

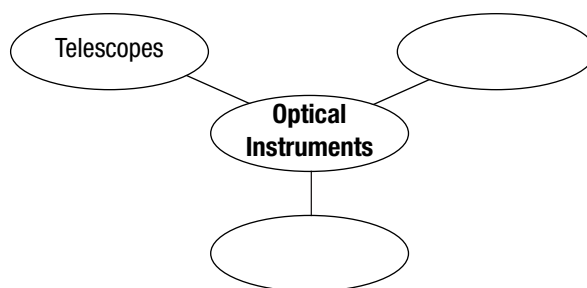
Chapter 19 Optics

Section 19.3 Optical Instruments**(pages 580–585)**

This section describes optical instruments, including telescopes, cameras, and microscopes. The basic principles of image formation by these instruments are explained.

Reading Strategy (page 580)

Using Prior Knowledge Add the names and descriptions of other optical instruments you know to the diagram. Revise the diagram after you read the section. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

**Telescopes (pages 580–581)**

- Circle the letter that best describes the amount of time it takes light from the most distant stars to reach Earth.
 - seconds
 - hours
 - millions of years
 - billions of years
- An instrument that uses lenses or mirrors to collect and focus light from distant objects is called a(n) _____.
- Complete the table about telescopes.

Telescopes		
Type	Parts That Collect and Focus Light	Description of How Image Is Formed
Reflecting telescope		
	Convex lenses	

Chapter 19 Optics

Cameras (pages 582–584)

4. Describe what a camera does. _____

5. Circle the letter of each sentence that describes how cameras form or record images.
 - a. An image is recorded on film or by a sensor.
 - b. Light rays are focused to form virtual images.
 - c. Light rays enter through an opening.
 - d. Light rays are focused by the opening or lens.
6. Is the following sentence true or false? In a simple pinhole camera made from a box, an upside-down, real image is formed on the back wall of the box. _____
7. What is the purpose of the lens elements in a film camera?

8. The device that controls the amount of light passing through a camera is the _____.
9. Describe what happens when you push the shutter release button on a modern film camera. _____

10. How is the position of the lens of a modern film camera used to bring an object into focus? _____

Microscopes (page 584)

11. An optical instrument that uses two convex lenses to magnify small objects is called a(n) _____.
12. Circle the letter that describes the path light rays follow through a compound microscope.
 - a. Light rays from the objective lens pass through the object and then pass through the light source.
 - b. Light rays from above pass up through the object and then pass through the objective lens.
 - c. Light rays from below pass up through the object, the objective lens, and the eyepiece lens.
 - d. Light rays from below pass up through the object, the concave lens, and the objective lens.
13. Is the following sentence true or false? When you look through the eyepiece of a compound microscope you see an enlarged, virtual image of the object. _____