

CHAPTER OVERVIEW

3: Optical Instruments

The title of this chapter is to some extent false advertising, because the instruments described are the instruments of first-year optics courses, not optical instruments of the real world of optical technology. Thus a telescope consists of a long focal length lens called the object glass and a short focal length lens called the eyepiece, and the magnification is equal to the ratio of the focal lengths. Someone whose experience with telescopes is limited to this concept of a telescope would scarcely recognize a real telescope. A real telescope would consist of an overwhelming mass of structural engineering intertwined with a bewildering array of electronics, wires and flashing lights. There would be no long focal length lens. Instead there would be a huge mirror probably with a hole in the middle of it. There would be no eyepiece, nor anyone to look through it. The observer would be sitting in front of a computer terminal, quite possibly in another continent thousands of miles away.

Thus the intent of the chapter is mainly to give a little bit of help to beginning students who are struggling to answer examination question of the type “A microscope consists of two lenses of such-and-such focal lengths. What is the magnification?” None of this means, however, that the simple and fundamental principles described in this chapter do not apply to real instruments. They most certainly do apply. This is just a beginning.

[3.1: The Driving Mirror](#)

[3.2: The Magnifying Glass](#)

[3.3: Spectacle Lenses](#)

[3.4: The Camera](#)

[3.5: The Telescope](#)

[3.6: The Microscope](#)

Thumbnail: The photographer can see the subject before taking an image by the mirror. When taking an image the mirror will swing up and light will go to the sensor instead. Camera lens Reflex mirror Focal-plane shutter Image sensor Matte focusing screen Condenser lens Pentaprism/pentamirror Viewfinder eyepiece. (CC BY-SA 3.0; Cburnett).

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