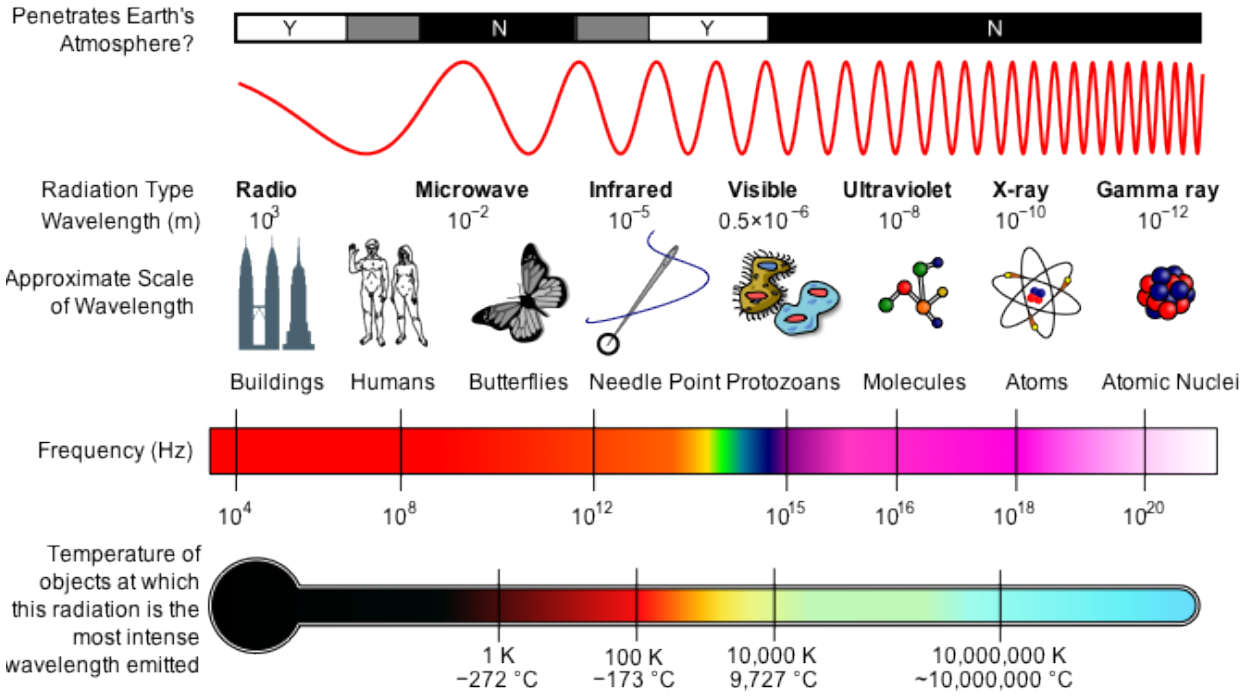
INTRO TO EMR


Penetrates Earth's Atmosphere?
Y
N
Y
N
Radiation Type
Wavelength (m)
Radio
10^{3}
Microwave
10^{-2}
Infrared
10^{-5}
Visible
0.5×10^{-6}
Ultraviolet
10^{-8}
X-ray
10^{-10}
Gamma ray
10^{-12}
Approximate Scale of Wavelength
Buildings
Humans
Butterflies
Needle Point
Protozoans
Molecules
Atoms
Atomic Nuclei
Frequency (Hz)
10^{4}
10^{8}
10^{12}
10^{15}
10^{16}
10^{18}
10^{20}
Temperature of objects at which this radiation is the most intense wavelength emitted
1 K
−272 °C
100 K
−173 °C
10,000 K
9,727 °C
10,000,000 K
~10,000,000 °C

SOLAR WIND

A stream of charged particles released from the upper atmosphere of the Sun

ELECTROMAGNETIC RADIATION

A wave that consists of changing electric field and a changing magnetic field travelling at right angles to each other

TRANSVERSE WAVE

A wave in which the vibrations are perpendicular to the direction the wave is travelling

WAVELENGTH

The distance from a point on 1 wave to the corresponding point on the next wave

FREQUENCY

The number of cycles per second

UNIVERSAL WAVE EQUATION

$$v = \lambda f$$

$$c = \lambda f$$

EXAMPLE 1

Determine the wavelength of this electromagnetic radiation with a frequency of 4.7619x1014Hz. Determine the type of specific type of EMR described.

EXAMPLE 2

Electromagnetic radiation passing through a detector determines that in 4.0x10-6s a total of 4 cycles pass through it. Use this information to determiner the frequency of the EMR

EXAMPLE 3

An excited atom in a neon sign emits electromagnetic radiation with a wavelength of 6.4x10-7m.

Calculate the frequency of the EMR

If the neon sign was located 25.0m from an observer, how long would it take the light from the sign to reach the observer

EXAMPLE 4

The antenna of a FM radio station broadcasts EMR with a frequency of 104.5MHz. A driver in a car is receiving these FM radio waves while travelling down a highway at 90.0km/h or 25m/s

Calculate the wavelength

Some of the FM radio waves can leave Earth's atmosphere and travel in space. Calculate how long it would take these radio waves to reach the Moon, which is located about 3.84x108m from Earth