Chapter 10 Light and Reflection

What You Will Learn

In this chapter, you will learn how to...

- **describe** examples of technologies that use light
- **describe** and **explain** a variety of sources of light
- **explain** how technologies that use light benefit society

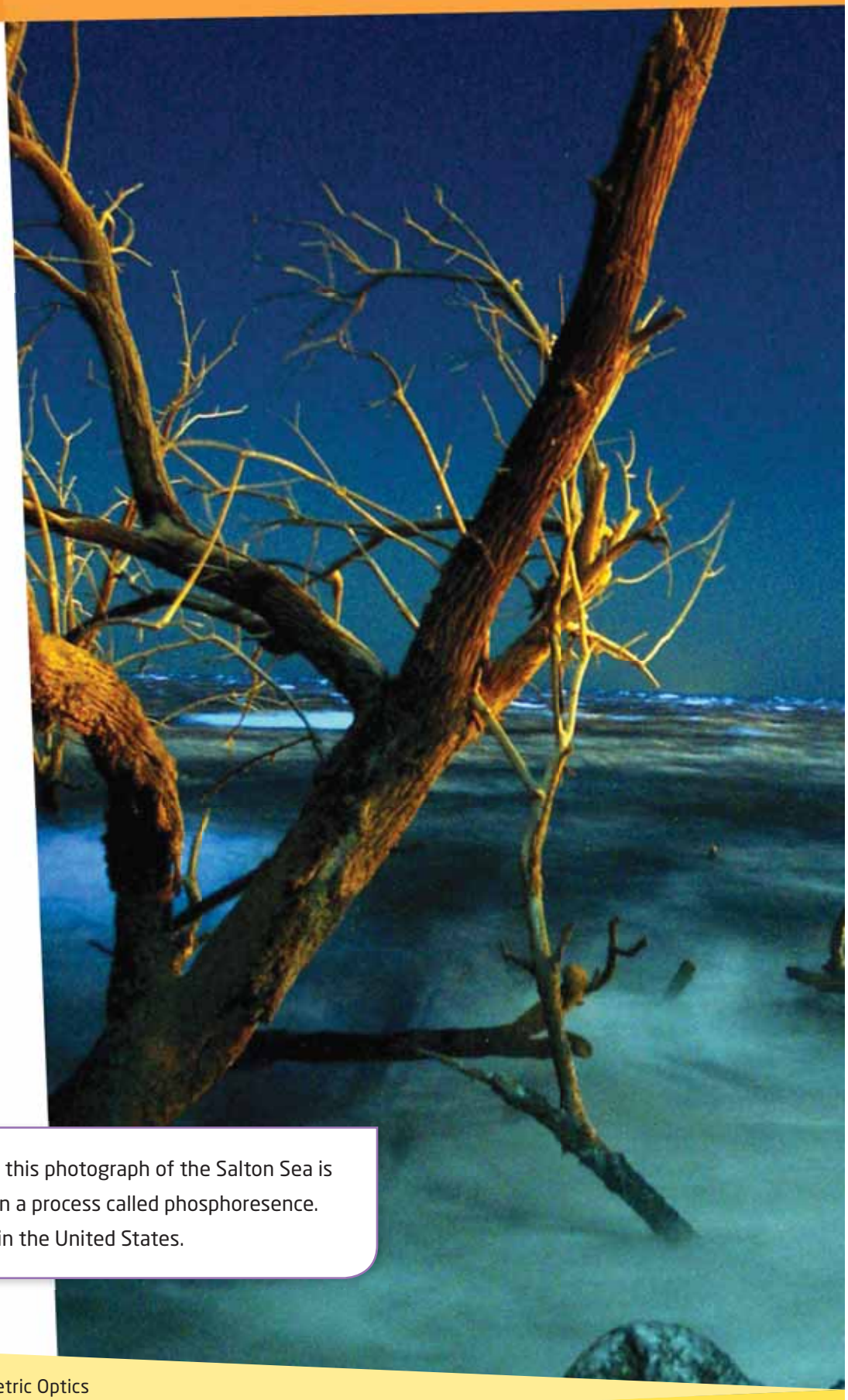
Why It Matters

Understanding light and its properties will help you understand how light is used in technologies such as security mirrors, glow sticks, solar ovens, and medical equipment.

Skills You Will Use

In this chapter, you will learn how to...

- **investigate** the laws of reflection using plane and curved mirrors
- **predict**, both quantitatively and qualitatively, the characteristics of images in plane and curved mirrors
- **analyze** a technological device that uses properties of light



The eerie glow that you see in this photograph of the Salton Sea is made by algae that emit light in a process called phosphoresence. The Salton Sea is in California in the United States.

Activity 10-1

Glowing Slime

In this activity, you will make glow-in-the-dark slime using glow-in-the-dark paint powder.

Add the paint powder to the glue solution.

Safety Precautions

- Do not eat the slime.
- Do not inhale the paint powder.

Materials

- two 500 mL measuring cups
- measuring spoons
- glue gel
- tap water
- glow-in-the-dark paint powder
- 4% (saturated) borax solution
- spoon
- resealable plastic bag
- flashlight

Procedure

1. Put on the goggles, apron, and rubber gloves.
2. In a measuring cup, make a glue-gel solution by mixing 15 mL of glue gel with 45 mL of warm water.
3. Stir 1 mL of glow-in-the-dark paint powder into the glue solution. The paint powder will not dissolve, but mix it in well.
4. In a clean measuring cup, mix 30 mL of the glue and paint solution from step 3 with 10 mL of the 4% borax solution.
5. With a spoon, transfer the slime into a resealable plastic bag. Seal the bag.
6. Turn out the lights, and shine a flashlight on the slime.
7. Clean up your work area, and dispose of the materials according to your teacher's instructions.

Questions

1. What happened after you shone the flashlight on the slime?
2. Use your knowledge of electrons to guess what is happening when glow-in-the-dark paint absorbs light.

Study Toolkit

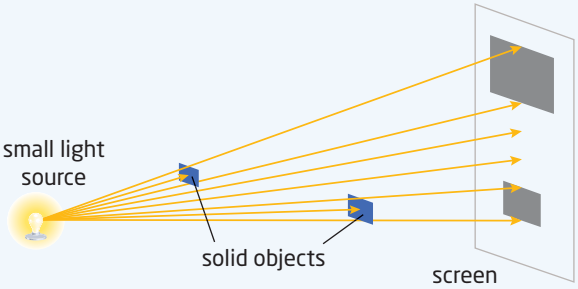
These strategies will help you use this textbook to develop your understanding of science concepts and skills.
To find out more about these and other strategies, refer to the Study Toolkit Overview, which begins on page 560.

Reading Graphic Text

Interpreting Diagrams

A diagram is a drawing that simplifies a concept. It uses symbols to represent objects, directions, and relationships. Reading the labels in a diagram can help you understand these symbols.

To interpret a diagram, first read the title and caption. This will help you understand the main idea. Then consider how each part of the diagram illustrates the main idea. For example, the caption below tells you how a property of light helps you predict shadow characteristics. The diagram illustrates how the shadow of an object changes with distance from a light source. The labels identify the parts of the diagram.



Using the fact that light travels in straight lines, you can predict the size and shape of shadows formed by opaque objects.

Use the Strategy

Examine **Figure 10.8B** on page 407. Read the caption to identify the main idea of the diagram. Explain how each labelled part of the diagram contributes to your understanding of the main idea.

Organizing Your Learning

Comparing and Contrasting

Comparing and contrasting new concepts can help you understand them. **Venn diagrams** and **tables** are two ways that you can graphically organize information. For example, the table below shows the similarities and differences between a real image and a virtual image.

Comparison of a Real Image and a Virtual Image

Type of Image	Differences	Similarities
Real image	A real image is formed when reflected (and refracted) rays meet.	Both images are formed by reflected (and refracted) rays.
Virtual image	The rays that form a virtual image appear to be coming from a specific position, but they are not actually coming from this position.	

Use the Strategy

Read the subsections titled "Chemiluminescence" and "Bioluminescence" on page 407. Make a table to show the similarities and differences between chemiluminescence and bioluminescence.

Word Study

Base Words

Base words are like building blocks or foundations. Knowing the meanings of common base words used in science may help you figure out the meanings of longer words that contain these base words. For example, knowing the meaning of *magnify* (make something appear larger) can help you figure out the meanings of *magnifier* and *magnification*.

Use the Strategy

Think about the meaning of the base word *sphere*. Use it to predict the meaning of *spherical*. Use a dictionary or the Glossary at the end of this textbook to check your predictions.