Thursday, January 10, 2019

Pick up: Writing prompt

Today you will:

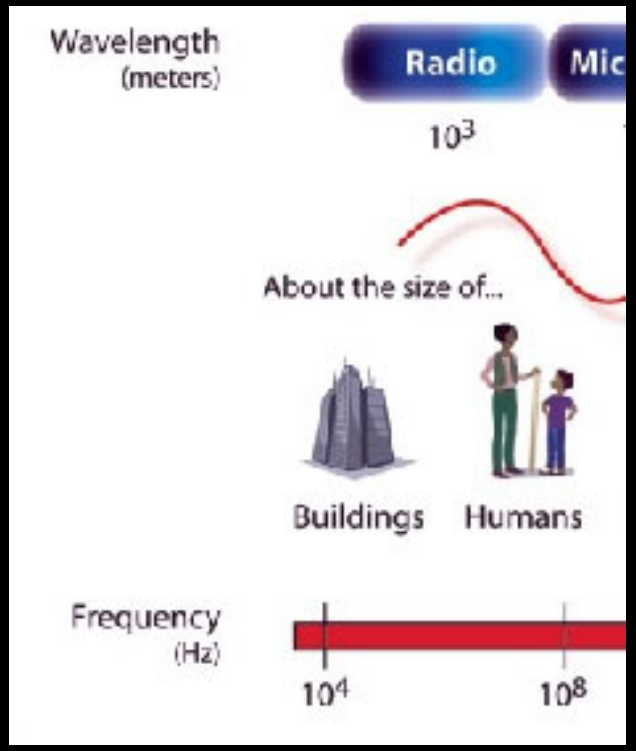
- EM Spectrum Video clip
- Notes on ISN pg 99
- Article Prompt

HOMEWORK:

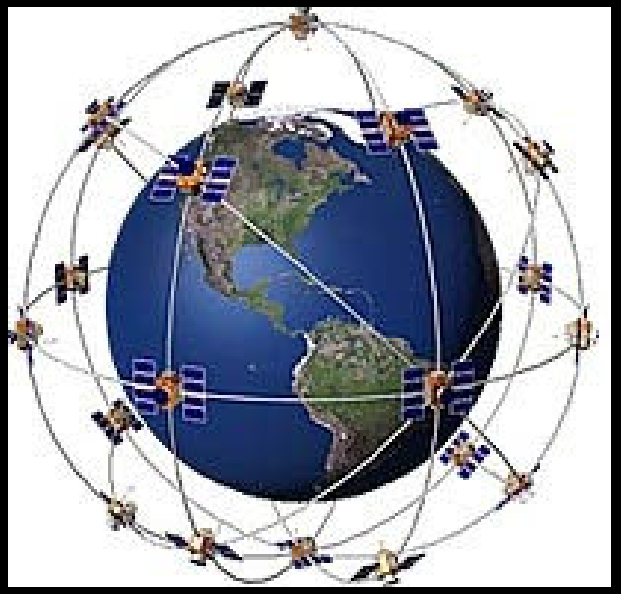
- Anything not done
- Get new ISN if necessary

RADIO WAVES

Have the **longest** wavelengths and **lowest** frequencies of all the electromagnetic waves.

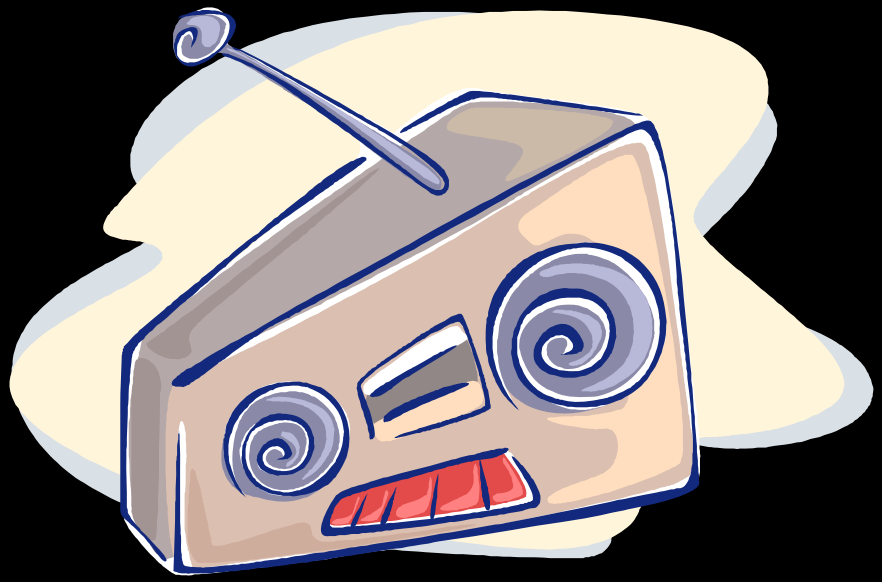


Global Positioning Systems (GPS) measure the time it takes a radio wave to travel from several satellites to the receiver, determining the distance to each satellite.



A radio picks up radio waves through an antenna and converts it to **sound waves.**

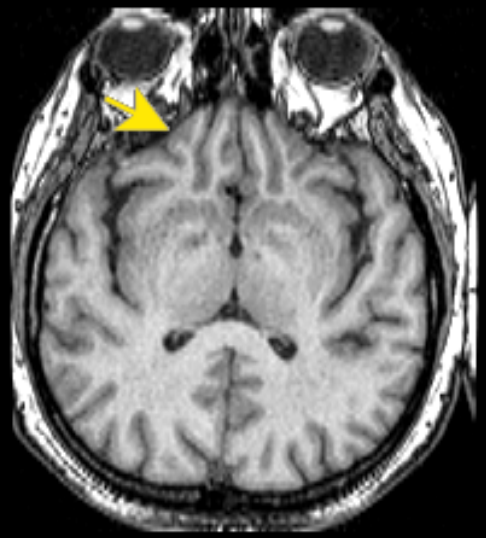
- Each radio station in an area broadcasts at a different frequency.
  - # on radio dial tells frequency.



MRI

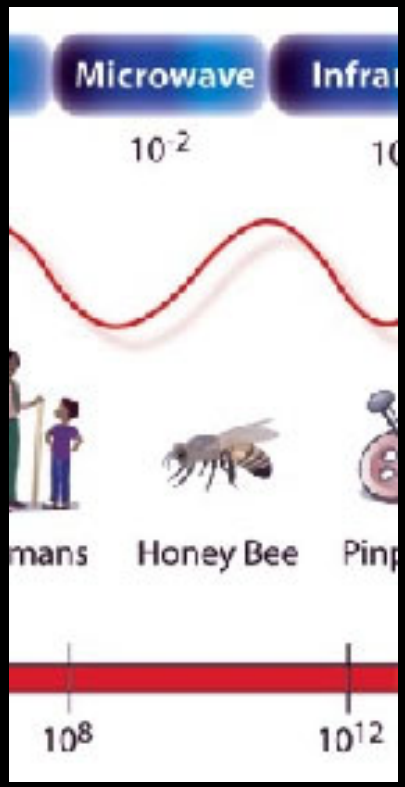
(MAGNETIC RESONACE IMAGING)

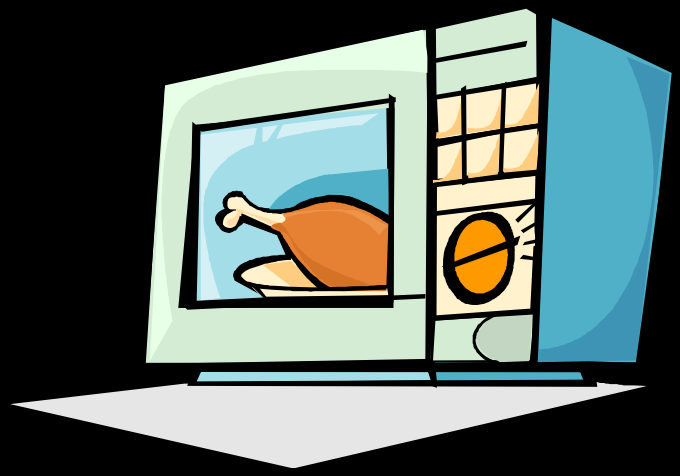
Uses Short wave radio waves with a magnet to create an image.



MICROWAVES

Have the shortest wavelengths and the highest frequency of the **radio waves.**





Used in microwave ovens.

- Waves transfer energy to the water in the food causing them to vibrate which in turn transfers energy in the form of heat to the food.

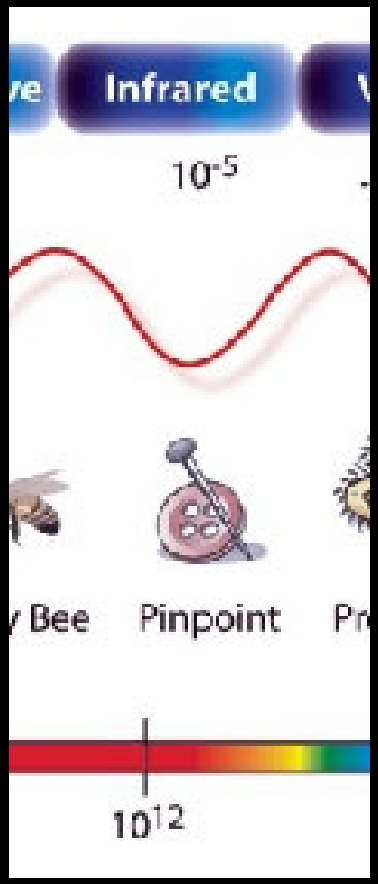
RADAR (Radio Detection and Ranging)

- Used to find the speed of an object by sending out radio waves and measuring the time it takes them to return.

INFRARED RAYS

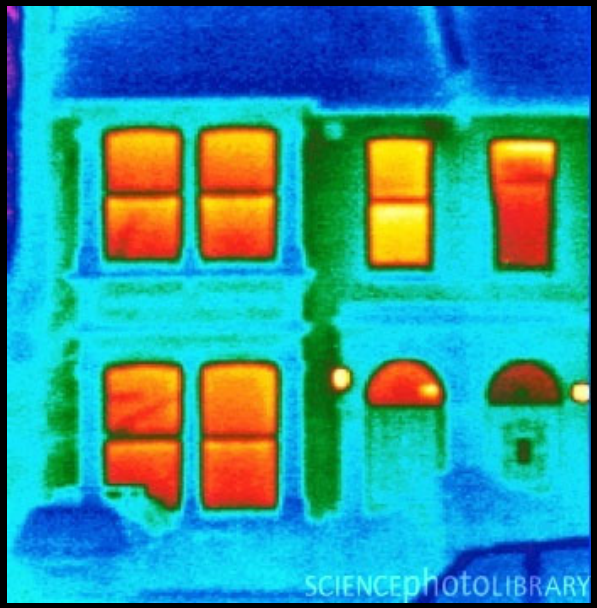
Infrared= below red

Shorter wavelength and higher frequency than microwaves.



You can feel the longest ones as warmth on your skin

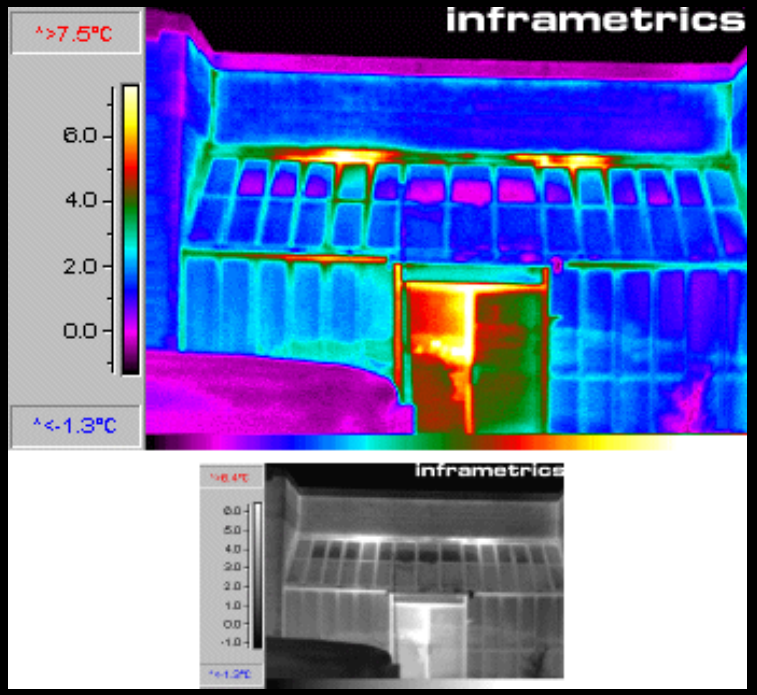
Warm objects give off more heat energy than cool objects.



Thermogram—a picture that shows regions of different temperatures in the body. Temperatures are calculated by the amount of infrared radiation given off.

Therefore people give off infrared rays.

Heat lamps give off infrared waves.



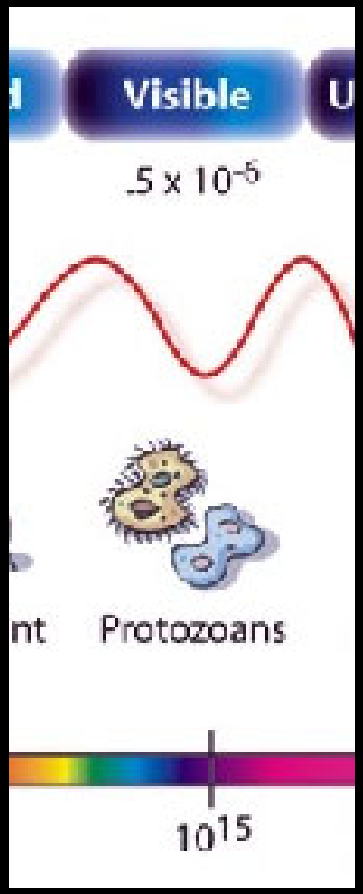
VISIBLE LIGHT

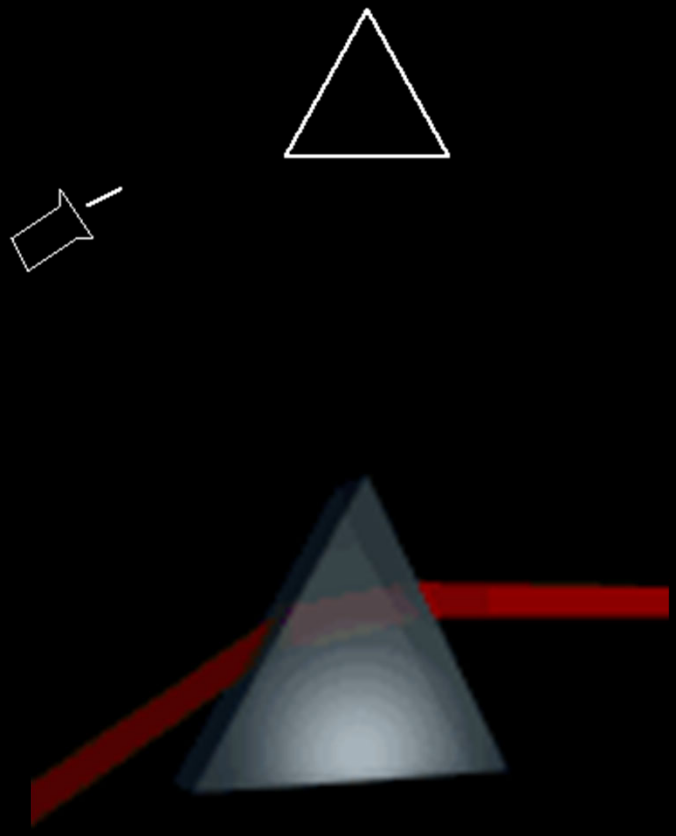
Shorter wavelength and higher frequency than infrared rays.

Electromagnetic waves we **can see.**

Longest wavelength= red light

Shortest wavelength= violet (purple) light



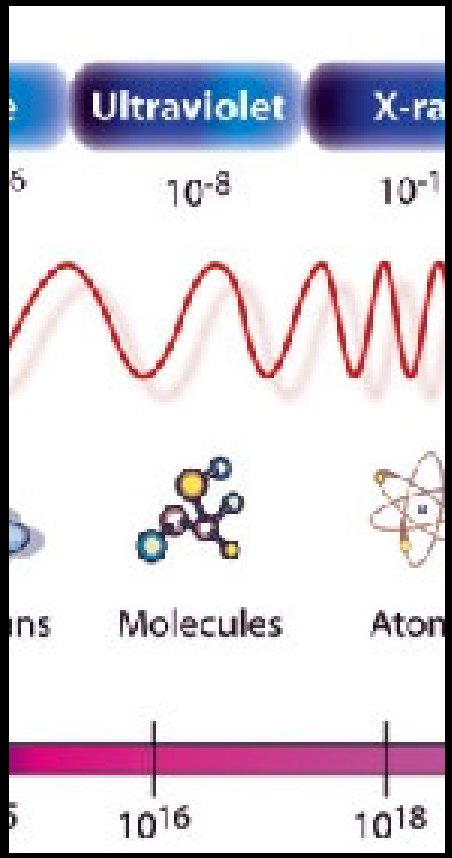


When light enters a new medium it bends (refracts). Each wavelength bends a different amount allowing white light to separate into it's various colors **ROYGBIV.**

ULTRAVIOLET RAYS

Shorter wavelength and higher frequency than visible light

Carry **more energy** than visible light

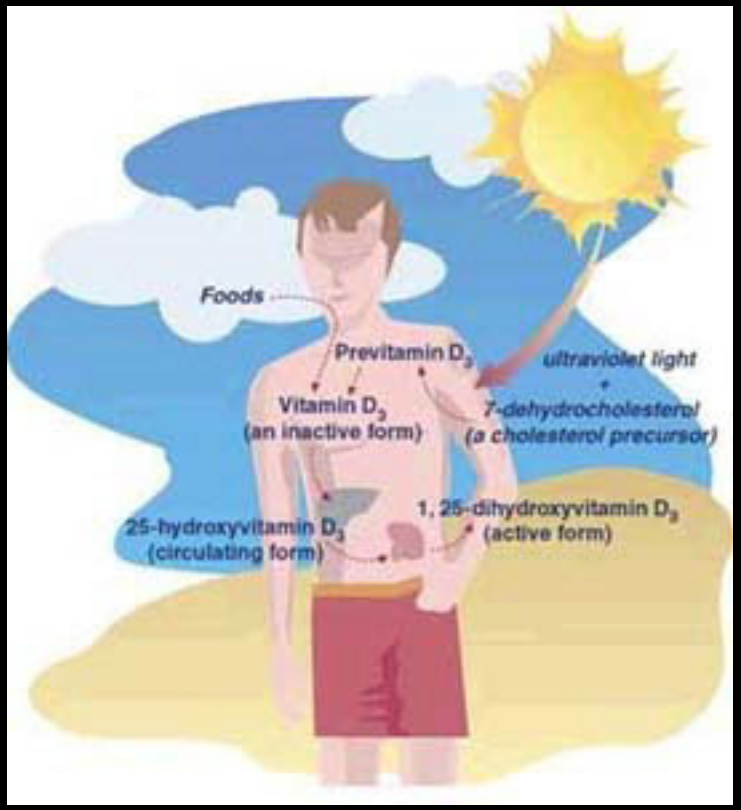


Used to **kill bacteria.** (Sterilization of equipment)

Too much can cause skin cancer.

Use sun block to protect against (UV rays)

Causes your skin to produce **vitamin D** (good for teeth and bones)

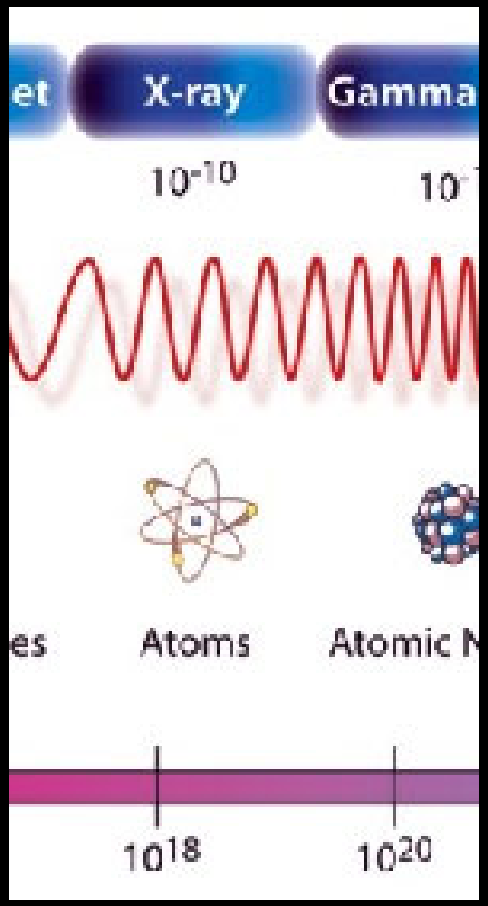


X- RAYS

Shorter wavelength and higher frequency than UV-rays

Carry a great amount of energy

Can penetrate most matter.

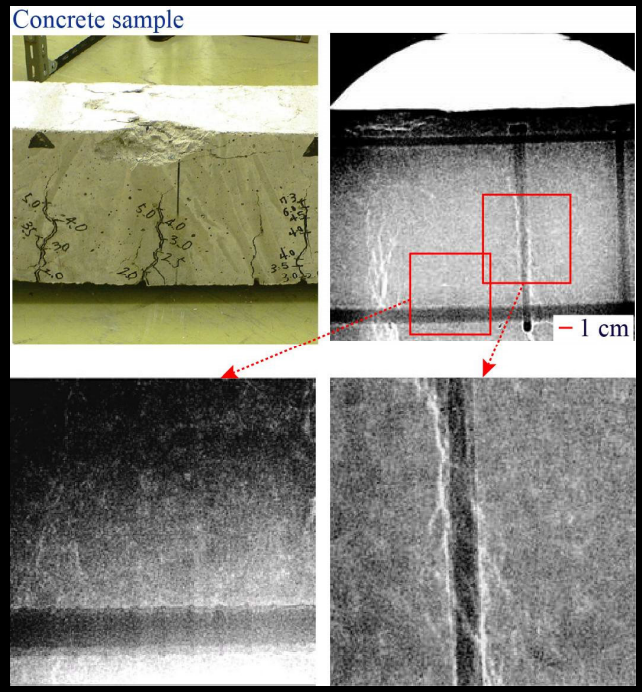


Bones and teeth absorb x-rays. (The light part of an x-ray image indicates a place where the x-ray was absorbed)

Too much exposure
can cause cancer
(lead vest at dentist protects organs from unnecessary exposure)

Used by **engineers** to check for tiny cracks in structures.

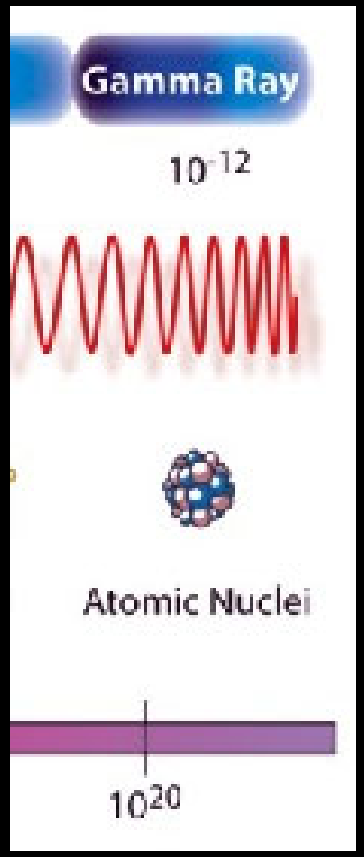
- The rays pass through the cracks and the cracks appear dark on film.



GAMMA RAYS

Shorter wavelength and higher frequency than X-rays

Carry the **greatest amount of energy** and penetrate the most.



Used in **radiation treatment** to kill cancer cells.

Can be very harmful if not used correctly.

The Incredible Hulk was the victim of gamma radiation.

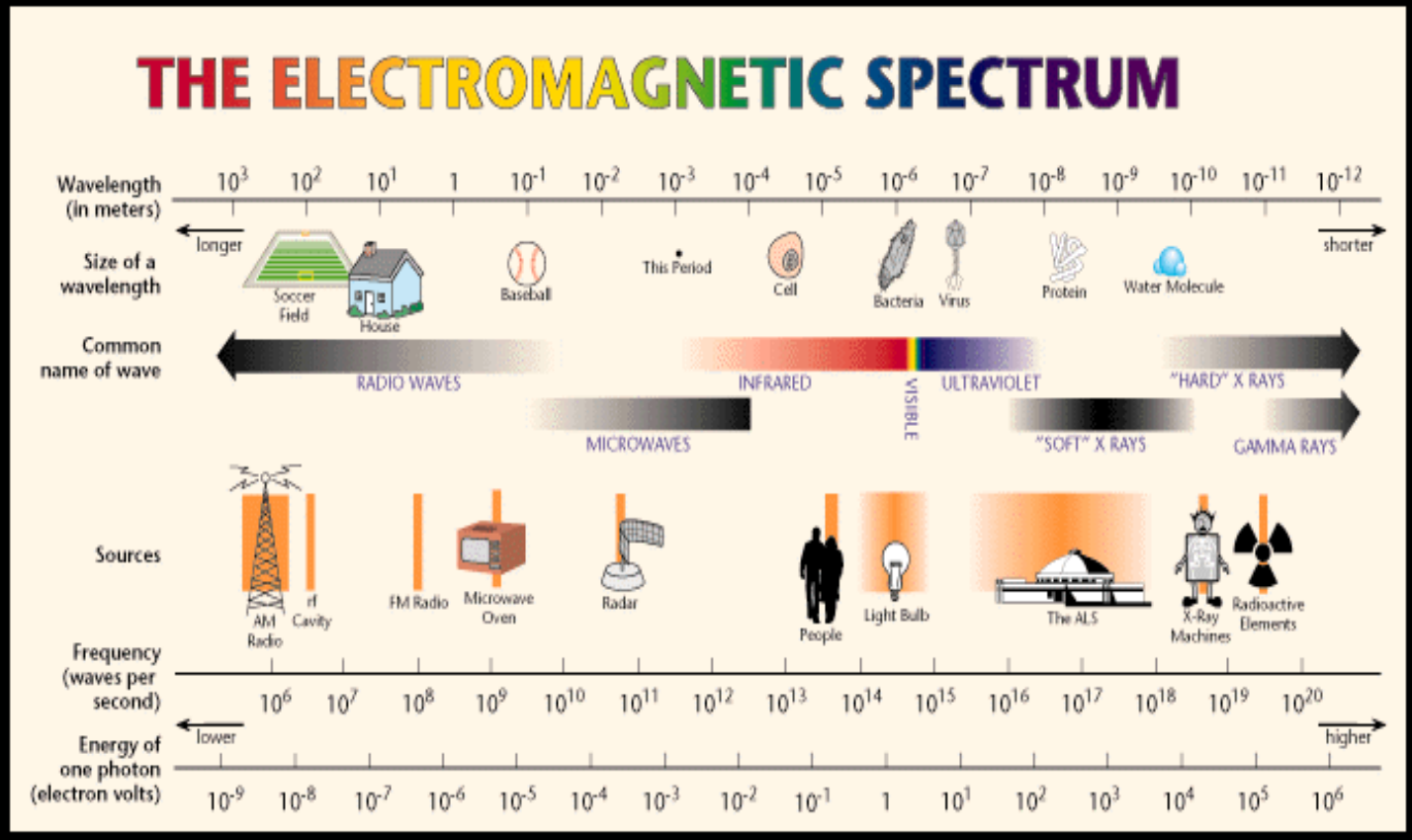
Exploding nuclear weapons emit gamma rays.

Brief SUMMARY

A. **All electromagnetic waves** travel at the same speed. (300,000,000 meters/second) in a vacuum.

B. They all have different **wavelengths** and different **frequencies.**

- Long wavelength-→lowest frequency
- Short wavelength→ highest frequency
- The higher the frequency the **higher the energy.**


THE ELECTROMAGNETIC SPECTRUM
Wavelength (in meters)
10^{3} 10^{2} 10^{1} 1 10^{-1} 10^{-2} 10^{-3} 10^{-4} 10^{-5} 10^{-6} 10^{-7} 10^{-8} 10^{-9} 10^{-10} 10^{-11} 10^{-12}
longer
shorter
Size of a wavelength
Soccer Field
House
Baseball
This Period
Cell
Bacteria
Virus
Protein
Water Molecule
Common name of wave
RADIO WAVES
INFRARED
VISIBLE
ULTRAVIOLET
"HARD" X RAYS
MICROWAVES
"SOFT" X RAYS
GAMMA RAYS
Sources
AM Radio
rf Cavity
FM Radio
Microwave Oven
Radar
People
Light Bulb
The ALS
X-Ray Machines
Radioactive Elements
Frequency (waves per second)
10^{6} 10^{7} 10^{8} 10^{9} 10^{10} 10^{11} 10^{12} 10^{13} 10^{14} 10^{15} 10^{16} 10^{17} 10^{18} 10^{19} 10^{20}
lower
higher
Energy of one photon (electron volts)
10^{-9} 10^{-8} 10^{-7} 10^{-6} 10^{-5} 10^{-4} 10^{-3} 10^{-2} 10^{-1} 1 10^{1} 10^{2} 10^{3} 10^{4} 10^{5} 10^{6}