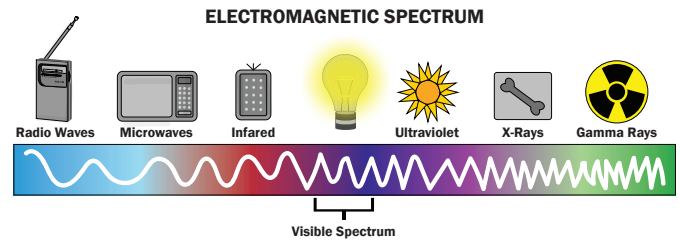


ELECTROMAGNETIC (EM) WAVES

EM SPECTRUM

CONCEPT The electromagnetic spectrum is the range of all types of electromagnetic radiation.



BACKGROUND

About 150 years ago, James Clerk Maxwell, an English scientist, developed a scientific theory to explain EM waves. He noticed that electrical fields and magnetic fields can couple together to form EM waves.

Heinrich Hertz, a German physicist, applied Maxwell's theories to the production and reception of radio waves. The unit of frequency of a radio wave -- one cycle per second -- is named the hertz, in honor of Heinrich Hertz.

REAL WORLD CONNECTIONS

RADIO: Your radio captures radio waves emitted by radio stations, bringing your favorite tunes. Radio waves are also emitted by stars and gases in space.

MICROWAVE: Microwave radiation will cook your popcorn in just a few minutes, but is also used by astronomers to learn about the structure of nearby galaxies.

INFRARED: Night vision goggles pick up the infrared light emitted by our skin and objects with heat. In space, infrared light helps us map the dust between stars.

VISIBLE: Our eyes detect visible light. Fireflies, light bulbs and stars all emit visible light.

ULTRAVIOLET: Ultraviolet radiation is emitted by the Sun and causes our skin to tan or burn depending on the amount of exposure.

X-RAY: A dentist uses X-rays to image your teeth and airport security uses them to see through your bag. Hot gases in the Universe also emit X-rays.

GAMMA RAY: Doctors use gamma-ray imaging to see inside your body. The biggest gamma-ray generator of all is the Universe.

EXAMPLES

Radiation is energy that travels and spreads out as it goes – the visible light that comes from a lamp in your house and the radio waves that come from a radio station are two types of EM radiation. The other types of EM radiation that make up the EM spectrum are microwaves, infrared light, ultraviolet light, x-rays and gamma-rays.