

Section 1: The EM Spectrum and Visible Light

Light has a wide range of energies—some light has higher energy than other types of light. Think about looking at the light from a rainbow. The blue light that you see has higher energy than the red light. Our eyes can only detect, or see, a very small portion of the total range of energies of light that comes from the Sun. **Visible light** is the name for this small range of energies that our eyes can see. Other energies are too high or too low for us to see with our eyes. The entire range of energies of light includes visible light and others that may be familiar to you. Your classmates will teach you about some of these other energies of light later. Your responsibility is to learn about visible light. The complete range of light energies—the ones we can see and the ones we cannot see—is called the **electromagnetic spectrum**, or **EM spectrum** (figure 2.12). The Sun emits all of these energies of light. So when you say “sunlight,” it means much more than just the light we can see!

Light can travel through empty space or through matter like a lens or plastic wrap. Light energy travels from the Sun to Earth by a process called **radiation**. Radiation is the process in which energy travels from a source to another object.

Look at figure 2.12 and see which energies of light you will learn about in this activity. You can see from the figure that visible light is made of several colors of light, each with its own energy. What happens when all the energies of visible light are produced at the same time? You see white light! White light is the light that comes from an everyday flashlight, the lights in your classroom, or even the light we see from Sun. You may have used a prism before to produce a rainbow. A prism bends, or refracts, white light. However, the colors of light do not bend by the same amount. So when white light passes through a prism, the colors that make up white light are separated. You see the rainbow of colors that make up visible light (figure 2.13).

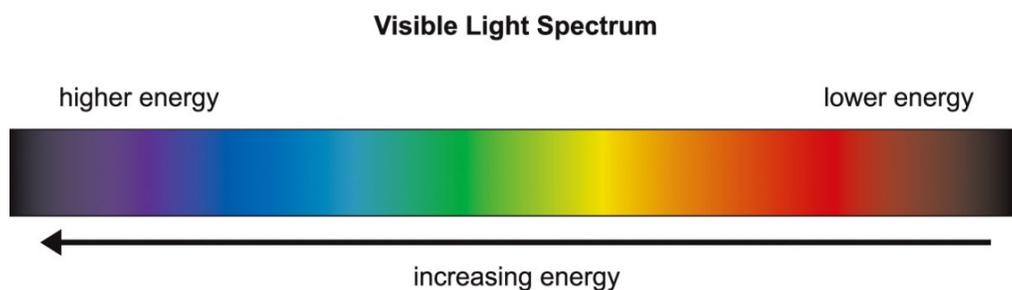


Figure 2.13: Visible light spectrum. This is the range of energies of light that we can see. This is only a very small portion of the electromagnetic spectrum. When a source produces light with all these energies at the same time, the light appears white.

You have learned a lot about light that passes through, or is **transmitted** by, objects like prisms or lenses. You have also thought about how light reflects off the surface of objects so we can see them. Keep in mind that what you see is the energy of light that is reflected off the object. Objects also absorb light. Suppose you shine white light (like the light from a flashlight) on a red apple. You see a red apple because red light is reflected from the surface of the apple to your

eye. Red is only part of the white light from your flashlight. What about the other colors of visible light? Those colors are absorbed by the apple (figure 2.14).

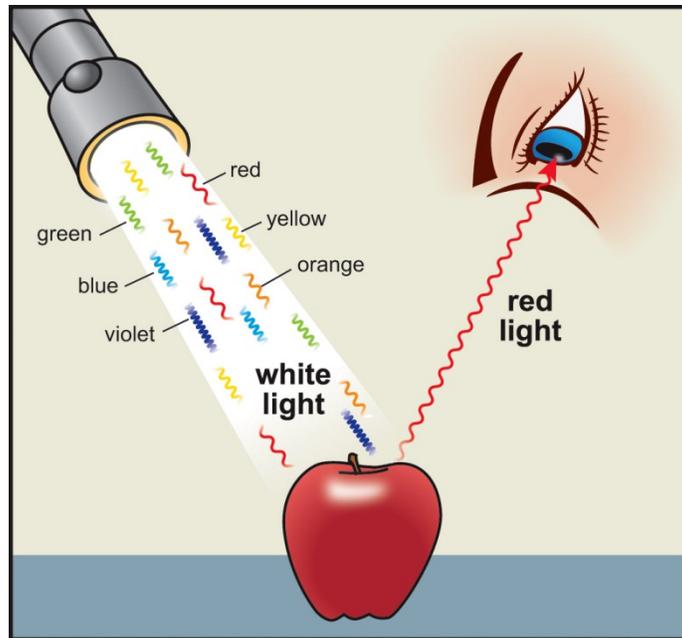


Figure 2.14: Seeing a red apple. When light of all the energies of visible light is present, we see white light. When this light is shining on a red apple, only the red energies of light are reflected to our eyes. That is why we see the apple as red. What happens to the other energies of light that hit the apple?