Name Date

Section 6.2 Summary

Extending Human Vision

Textbook pages 216–229

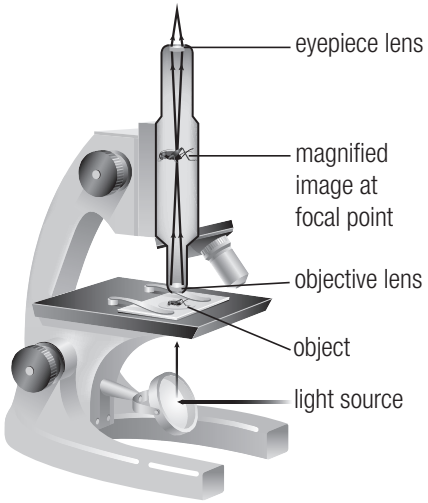
Before You Read

How could you use lenses and mirrors to help you see an object that is very tiny or far away? Write your ideas on the lines below.

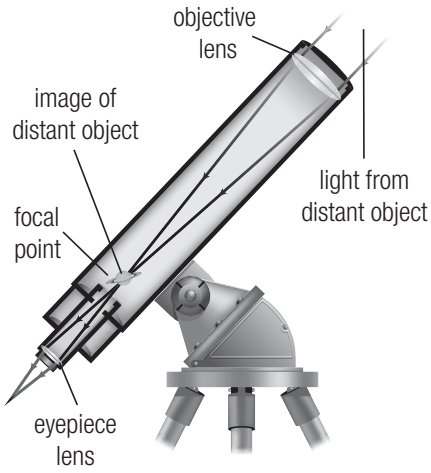
_____

_____

Create a Quiz
After you have read this section, create a quiz with five questions based on what you have learned. Trade your quiz with a partner. Answer each other's questions.



microscope



refracting telescope

How does a microscope work?

A microscope magnifies small, close objects so that they look larger than their real size. In a compound light microscope, a convex lens makes an enlarged image inside the microscope tube. The light rays from that image then pass through another convex lens in the eyepiece. This magnifies the image even more.

How does a telescope work?

A telescope magnifies distant objects. In a **refracting telescope** a convex lens gathers light from the object and focusses it into an enlarged image. The light rays from that image then pass through a convex eyepiece lens to magnify the image even more. Binoculars are actually two refracting telescopes placed side by side. ✔

Reading Check

1. What kind of lens is used in a microscope and a refracting telescope?

_____

_____

In a **reflecting telescope** a concave mirror gathers the light from a distant object. A plane mirror reflects the light gathered by the concave mirror toward the side of the telescope tube. The image that forms there is magnified by a convex eyepiece lens.

How can you record what you see?

A camera works in much the same way as the eye to form an image. A camera has an opening to let light in, just as the eye has a pupil. In each case, the size of the opening can be controlled to let in more or less light.

The camera and the eye each have a convex lens to gather and focus light into an image. A camera has a light detector that acts like the retina of the eye. The light detector changes light into electric signals. The electrical signals are changed into a picture. The picture can be stored or printed.

How do you bring an object into focus?

In devices like cameras, telescopes, and microscopes, you can make a clear image by focussing. Focussing means changing the distance between the objective lens and the eyepiece lens or screen so that the light rays converge on the screen.

How does laser light extend human vision?

Laser light is light that has just one wavelength. Laser light can carry a large amount of energy. This makes it useful as a tool for surgery, such as eye surgery.

Laser light is also used in optical fibre technology. An **optical fibre** is a very thin transparent tube that can transmit laser light from one place to another, even around corners. The laser light enters one end of the fibre and keeps reflecting off the smooth inside walls until it reaches the other end. This type of reflection is called **total internal reflection**.

The light in optical fibres can be used to carry sound, movie, and Internet signals. A tiny camera on one end of an optical fibre can send pictures to a monitor and let surgeons view the inside of the body. ✔

✔ *Reading Check*

2. What are two ways that laser light is used?

_____

_____

_____

Name Date

Cloze Activity
Section 6.2

Use with textbook pages 216–225.

Using optical systems

Vocabulary	
binoculars	magnifies
concave	microscope
converge	optical fibres
convex	plane
diverge	reflecting
eyepiece	refracting
laser light	total internal reflection

Use the terms in the vocabulary box to fill in the blanks. Use each term only once. You do not need to use all the terms.

1. A compound light _____ uses two _____ lenses.

2. A microscope _____ small objects by forming an enlarged image of the object.

3. A _____ telescope has a convex lens to collect, refract, and focus light rays from distant objects and a convex eyepiece to magnify the image.

4. A _____ telescope uses a concave mirror, a _____ mirror, and a convex lens to collect and focus light from distant objects.

5. _____ are actually two refracting telescopes put side by side.

6. All the light in _____ has the same wavelength and moves in the same direction.

7. Almost no light is lost or absorbed in _____, which are transparent glass fibres.

8. _____ occurs when a light ray strikes the wall of the fibre and is reflected back into it.