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Name: **Date:**

The Electromagnetic Spectrum

Instructions: Read the article and examine the diagram. Then answer the questions below.

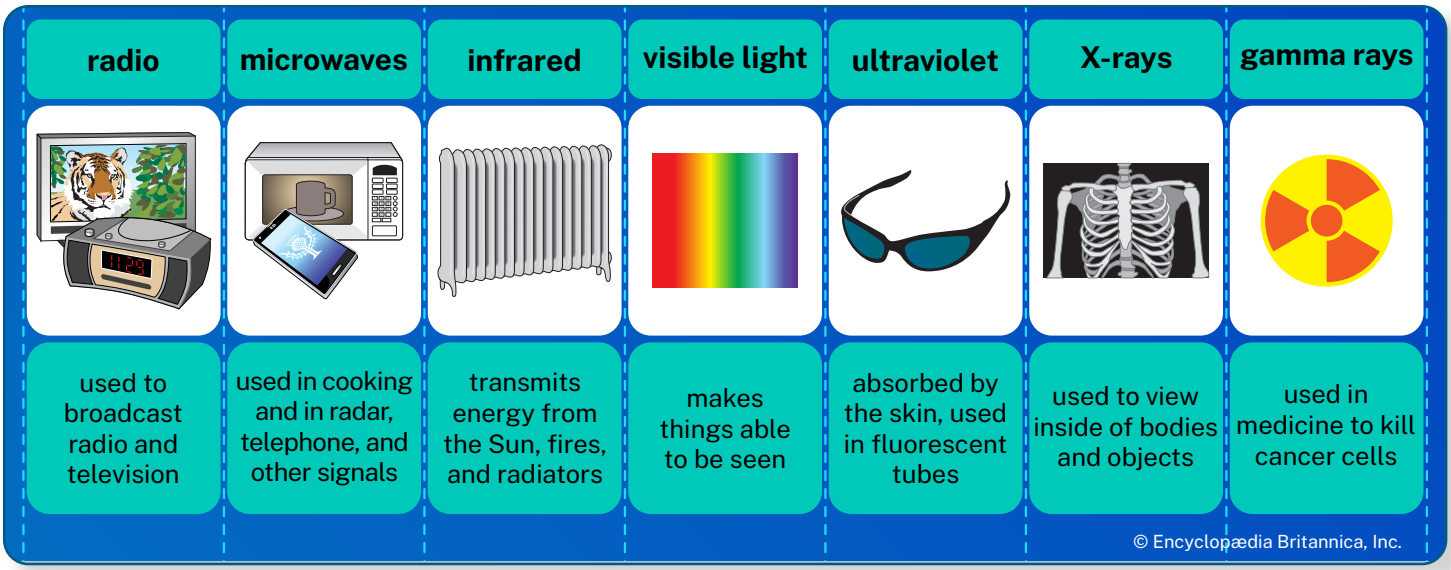
Electromagnetic waves, like all waves, transfer energy from place to place. Unlike mechanical waves, such as sound waves and water waves, electromagnetic waves do not require a medium, or material, through which to travel. The entire range of electromagnetic waves is called the electromagnetic spectrum, which can be organized by the wavelengths or frequencies of the waves.

Wavelength and frequency are closely related characteristics of electromagnetic waves. Wavelength is the distance from one point of the wave to the corresponding point on the next part of the wave, such as from crest to crest or from trough to trough. The number of wavelengths that move past a given point in a specific amount of time is the wave's frequency. The longer the wavelength, the lower the frequency and the lower the energy the wave carries. The shorter the wavelength, the higher the frequency and the greater the energy the wave carries.

The electromagnetic spectrum is divided into the following groups: radio, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays. Radio waves have the longest wavelengths, lowest frequencies, and lowest energies, while gamma rays have the shortest wavelengths, highest frequencies, and highest energies. There are many ways that we use electromagnetic radiation, from communications to medical care to observing distant objects in the universe. Recall that electromagnetic waves have different wavelengths, frequencies, and energies. The specific uses of electromagnetic waves are based on these properties. While some applications use only one type of electromagnetic wave, others may use a variety of waves. Some of these uses are shown in the diagram below.

Uses of Electromagnetic Waves

Electromagnetic waves play a part in many kinds of technology.



1. What is the meaning of the word *application* as it is used in the following sentence from the article?
   While some applications use only one type of electromagnetic wave, others may use a variety of waves.
   a. attention or effort
   b. a form to be filled out
   c. laying one thing on another
   d. a use to which something is put

2. In the first paragraph, what word is used to indicate that the author is contrasting mechanical waves and electromagnetic waves?
   a. unlike
   b. entire
   c. require
   d. specific

3. How does the diagram build on information provided in the article?
   a. It includes all possible uses of electromagnetic waves.
   b. It identifies the exact wavelengths of electromagnetic waves.
   c. It contrasts the uses of electromagnetic and mechanical waves.
   d. It provides examples of different uses of electromagnetic waves.

4. Based on the following sentence from the article, what is the relationship between visible light and the electromagnetic spectrum?
   The electromagnetic spectrum is divided into the following groups: radio, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays.
   a. Visible light is the most important section of the electromagnetic spectrum.
   b. Visible light is a specific part of the electromagnetic spectrum.
   c. Visible light is a category that includes the electromagnetic spectrum.
   d. Visible light and the electromagnetic spectrum are terms that describe the same phenomenon.

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The Electromagnetic Spectrum Answer Key

1. **d.** a use to which something is put
2. **a.** unlike
3. **d.** It provides examples of different uses of electromagnetic waves.
4. **b.** Visible light is a specific part of the electromagnetic spectrum.