SECTION 1

Characteristics of Light

SECTION OBJECTIVES

- Identify the components of the electromagnetic spectrum.
- Calculate the frequency or wavelength of electromagnetic radiation.
- Recognize that light has a finite speed.
- Describe how the brightness of a light source is affected by distance.

ELECTROMAGNETIC WAVES

When most people think of light, they think of the light that they can see. Some examples include the bright, white light that is produced by a light bulb or the sun. However, there is more to light than these examples.

When you hold a piece of green glass or plastic in front of a source of white light, you see green light pass through. This phenomenon is also true for other colors. What your eyes recognize as "white" light is actually light that can be separated into six elementary colors of the visible *spectrum:* red, orange, yellow, green, blue, and violet.

If you examine a glass prism, such as the one shown in **Figure 1,** or any thick, triangular-shaped piece of glass, you will find that sunlight passes through the glass and emerges as a rainbowlike band of colors.

The spectrum includes more than visible light

Not all light is visible to the human eye. If you were to use certain types of photographic film to examine the light dispersed through a prism, you would find that the film records a much wider spectrum than the one you see. A variety of forms of radiation—including X rays, microwaves, and radio waves—have many of the same properties as visible light. The reason is that they are all examples of **electromagnetic waves.**

electromagnetic wave

a wave that consists of oscillating electric and magnetic fields, which radiate outward from the source at the speed of light

Light has been described as a particle, as a wave, and even as a combination of the two. Although the current model incorporates aspects of both particle and wave theories, the wave model is best suited for an introductory discussion of light, and it is the one that will be used in this section.

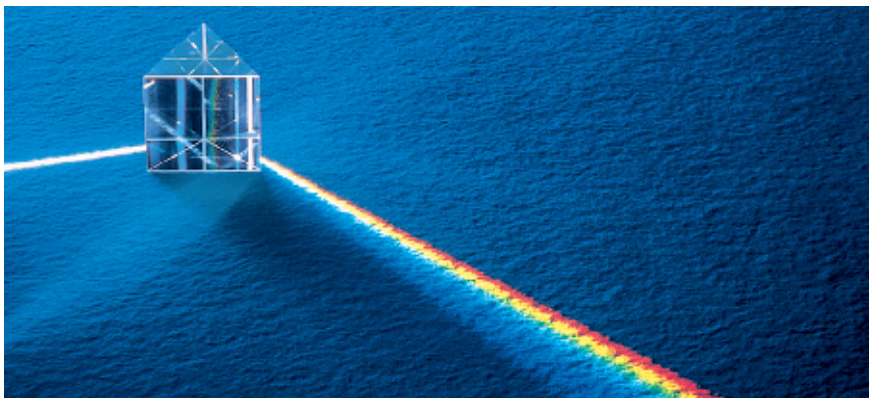

Figure 1
A prism separates light into its component colors.

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