

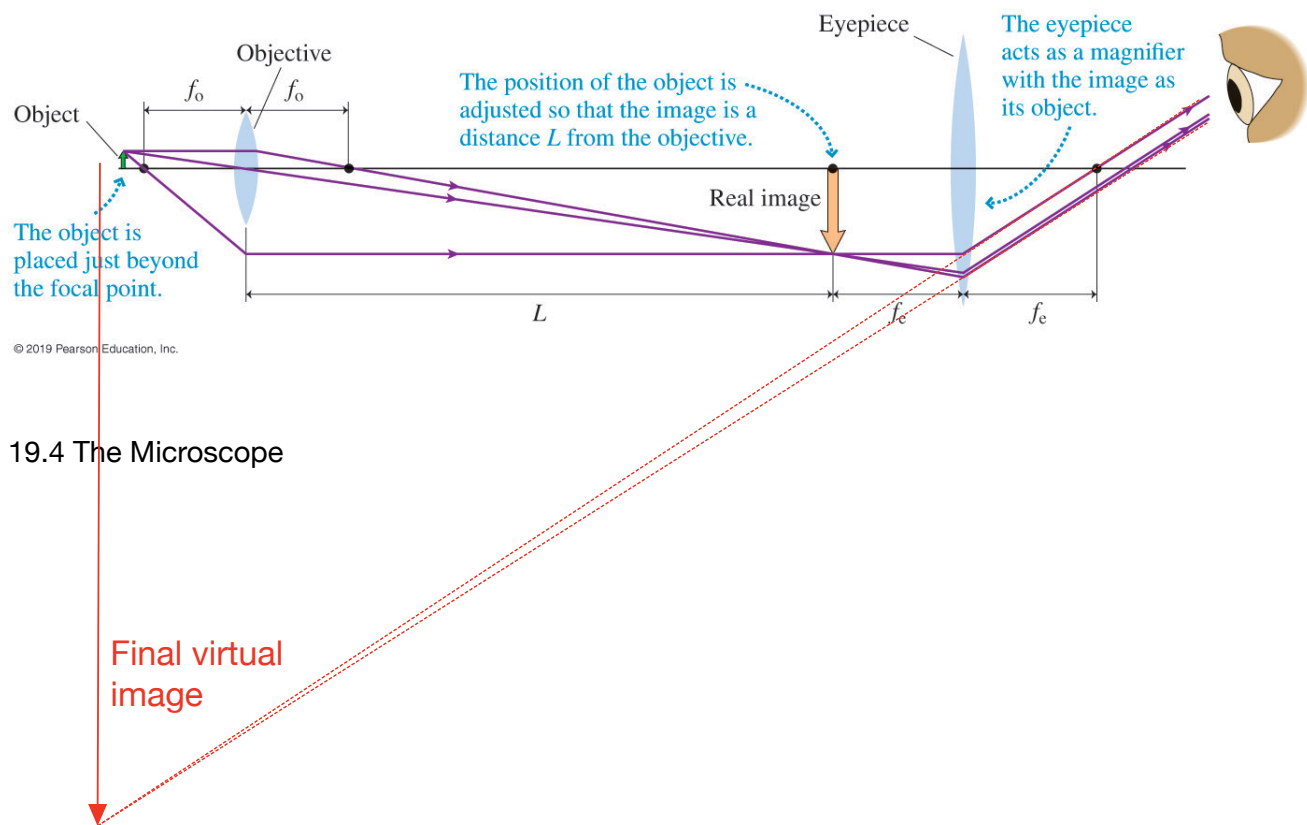
Chapter 19: Optical Instruments

For lens combinations, the main idea is that the image from the first lens acts as the object for the second lens.

This chapter discusses several diverse applications: the camera, human eye, magnifier, microscope, and telescope. Each application builds on the same foundation, but focuses on specific applications, and uses specialized jargon. In this class, we will stay focused on the foundation. The goal is that in the future, you could easily read the specific applications when the need arises, but you don't need to cram them all in now.

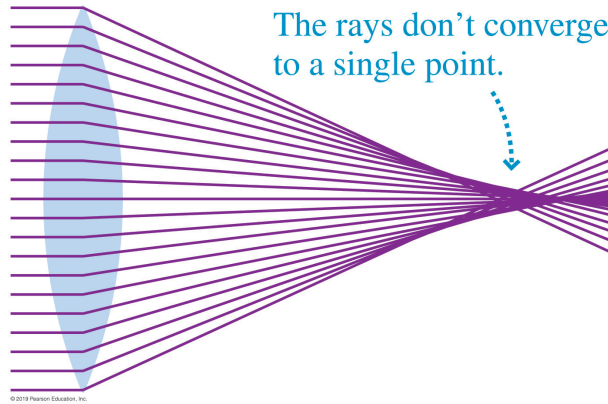
You are responsible for being able to handle problems with two lenses, as in the Chapter 18 examples. The applications in this chapter often offer good examples of such problems, with good well-drawn figures.

Some topics in this chapter deal with angular size. We will not do any problems that involve angular size.



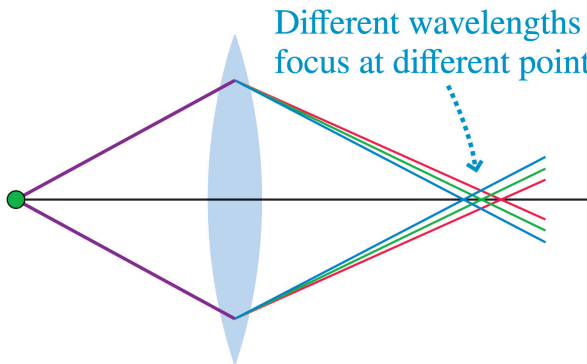
19.4 The Microscope

Complications

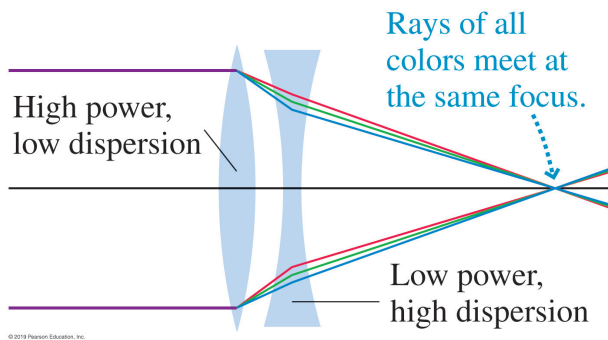


Spherical aberration

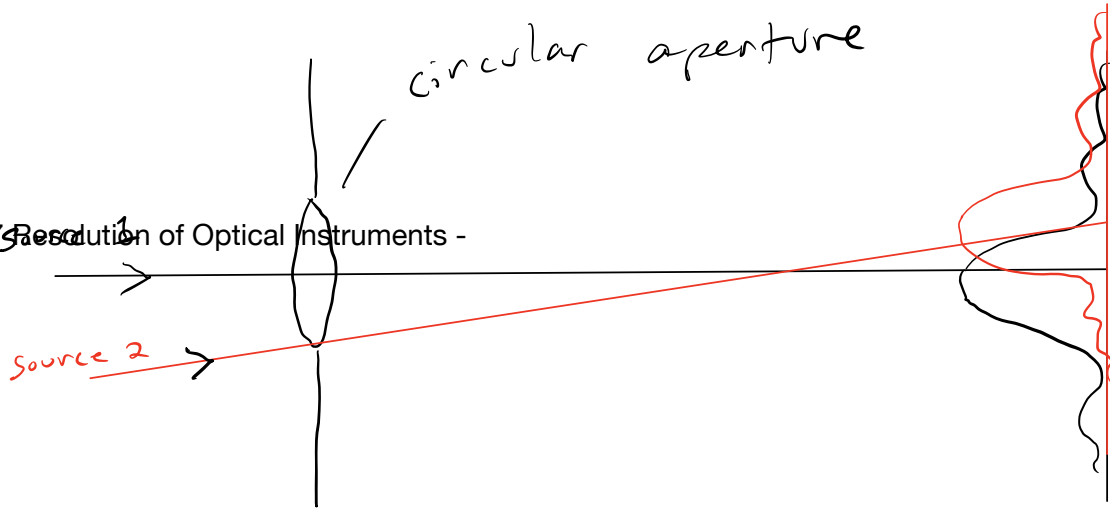
19.6



Color and Dispersion



19.7 Resolution of Optical Instruments -

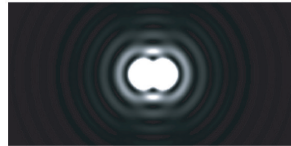


Can you distinguish them?

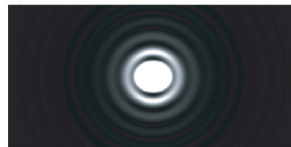
(a) Stars resolved



(b) Stars just resolved



(c) Stars not resolved



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screen/
sensor

3 broad aspects of Resolution

- How small an object can you see? Need $\lambda \ll$ size of objects to avoid diffraction
- How easily can you distinguish nearby objects? (picture above)
- How small a wavelength difference can you detect? (Homework diffraction grating problem.)