

CHAPTER

3

DIRECTED READING WORKSHEET

Light and Living Things

As you read Chapter 3, which begins on page 52 of your textbook, answer the following questions.

Strange but True! (p. 52)

1. The baby in the picture has jaundice. All of the following are true of jaundice EXCEPT
 - a. it is caused by a buildup of bilirubin in the skin.
 - b. it causes babies' skin to turn bluish.
 - c. it is treated with blue light.
 - d. if left untreated, it can cause brain damage.
2. What is a "bili blanket?"

What Do You Think? (p. 53)

Answer these questions in your ScienceLog now. Then later, you'll have a chance to revise your answers based on what you've learned.

Investigate! (p. 53)

3. What happens to light that passes through a spectroscope?

Section 1: The Electromagnetic Spectrum (p. 54)

4. Bees can see something you can't see. What is it?

Chapter 3, continued

5. All electromagnetic waves are the same. True or False?
(Circle one.)

Waves Carry Energy (p. 54)

6. Earthquakes are caused by _____ waves.
7. The energy of a wave can cause matter to move. True or False?
(Circle one.)
8. Although sound waves travel through the air, the air does not travel with the sound. What would happen every time you heard the phone ring if air did travel with sound?

9. Look at Figure 2. A leaf floating on the surface of a lake doesn't move toward the shore with the waves. True or False?
(Circle one.)

Each of the following statements describes mechanical or electromagnetic waves. In the space provided, write *M* for a mechanical wave and *E* for an electromagnetic wave.

10. _____ water waves, for example
11. _____ travel fastest through empty space
12. _____ can transfer energy without traveling through a medium
13. _____ radio waves, for example
14. _____ requires a substance through which to travel

Electromagnetic Waves (p. 56)

15. In a vacuum, all electromagnetic waves travel at the speed of light. True or False? (Circle one.)
16. Light travels slower in glass than it does in space.
True or False? (Circle one.)
17. An electromagnetic wave's _____ and _____ are used to classify it.
18. Usually waves that have _____ frequencies and _____ wavelengths carry the most energy.

Chapter 3, continued

19. Using the diagram of the electromagnetic spectrum on pages 56–57, arrange the following waves in order from shortest to longest wavelength: X rays, microwaves, gamma rays, visible light, radio waves.

20. Which one of the following colors of visible light carries the most energy?

- a. red
- b. orange
- c. yellow
- d. green
- e. blue
- f. violet

21. Plants use visible light to make their own food. True or False? (Circle one.)

22. Why might you think of the name *Roy G. Biv* when you look at a rainbow?

23. Ultraviolet light makes up about _____ percent of the energy from the sun.

Mark each of the following statements *True* or *False*.

- 24. _____ Ultraviolet light carries less energy than visible light.
- 25. _____ Bacteria can be killed by ultraviolet light.
- 26. _____ Limited exposure to ultraviolet light helps your body make calcium.
- 27. _____ Too much ultraviolet light causes sunburn.
- 28. _____ Ultraviolet light is completely blocked by clouds.

Review (p. 58)

Now that you've finished Section 1, review what you learned by answering the Review questions in your ScienceLog.

Chapter 3, continued

Section 2: Reflection, Absorption, and Scattering (p. 59)

1. Why do a cat's eyes seem to glow in the dark?

Reflection (p. 59)

2. Light waves are the only type of waves that reflect off objects.

True or False? (Circle one.)

3. How does reflection enable you to see objects?

Use the text and Figures 6 and 7 on pages 59–60 to answer questions 4–8. Each of the following statements is false. Change the underlined word to make the statement true, and write the new word in the space provided.

4. When light hits a mirror, its angle of incidence is greater than its angle of reflection.

5. The absorption of a beam of light on a surface is called incidence.

6. The angle between the reflected beam and the normal is called the angle of incidence.

7. Light beams strike all points of a very rough surface at the same angle.

8. When light beams are reflected at the same angle, it is called diffuse reflection.

Chapter 3, continued

Absorption and Scattering (p. 60)

9. Why does a flashlight beam seem to weaken as it travels farther away from a flashlight?

Each of the following descriptions is true of either scattering or absorption. In the space provided, write *S* for scattering and *A* for absorption.

- 10. _____ the release of light energy by particles of matter that have absorbed extra energy
- 11. _____ causes light to go in all directions
- 12. _____ the transfer of energy carried by light waves to particles in matter
- 13. _____ affects light with short wavelengths more than light with long wavelengths
- 14. _____ allows you to see objects that are located outside the flashlight beam
- 15. Why is the sky blue?

Light and Color (p. 61)

16. When you see a lime under white light, it appears white.

True or False? (Circle one.)

17. In transmission, light passes through _____.

18. In Figure 9, the glass feels warm because the light is transmitted through the window. True or False? (Circle one.)

Chapter 3, continued

19. The _____ of a light wave determines the color of the light.
20. The color of an object is determined by the color of the light that reaches your eyes after being reflected off the object.
True or False? (Circle one.)
21. Use the terms you've learned in this chapter to explain why the strawberry in Figure 10 looks red.

22. A _____ object absorbs all the colors of white light and a _____ object reflects all the colors of white light.

Mixing Colors of Light (p. 63)

23. What three colors of light can be combined to form all colors of light, including white light?
- | | |
|------------|----------|
| a. yellow | d. blue |
| b. red | e. cyan |
| c. magenta | f. green |

24. _____, a secondary color of light, is formed when red and green, two _____ colors of light, are added together.

Mixing Colors of Pigment (p. 64)

25. Pigments, such as chlorophyll, give objects their _____.
26. What three colors of pigment can be combined to produce any color?
- | | |
|------------|----------|
| a. yellow | d. blue |
| b. red | e. cyan |
| c. magenta | f. green |

Review (p. 64)

Now that you've finished Section 2, review what you learned by answering the Review questions in your ScienceLog.

Chapter 3, continued

Section 3: Refraction (p. 65)

Place the following sentences in the order of the steps that light takes so that you can see an object by writing the appropriate number in the corresponding space.

1. _____ Light enters your eye through your pupil.
2. _____ Light forms an image on your retina.
3. _____ Light passes through your cornea and lens.
4. _____ Light reflects off an object.

Rays Show the Path of Light Waves (p. 65)

5. A ray is an arrow that shows the path and _____ of a light wave.
6. Since light waves travel in straight lines, they can never change direction. True or False? (Circle one.)

Refraction (p. 66)

7. Light travels at different speeds through different media. True or False? (Circle one.)
8. Why is the beam of light in Figure 14 bent?

9. Light waves with _____ wavelengths are bent less than light waves with _____ wavelengths.
10. White light can be separated into different colors during refraction because the different component colors of white light have different wavelengths. True or False? (Circle one.)
11. What causes a rainbow?

Chapter 3, continued

Lenses Refract Light (p. 67)

12. Which of the following are characteristics of lenses?
(Circle all that apply.)

- a. They are flat.
- b. They are curved.
- c. They are reflective.
- d. They are transparent.

After you finish reading page 67, choose the type of lens in Column B that matches the description in Column A, and write the corresponding letter in the space provided. Lenses can be used more than once.

| Column A | Column B |
|---|-----------------|
| ___ 13. helps people who are nearsighted | a. convex lens |
| ___ 14. one focuses light inside your eye | b. concave lens |
| ___ 15. thinner at the edges than at the middle | |
| ___ 16. thicker at the edges than at the middle | |
| ___ 17. refracts light toward its center | |

Optical Instruments (p. 68)

18. Optical instruments use arrangements of

_____ and _____
to help people make observations.

Using Figure 19 as a reference, mark the following statements *True* or *False*.

- 19. _____ The longer the shutter of a camera is open, the more light that enters the camera.
- 20. _____ More light enters the camera when the aperture is small than when the aperture is large.
- 21. _____ The lens of a camera is a concave lens.
- 22. There are two kinds of telescopes. _____ telescopes use mirrors to collect light, and _____ telescopes use lenses to collect light.
- 23. What is the difference between microscopes and telescopes?
 - a. Microscopes have an objective lens.
 - b. Microscopes have an eyepiece lens.
 - c. Microscopes produce a magnified image.
 - d. Microscopes are used to look at tiny, nearby objects.

Review (p. 69)

Now that you've finished Section 3, review what you learned by answering the Review questions in your ScienceLog.