

Chapter 19**STUDY GUIDE**

Use with Text Pages 536-543

● Light and Color*Use the words in the box to fill in the blanks.*

translucent	primary	opaque	black	transmits	colors
white	cone	absorbs	transparent	reflect	filter

For you to see an object, it must _____ light. A material through which nearly all light passes is _____. A material that you cannot see through clearly is _____. _____ objects cannot be seen through. _____ light is a mixture of all visible wavelengths of the spectrum. _____ objects absorb all colors and reflect little light. Red, blue, and green are the three _____ colors of light. They can be mixed to produce any color.

The retina contains _____ cells that detect certain wavelengths of light. When the brain responds to these signals, we see _____.

One way of producing color is by the use of a _____, a transparent object that _____ some colors and allows others to pass through. The color of the filter is the same as the color of light it _____.

Use the words in the box to fill in the blanks.

cyan	filter	pigment	additive
subtractive	black	reflected	

A colored material that absorbs certain colors and reflects others is a _____. To mix and make any color, it is necessary to have only three primary pigment colors—magenta, yellow, and _____. Light color is determined by the wavelength of light transmitted through a _____. Pigment color is determined by the wavelength of light _____ from pigment particles.

Because primary light colors combine to produce white light, they are called _____ colors. If all primary pigments are added equally, the result will be _____. Because black results from the absence of reflected light, the primary pigment colors are called _____ colors.

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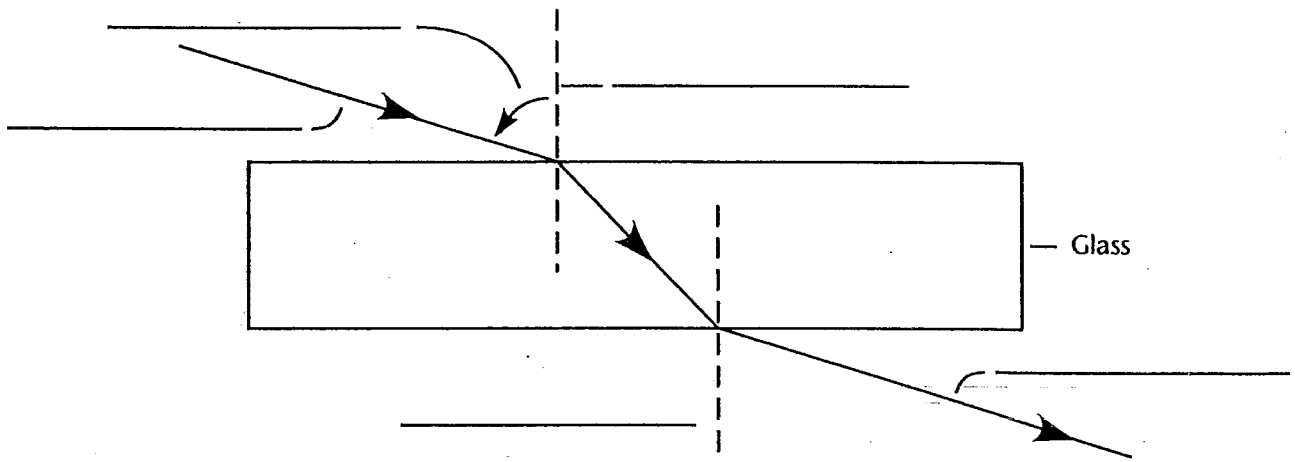
● Wave Properties of Light

Use the words in the box to fill in the blanks.

incident equal reflection incidence reflected normal reflection

When a wave strikes an object and bounces off, _____ occurs. Waves that strike an object are called _____ waves. Waves that bounce off are called _____ waves. A perpendicular line drawn from where the incident wave strikes is called the _____. The angle between the incident wave and the normal is the angle of _____. The angle between a reflected wave and a normal is the angle of _____. In reflection, the angles will be _____.

Label the diagram of a refracted light wave. Use the terms *incident wave*, *angle of incidence*, *refracted wave*, and *normal* to fill in the blanks. One term is used twice.



Use the words in the box to fill in the blanks.

interference light diffraction slits dark colors diffraction grating

The bending of light around corners is _____. Diffraction results in light and _____ areas on the edge of a shadow. Light or sound waves can meet, causing _____. If light is passed through narrow _____, the light waves will interfere, forming dark and _____ bands. When white light is passed through a _____, white light is separated into _____.

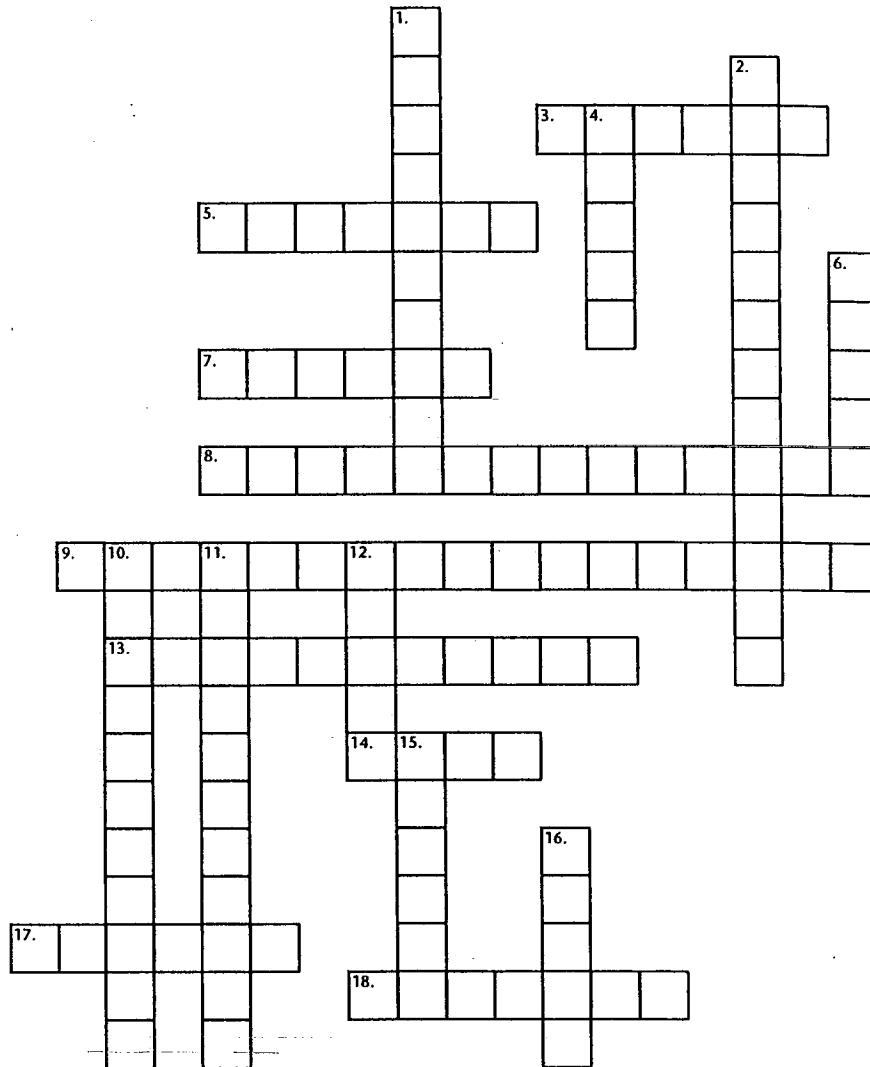
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REINFORCEMENT

● Light and Color

Solve the following crossword puzzle by using the clues provided.



Across

3. Soak up, for example, light rays
5. Colored material that absorbs some colors but reflects others
7. Color that results from mixing red and yellow pigments
8. Primary light colors are this type.
9. Primary pigments are this type.
13. Allows some light to pass without your being able to see through clearly
14. Type of nerve cells on retina that allow you to see dim light
17. Transparent object that allows one or more colors through but absorbs others
18. What an object does to light so we see it

Down

1. Light produced by mixing all colors of the visible spectrum
2. Colors that can be mixed to produce any other colors
4. Color of an object that absorbs all light
6. Nerve cells you use to distinguish colors
10. This type of radiation lies just outside the high-frequency end of the visible spectrum.
11. Allowing nearly all light to pass through
12. What you see when reflected wavelengths of light reach your eyes
15. Material you cannot see through
16. The color you see if you are looking at light that has no red or blue

Chapter 20

CHAPTER TEST

● Mirrors and Lenses

. Testing Concepts

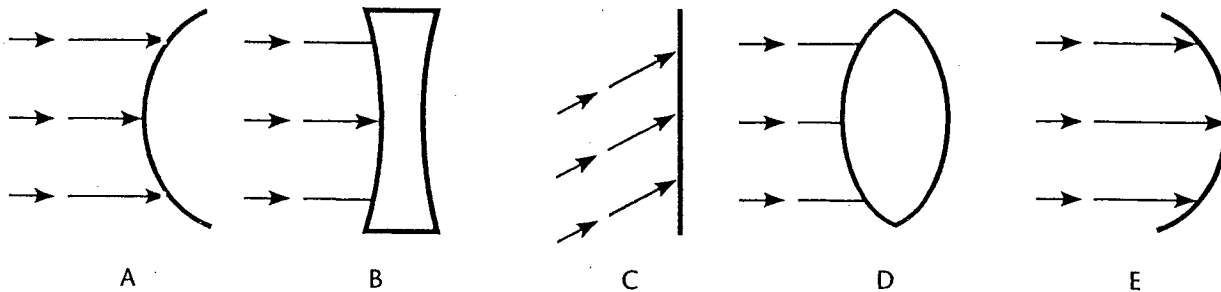
In the blank at the left, write the letter of the term or phrase that correctly answers each question or best completes each statement.

- _____ 1. Which of the following uses a lens and two mirrors?
 a. refracting telescope c. binoculars
 b. microscope d. reflecting telescope
- _____ 2. The most common use of _____ is in communications.
 a. optical fibers b. convex lenses c. microscopes d. polarized light
- _____ 3. Sunglasses with _____ lenses are used to reduce glare.
 a. convex b. concave c. polarized d. wide-angle
- _____ 4. Which of these does NOT have an objective lens?
 a. reflecting telescope c. microscope
 b. refracting telescope d. binoculars
- _____ 5. The rays of _____ light spread out as the light travels away from its source.
 a. coherent b. laser c. polarized d. incoherent
- _____ 6. Laser light is NOT used _____.
 a. to read bar codes on packages c. with optical fibers
 b. in car headlights d. for cutting and welding materials
- _____ 7. _____ are thick in the middle and thin at the edges.
 a. Convex lenses b. Plane mirrors c. Concave lenses d. Convex mirrors
- _____ 8. The image formed by a plane mirror is _____.
 a. real and upright c. upright and reversed
 b. virtual and inverted d. real and reversed
- _____ 9. A _____ lens has a short focal length, produces a small image, and includes much of its surroundings.
 a. concave b. wide-angle c. telephoto d. convex
- _____ 10. Total _____ reflection makes the transmission of light through optical fibers possible.
 a. virtual b. external c. polarized d. internal
- _____ 11. One of the most common types of lasers is made up of a mixture of _____ and neon.
 a. helium b. hydrogen c. oxygen d. carbon
- _____ 12. Which of these is true about a real image?
 a. It is reversed. c. It can be projected onto a screen.
 b. It is enlarged. d. It appears behind the mirror.
- _____ 13. Light is refracted and spread out by a _____.
 a. convex lens b. convex mirror c. concave lens d. concave mirror
- _____ 14. Electrical power for the Hubble Space Telescope is provided by _____.
 a. storage batteries b. solar panels c. fuel cells d. convex lenses

Chapter 20 Test (continued)

Skill: Sequencing

3. On the diagrams below, the lines and arrows represent light rays. Continue the lines and arrows to show what happens to the light after it strikes each mirror or lens.



4. Write the letter of the lens or mirror above that matches each description below.

- ___ a. convex mirror
- ___ b. convex lens
- ___ c. concave lens
- ___ d. plane mirror
- ___ e. concave mirror
- ___ f. refracts and spreads light
- ___ g. reflects and spreads light
- ___ h. used to correct farsighted vision
- ___ i. used in car headlights
- ___ j. produces an upright, reversed image

Skill: Concept Mapping

5. Draw a concept map to show the benefits of a large telescope, such as the Hubble Space Telescope, in space. At the top of your map write the words "Space Telescope Benefits" and circle them. Draw lines to connect to the serious benefits that you can think of.