

Section 2: The EM Spectrum and Ultraviolet 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 come 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 ultraviolet light—light you cannot see. 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. The type of EM radiation that has energies a little higher than visible light is **ultraviolet** radiation, or UV light. You may know that this radiation is responsible for skin damage. The UV light energy interacts with our skin to cause sunburn and, in some cases, skin cancer. You cannot see this radiation with your eyes, but you have evidence that it is there if you have ever gotten a sunburn!

Tanning beds use UV light. You may have used these devices before or know someone who has. These beds use special lightbulbs that produce UV light in a range of energies. This type of light will darken the skin. Remember that UV light is the energy responsible for sunburn, so be careful! You can get a sunburn in these beds. Too much exposure to UV light, whether you are outside in the Sun or inside in a tanning bed, can cause permanent skin damage. This can lead to skin cancer. Sunscreens block UV light from reaching the cells of your skin. This can reduce your risk of getting skin cancer.

Our eyes may not detect ultraviolet radiation, but other organisms’ eyes do. Some organisms such as insects can detect a wider range of energies than humans can. In fact, bees find some flowering plants by detecting the UV radiation reflected by their flowers (figure 2.15). While the flower may appear as one color to us, to a bee the UV light it sees guides it to the center of the flower. This adaptation lures bees as pollinators to the plant.

a.



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b.



Bjorn Rorslett / Photo Researchers

Figure 2.15: A flower in (a) visible light and (b) ultraviolet (UV) light. A bee's eyes can see higher energies of EM radiation. The two images show the same flower (a) as we see it in visible light and (b) the way a bee would see it in UV light. A special filter or camera was used to record the image of the flower reflecting UV light.