

CONCEPT 2

Sources of electromagnetic radiation are all around you.

Activity

Electromagnetic Radiation Inventory

A lot of things you are familiar with give off electromagnetic radiation. As a class, brainstorm as many as you can. Then answer the questions below.

1. Which sources can be found in your home or school? in your community or region?
2. What other questions or concerns do you have about sources of electromagnetic radiation? Discuss these as a class.

Now that you have a better understanding of how electromagnetic radiation shapes your world, where do you think it comes from? There are many different sources of electromagnetic radiation. Some sources are familiar, like cell phones and light bulbs. Others, like X-ray tubes, may be unfamiliar. Some sources are artificial, while others are natural, including living organisms.

Figure 3.2 explores several of these sources. You may be surprised to learn that even you are a source of electromagnetic radiation.

As you read about these sources, keep in mind that electromagnetic radiation is energy. That means it is neither created nor destroyed. Instead, it is transferred from one object to another or transformed into another kind of energy.

Figure 3.2 Some sources of electromagnetic radiation.



The Sun: A Source of All Types of Electromagnetic Radiation

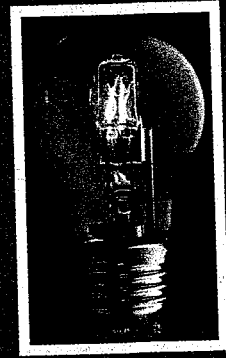
Chemical Reactions in Living Organisms: A Source of Visible Light

The body reactions involving the breakdown of glucose and other nutrients in living organisms can be a source of visible light.



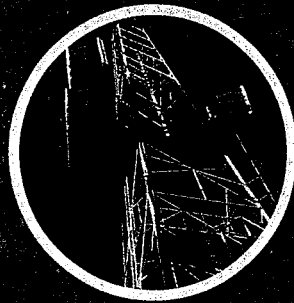
Heated Materials: A Source of Visible Light and Infrared Radiation

All objects, including you, give off infrared radiation. As an object gets hotter, it gives off more infrared radiation. You sense this energy as heat. If objects are very hot, they can give off visible light as well. The filament in a light bulb is a good example of a heated material that gives off both infrared radiation and visible light.



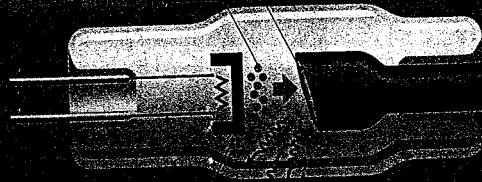
Telecommunications: A Source of Microwaves and Radio Waves

Telecommunications systems use microwaves and radio waves to transmit information. These waves are a form of electromagnetic radiation. They travel through the air and can be used to send messages over long distances.

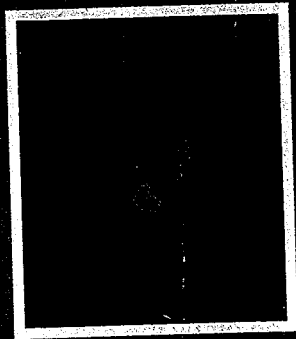


X-ray Tubes: A Source of X-rays

X-ray tubes are used to produce X-rays. They consist of a glass envelope containing a vacuum and two electrodes. When a high voltage is applied across the electrodes, electrons are accelerated from the cathode to the anode. When these electrons strike the anode, they produce X-rays.



Radioisotopes: A Source of Gamma Rays



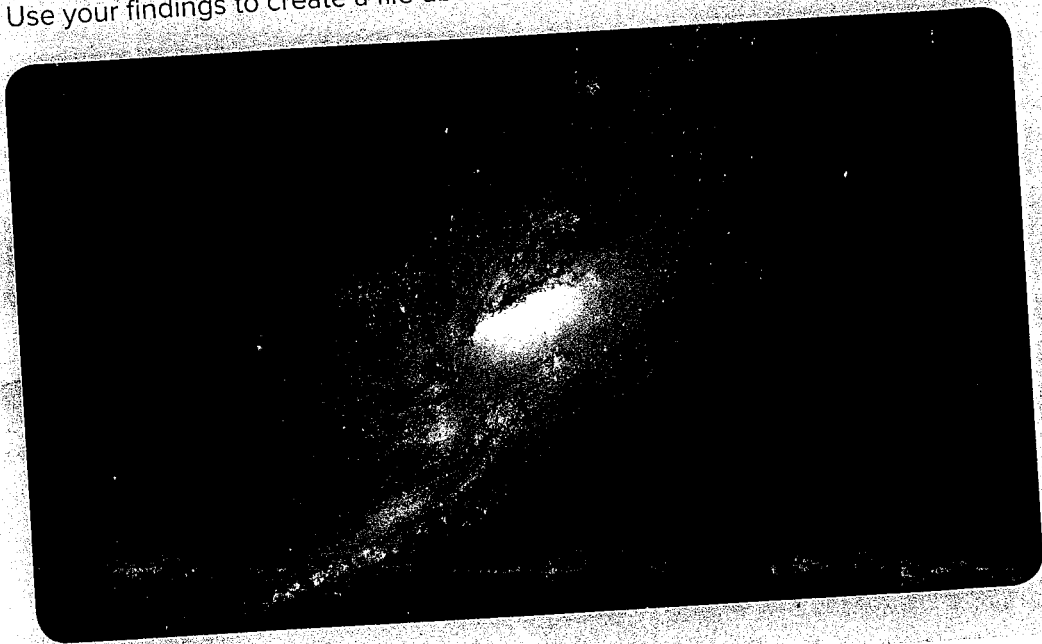
Radioisotopes are unstable atoms that decay and release energy in the form of gamma rays. These rays are a form of electromagnetic radiation with a very short wavelength and high energy. They are used in medicine for diagnosis and treatment, and in industry for material analysis.

Extending the Connections

The X-Ray Files

Many sources of electromagnetic radiation are truly out of this world!

1. Carry out research to find out more about extraterrestrial sources of electromagnetic radiation. (Extraterrestrial refers to anything that is beyond Earth.)
2. Choose one that interests you. Do more research to find the following information:
 - a description of the source
 - what type(s) of electromagnetic radiation the source gives off
 - how we measure or detect the electromagnetic radiation
 - one question you have about the source and the answer you found to it
 - an image of the source, if available
3. Use your findings to create a file about the source. Share your file with the class.



Before you leave this page . . .

1. What type or types of electromagnetic radiation are given off by the following sources?
 - a) a halogen light bulb
 - b) the Sun
 - c) iodine-131
 - d) you
2. Identify three sources of electromagnetic radiation that you interacted with this week.
3. A type of starfish uses electromagnetic radiation to warn predators that it does not taste good. What type of electromagnetic radiation is most likely given off by the starfish?