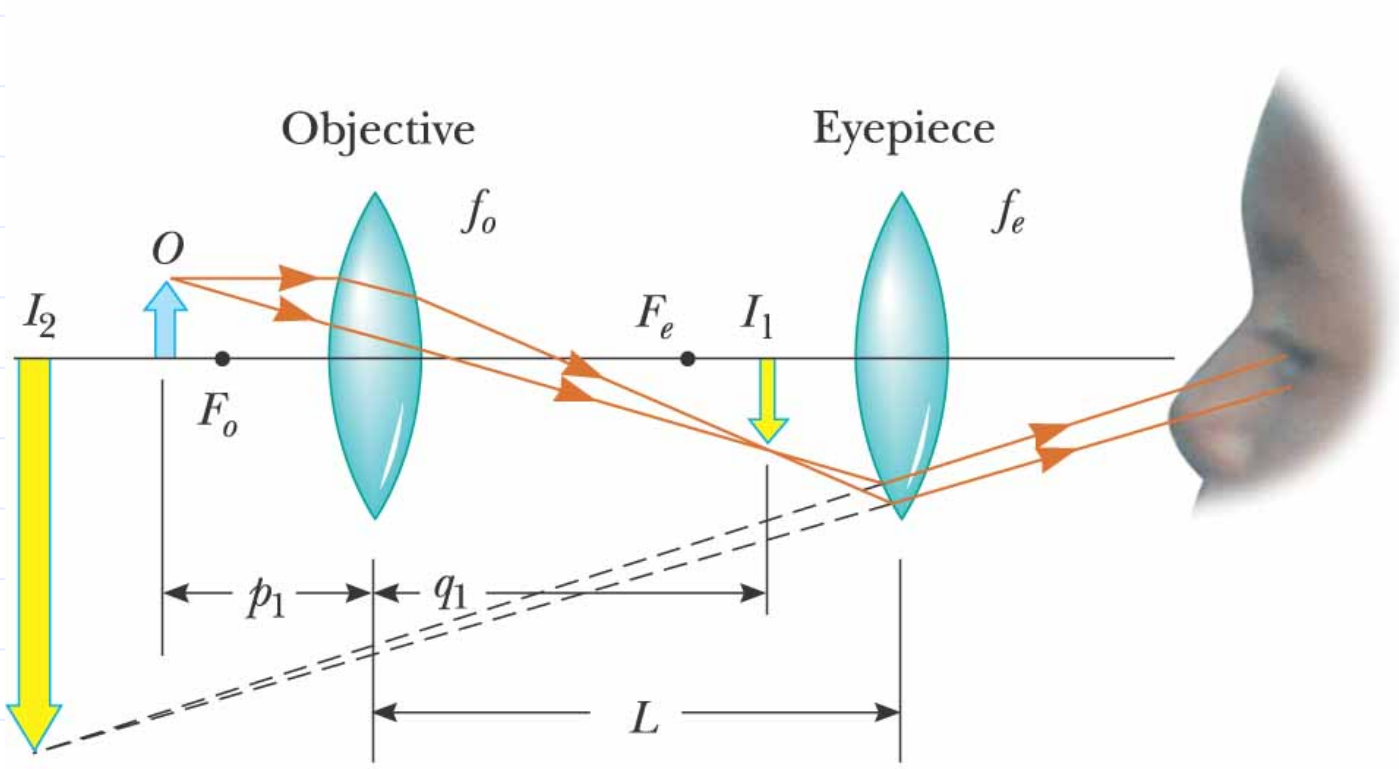
- An object of height h is a distance p from our eye
- The object subtends an angle θ of our field of view
- In general, we would like to increase the image size of the object that is created at the retina of the eye – increase θ



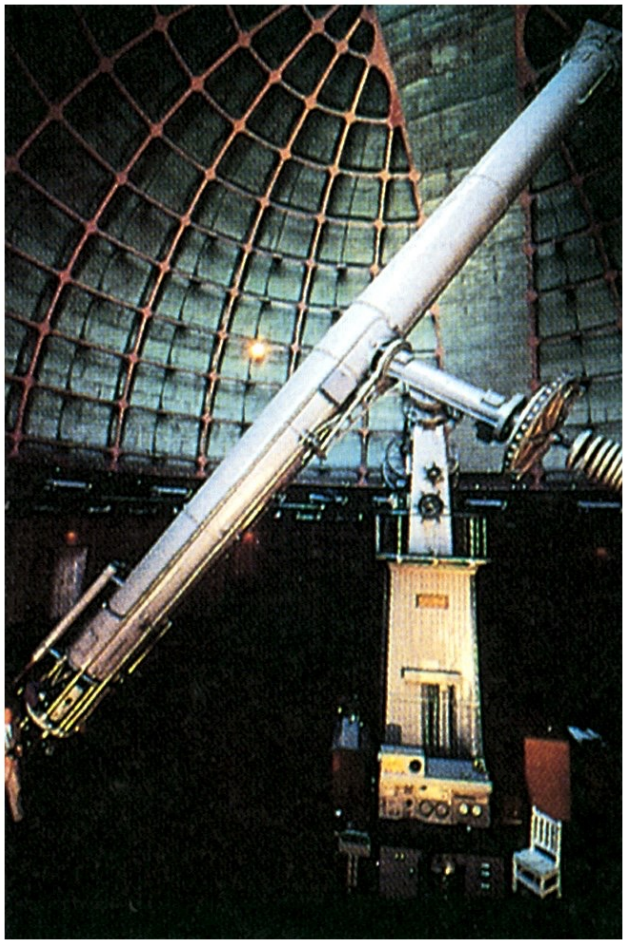
Magnifying glass – converging lens

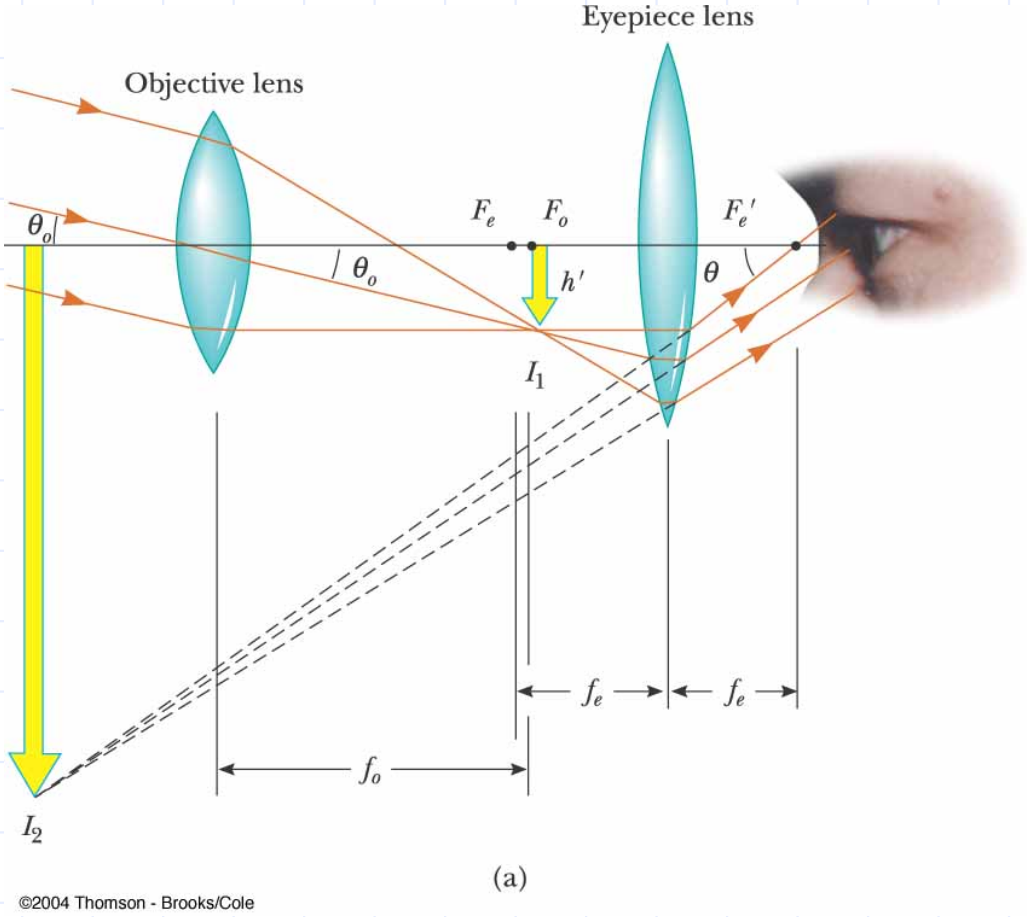


Compound microscope – two converging lens

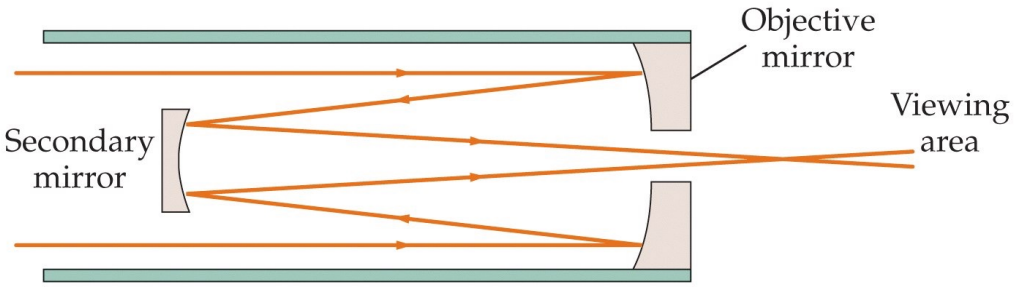


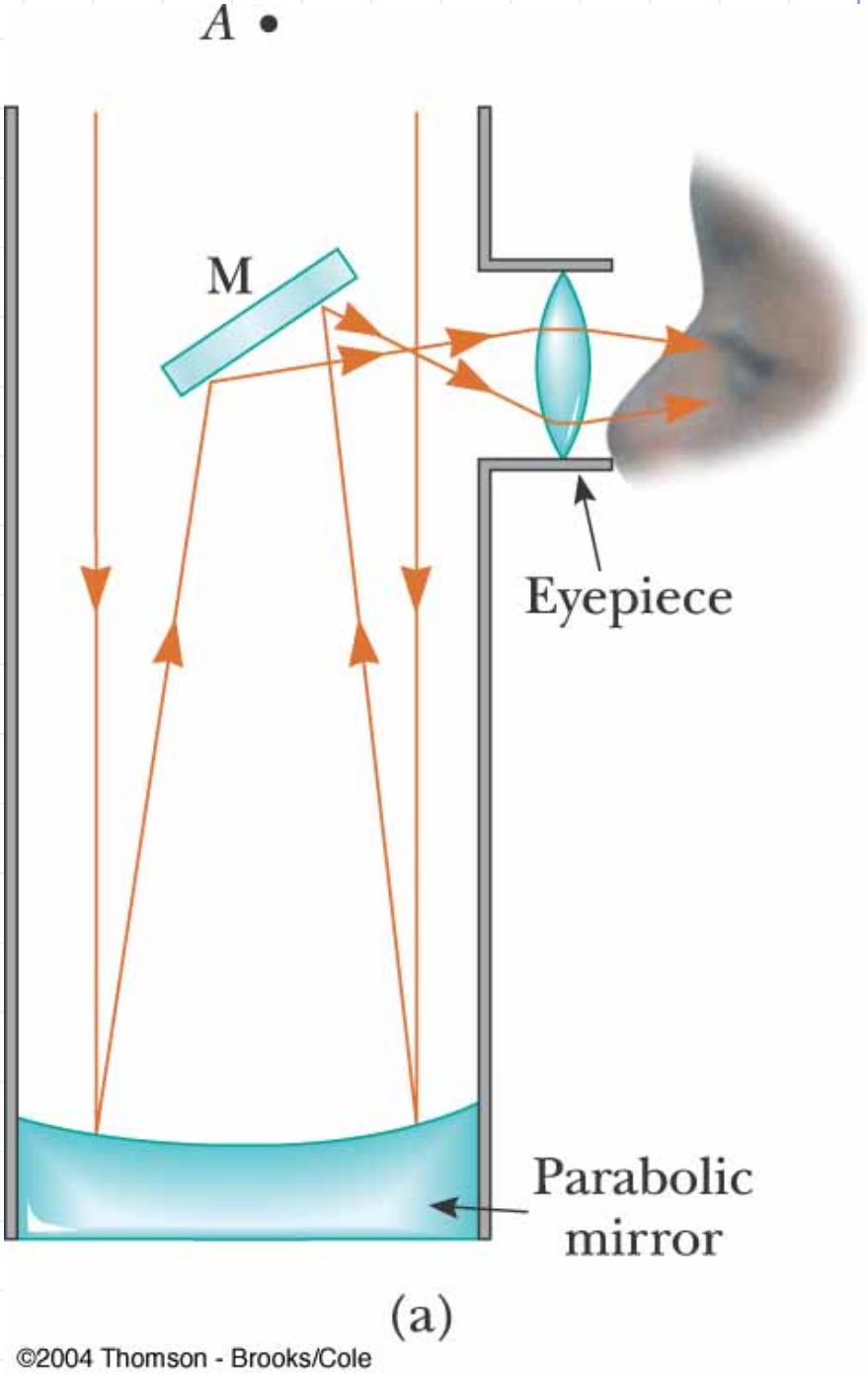
Refracting telescope





Reflecting telescope



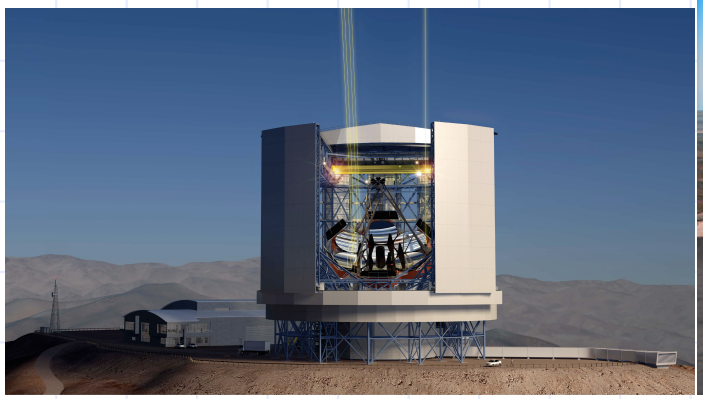


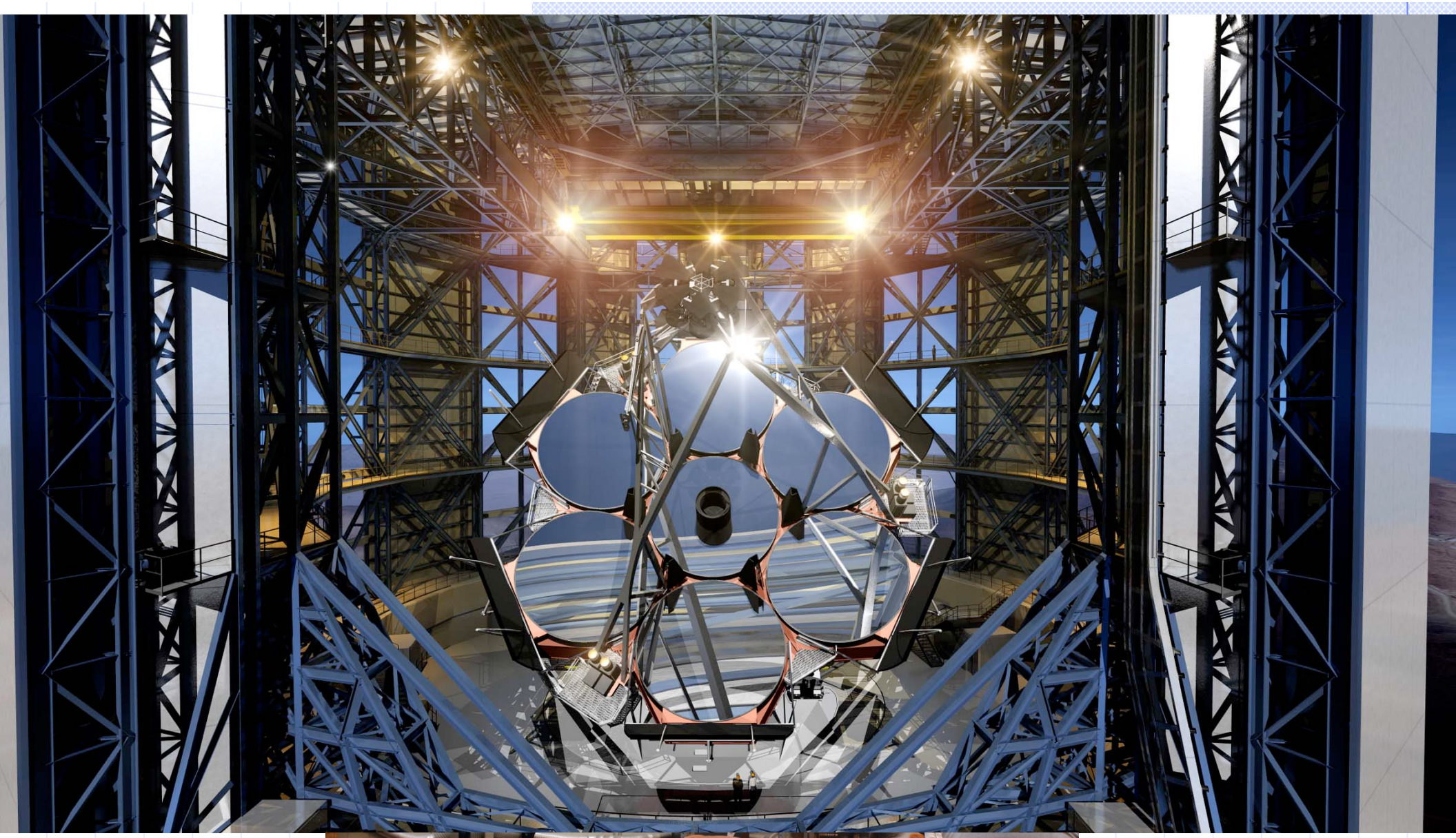
Towards 30-Meter Class Telescopes

- VLT (Very Large Telescope) D=8.2 m
- E-ELT (European Extremely Large Telescope) D=38 m
- GMT (Giant Magellan Telescope) D= 24.5 m

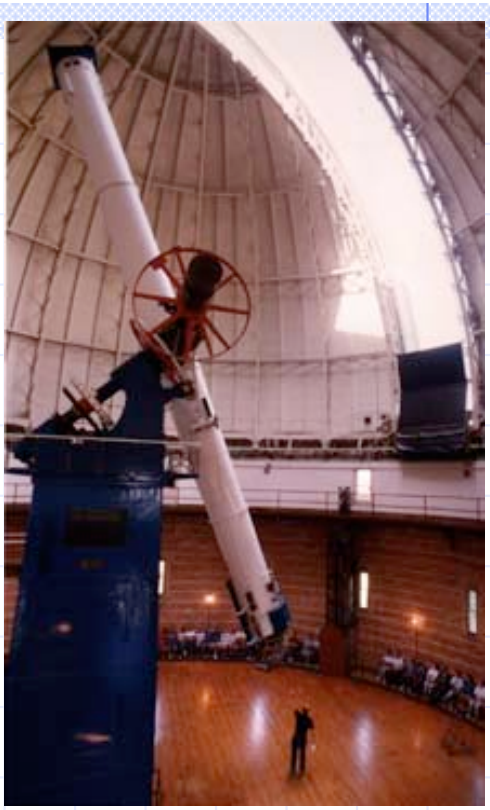
The VLT Array on the Paranal Mountain

ESO PR Photo 14a/00 (24 May 2000) ©European Southern Observatory





Example Problem



- The refracting telescope at the Yerkes Observatory has a 1.00-m diameter objective lens of focal length 20.0 m. If it has an eyepiece of focal length 2.50 cm, (a) determine the magnification of Mars as seen through the telescope. (b) Are the Martian polar caps right side up or upside down?