ELECTROMAGNETIC RADIATION 15 APRIL 2014

Lesson Description

In this lesson we:

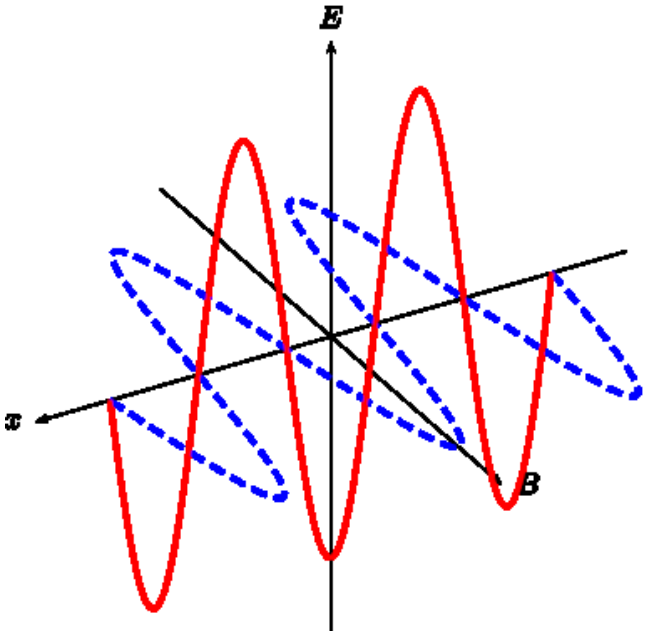
- Define electromagnetic radiation.
- Identify uses for various ranges of EM radiation.
- Solve for frequency and wavelength using the wave equation.
- Calculate the energy of a photon.

Summary

Electromagnetic Spectrum

Visible light – only a part of a whole range of radiation that our eyes cannot detect.

Made up of changing electric and magnetic fields interacting.



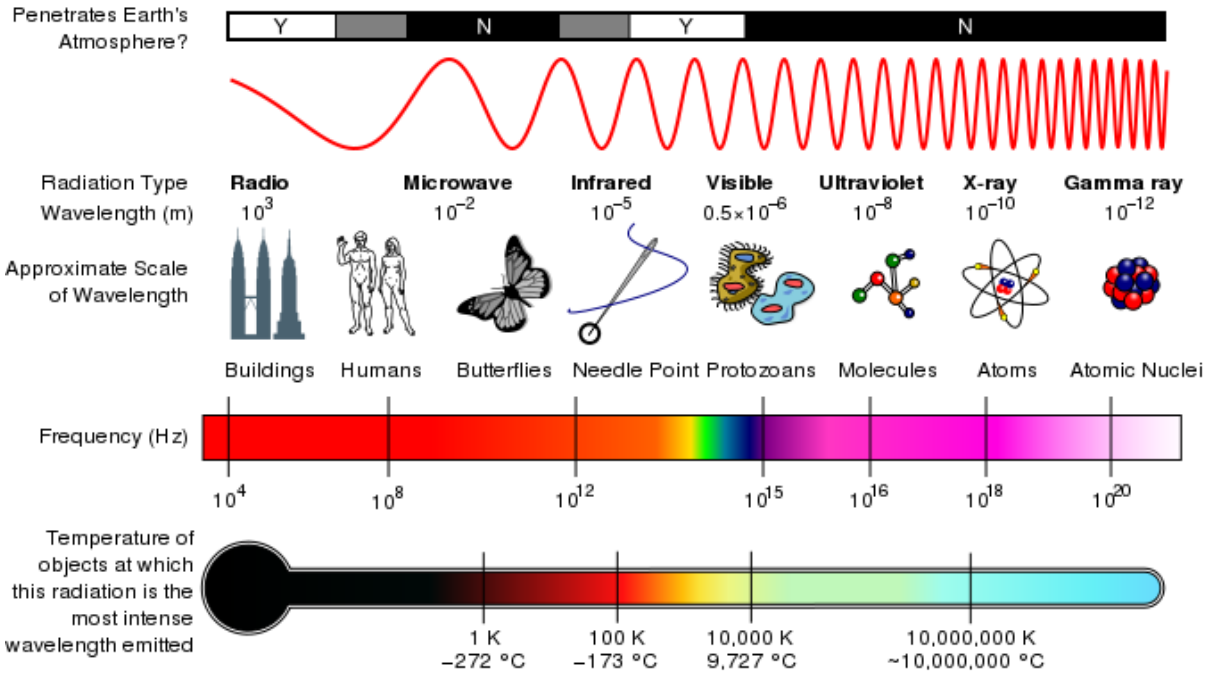
Picture taken from: www.everythingscience.co.za

Properties:

Travel at a constant **speed** of 300 000 000 $m.s^{-1}$ or **3 x 10 ^{8} $m.s^{-1}$** in a vacuum.

No medium is required for EM radiation to pass through.

Wave particle duality – behaves like a wave and a particle.



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Test Yourself

Question 1

Provide the correct SI unit for each of the following:

a.) frequency
b.) wavelength
c.) energy
d.) period

Question 2

The symbol h stands for:

A. speed
B. energy
C. Huygen's Principle
D. Planck's constant

Question 3

A radio wave has high…

A. frequency
B. energy
C. wavelength
D. amplitude

Question 4

UV radiation is used in:

A. TV broadcasts
B. cell phone technology
C. detecting broken bones
D. sun beds

Improve your Skills

Question 1

Two forms of radiation are given:

A. EM radiation with a frequency of 0.5 THz
B. EM radiation with a wavelength of 890 μm

a.) Calculate the energy of a photon of each form EM radiation.
b.) Compare the forms of radiation in terms of which has the longer wavelength?

Question 2

X-rays are part of the electromagnetic spectrum. It is given that the wavelength of certain X-rays are 2.3 nm.

a.) Calculate the frequency of the X-rays.
b.) Determine the energy of a photon of this X-ray radiation.
c.) Suggest a medical use of X-rays.
d.) Discuss the penetrating ability of X-rays.
e.) What precautions would medical personal operating X-ray machines need to take?

Links

- www.everythingscience.co.za