



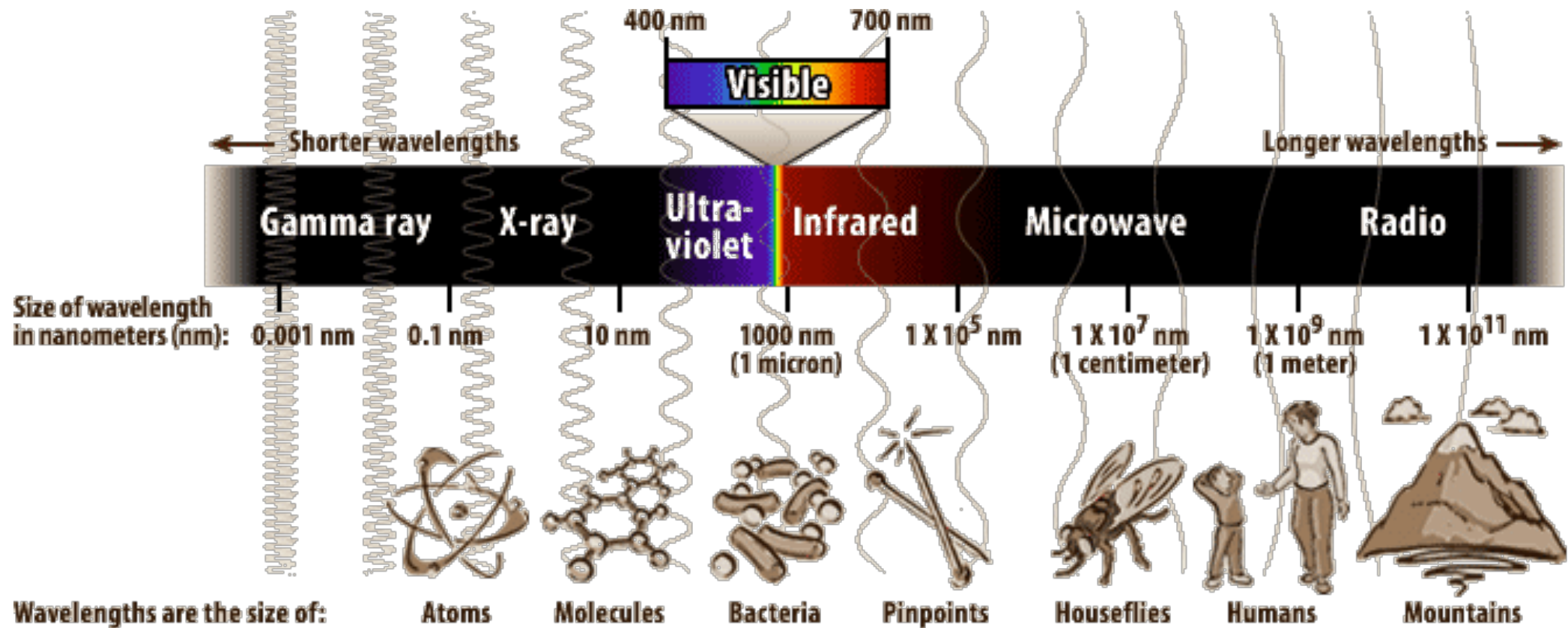
# Light

<https://www.youtube.com/watch?v=9udYi7exojk>

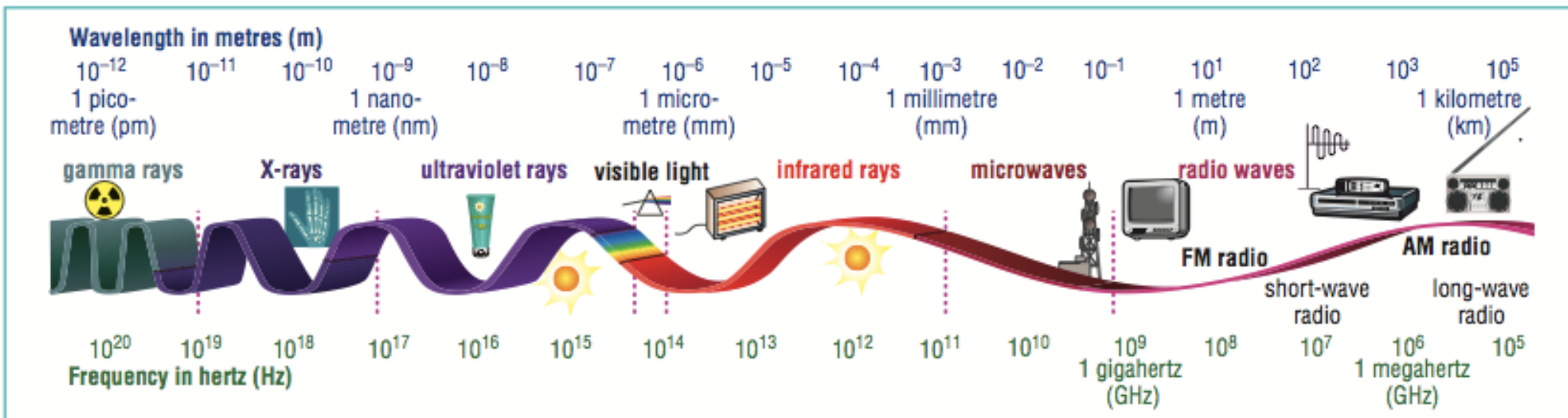
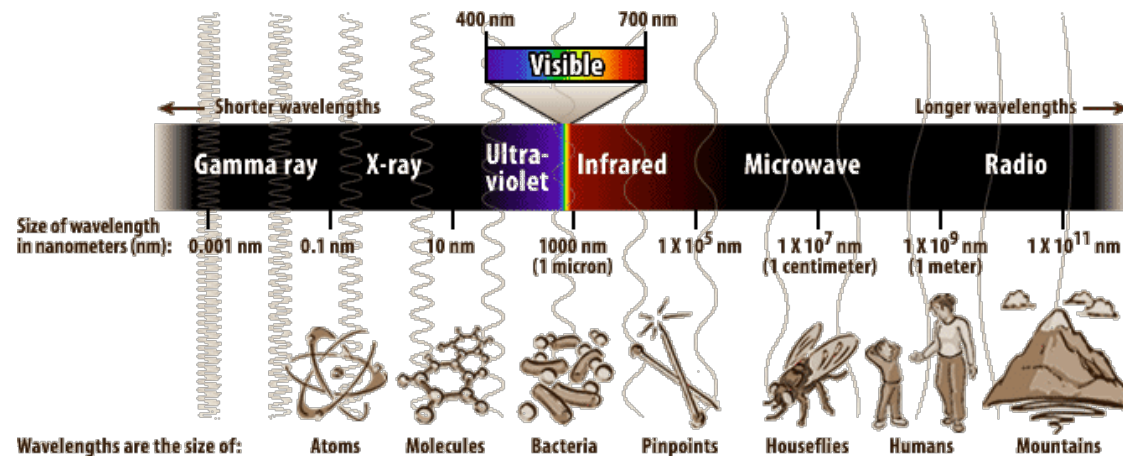


What do X-rays, light, microwaves, radio waves, and infrared have in common?

# Electromagnetic Spectrum



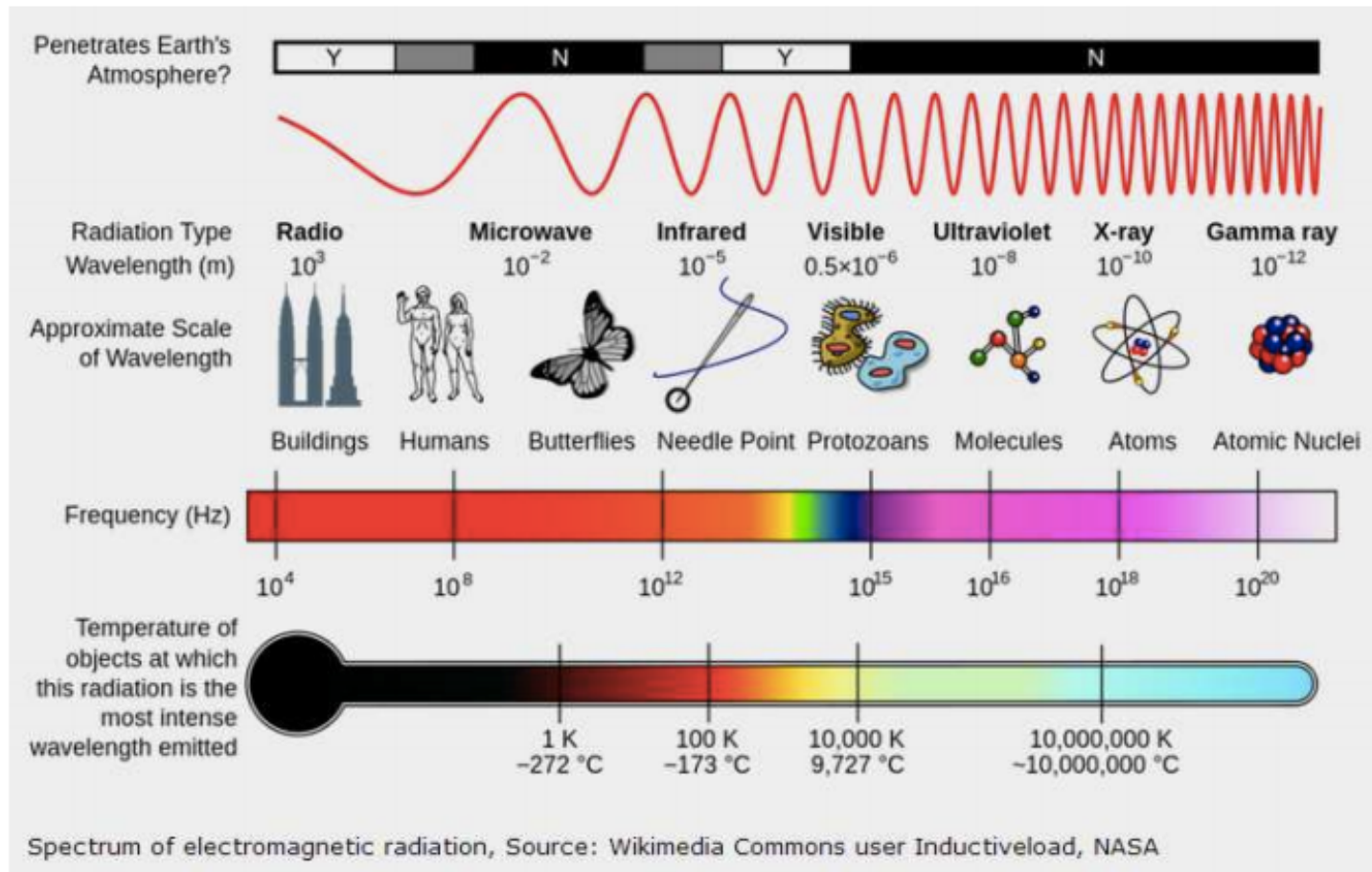
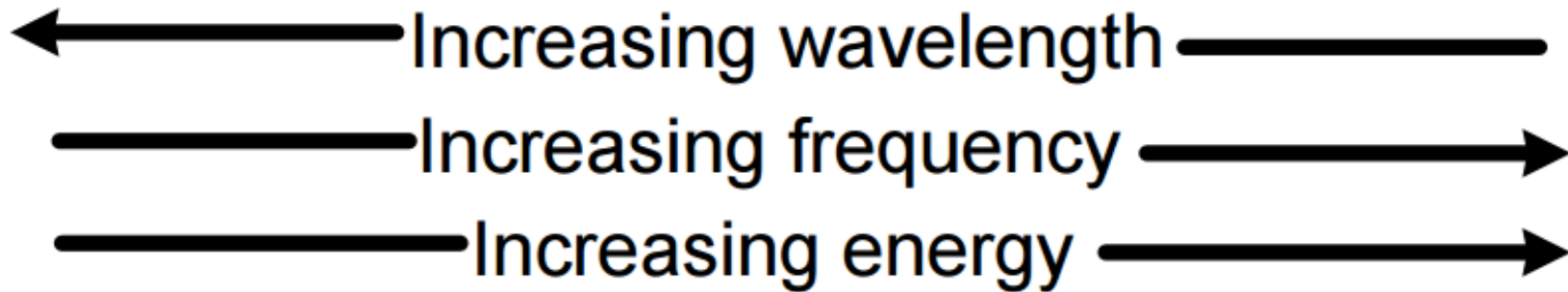
# Electromagnetic Spectrum



**Fig 7.3.8** The electromagnetic spectrum—although wavelengths and frequency vary, speed is the same (300 000 000 metres per second) for all types of electromagnetic waves.

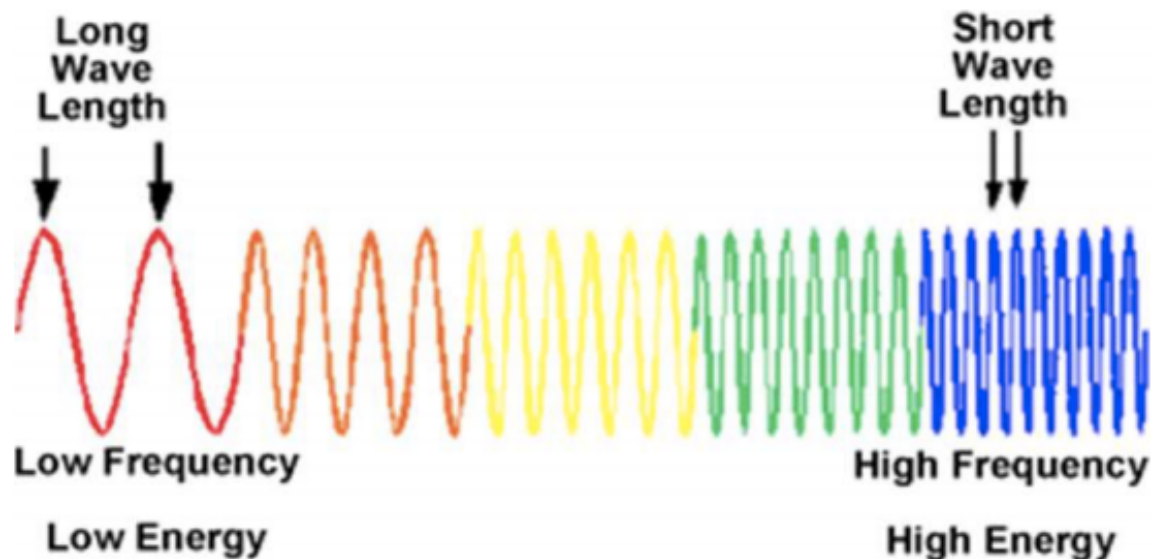
# Energy Differences

The higher the frequency, the higher the energy.



# Wavelengths of Visible Light

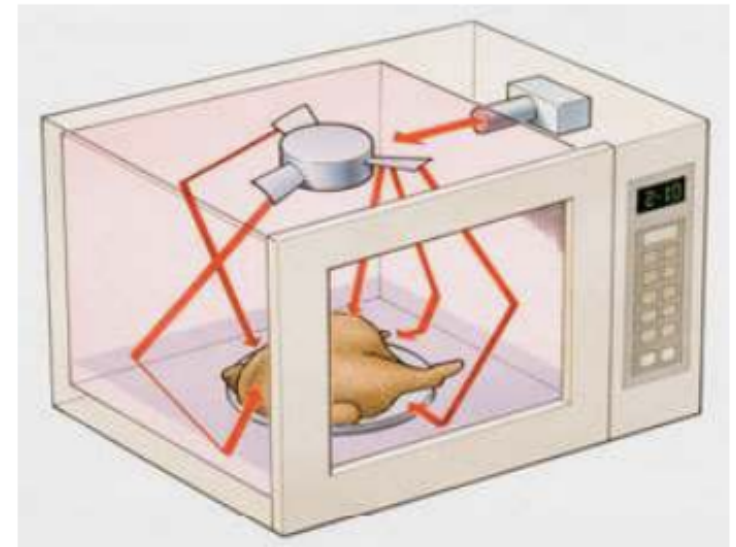
This means that violet light has a frequency almost twice as large as red light, and, therefore, almost twice as much energy.



# Microwaves used in Heating

Microwaves use the energy they carry to heat food. Water and fats inside the food absorb the energy and begin to rotate.

As these molecules spin they transfer the absorbed energy to other parts of the food, causing the food to heat up.



# Microwaves Used In Communications

Due to microwave technology, other devices such as bluetooth and WiFi work at a frequency of around 2.5 GHz.

Next time you post an image, be sure to thank microwaves for making Instagram possible!





# Electromagnetic Radiation

Radiation can be described as the movement of energy through space.

There are many different sources of radiation that vary by intensity.

The Sun, light bulbs, nuclear reactions, and radon gas, are all sources that produce electromagnetic radiation.

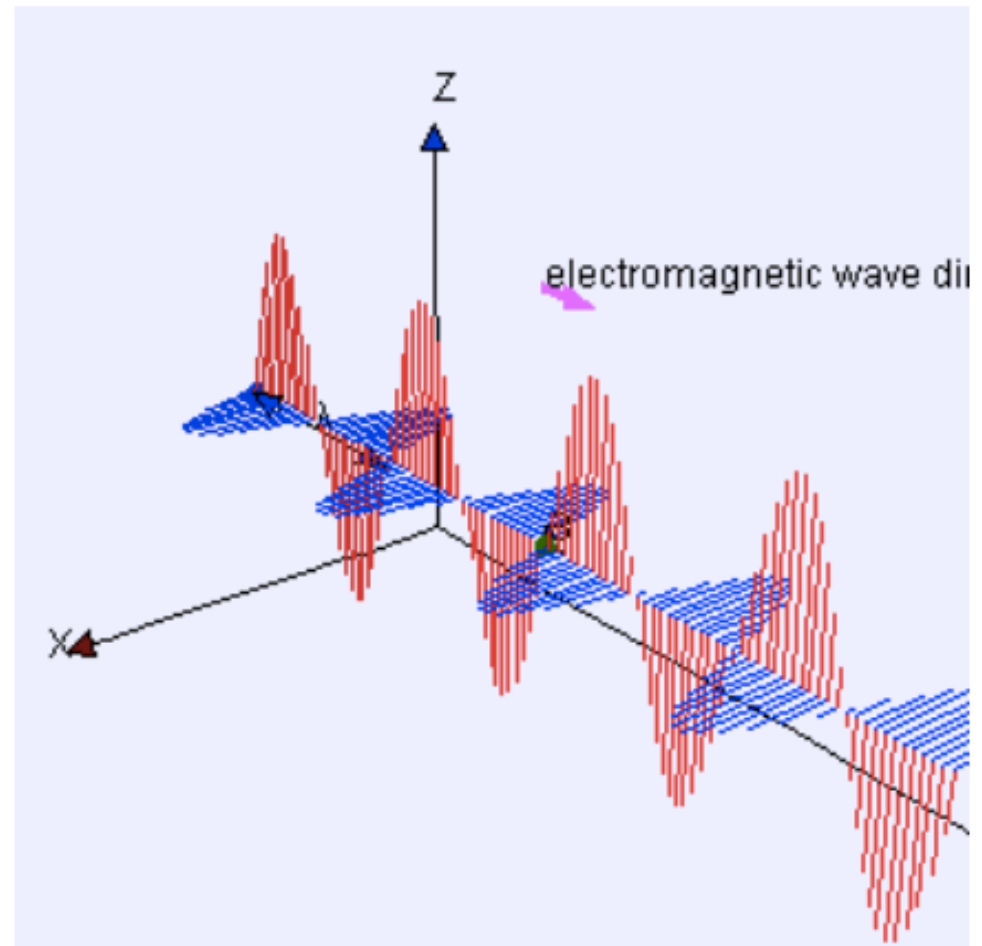


We are constantly bombarded by electromagnetic radiation, most of which we cannot see.

# Electromagnetic Radiation

One way electromagnetic radiation travels through space is as a wave.

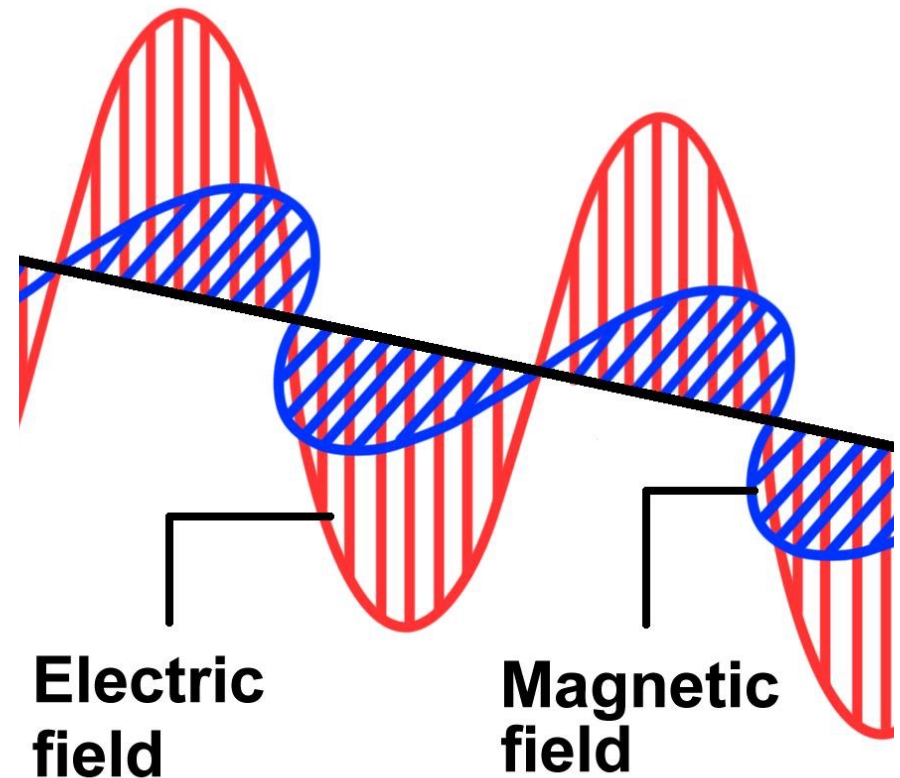
Electromagnetic waves are different from mechanical waves because they don't need a medium to travel through.



What's "waving" in an electromagnetic wave?

# Electromagnetic Waves

- Electromagnetic waves are produced by vibrating electric charges.
- When an electric charge vibrates, its electric field changes, producing a changing magnetic field.
- The changing magnetic field produces a changing electric field.
- The changing electric field produces a changing magnetic field.
- Creates a transverse wave



# How Electromagnetic Waves Travel

- Electromagnetic waves do not need a medium to travel through.
- These waves can travel through empty space as well as through mediums like air or water!
- Electromagnetic waves also do not lose energy as they travel.
- Goes straight and spreads out until it hits matter = change in direction

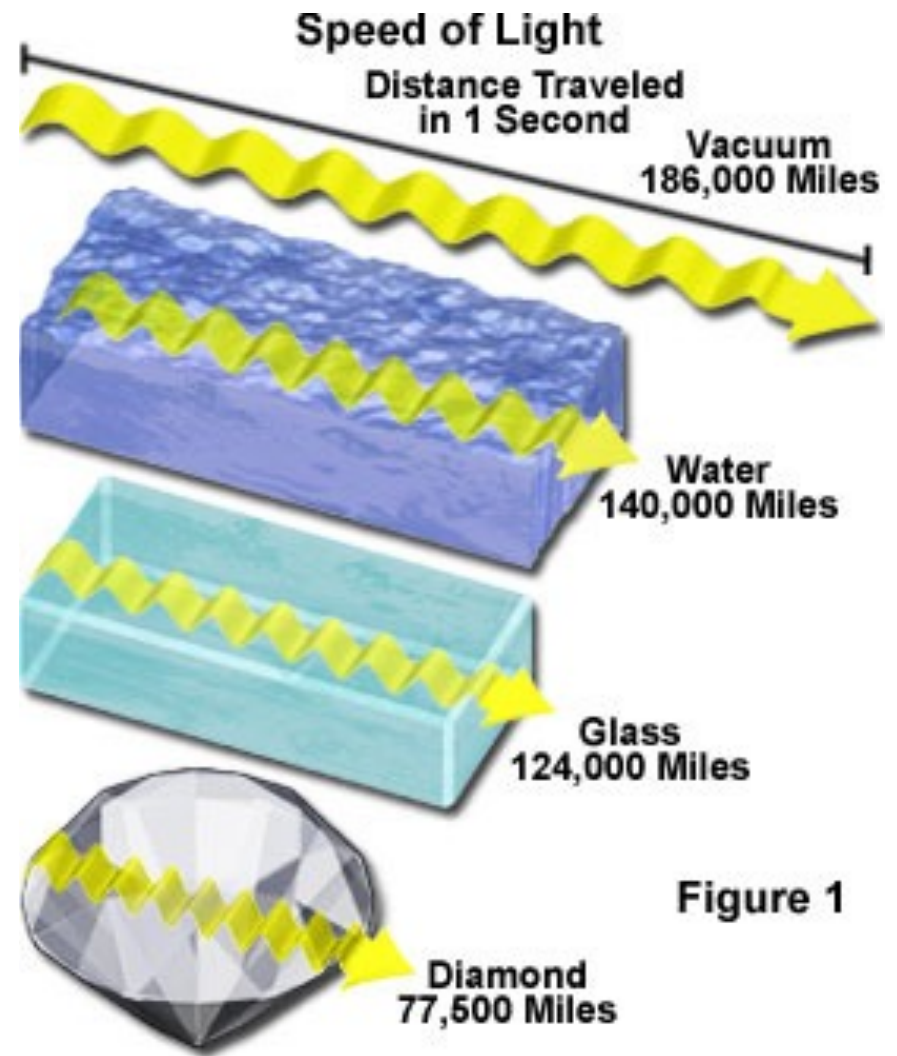


Figure 1

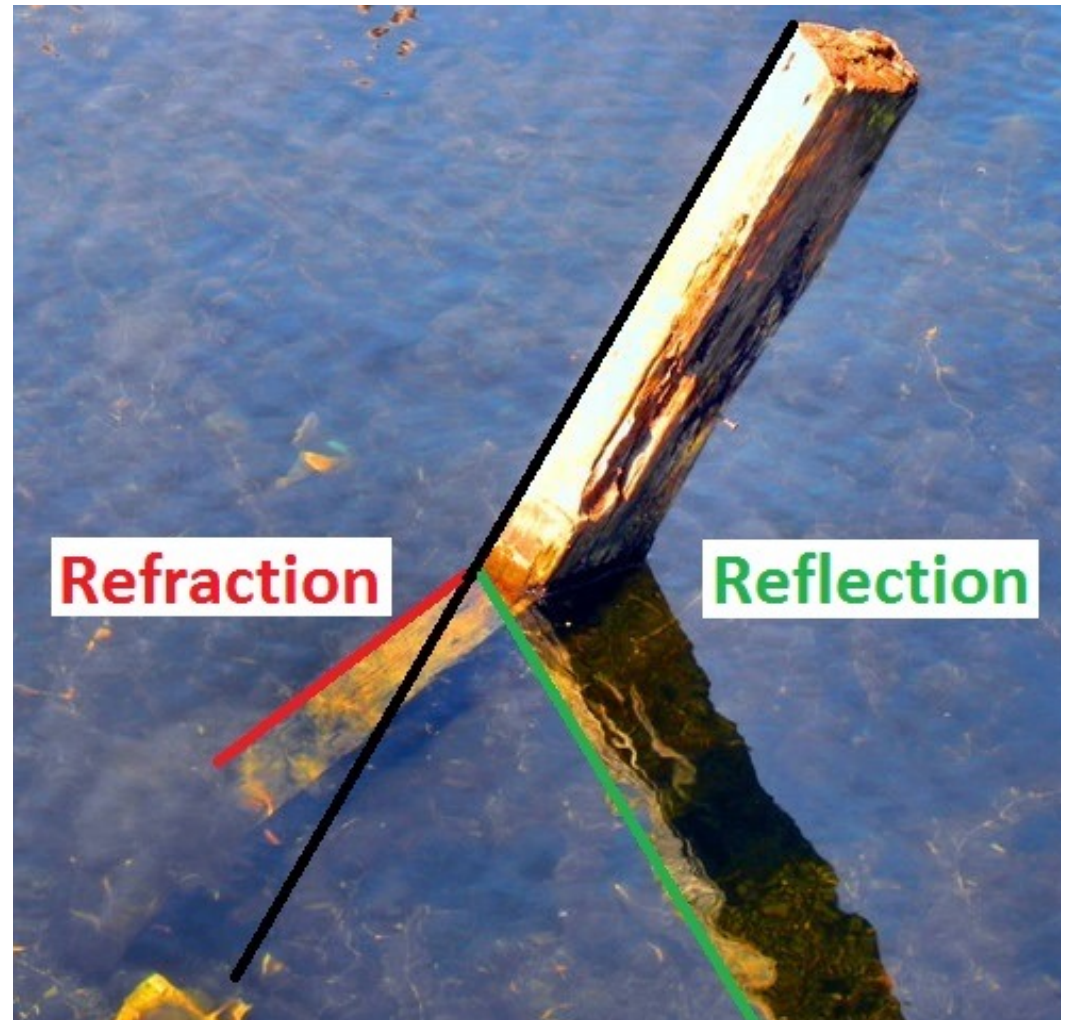
*1,079,252,849 km/h*

*670,616,629 mph*

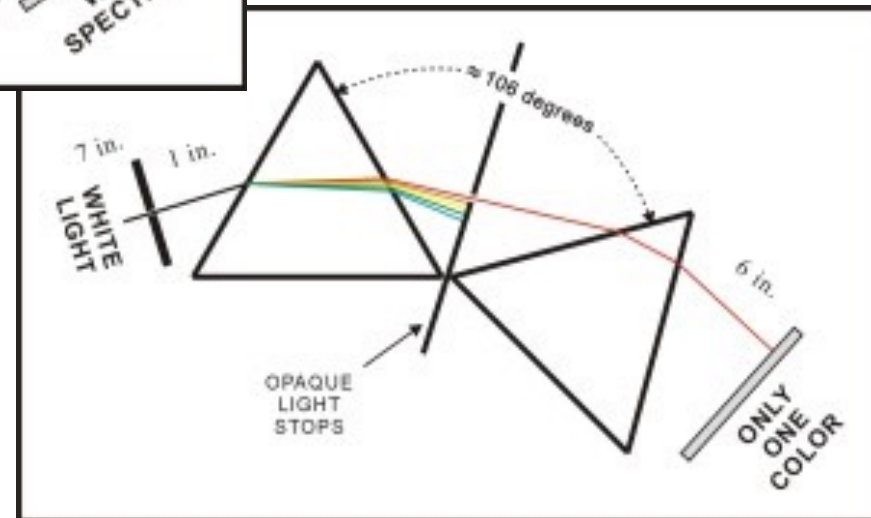
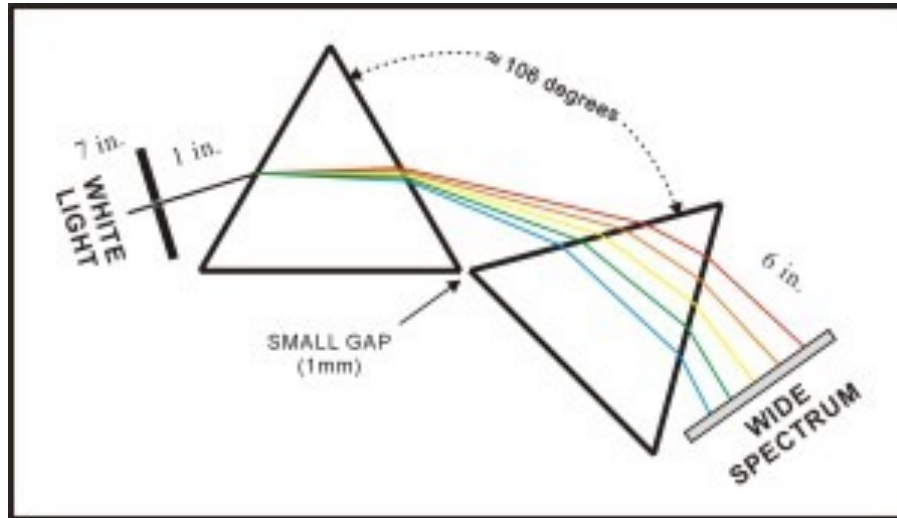
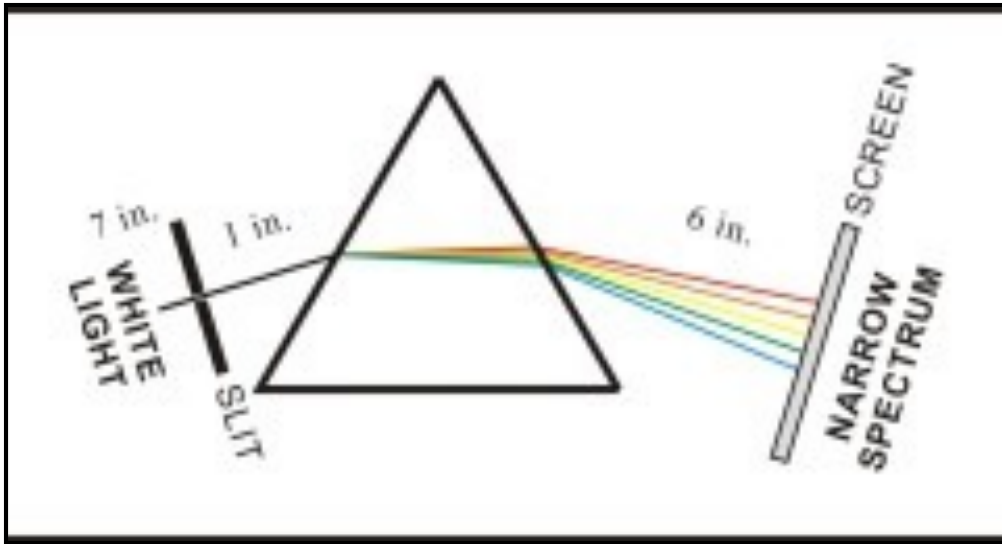
If you could travel at the speed of light, you could  
go around Earth's  
equator 7.5 times in one second.

# What changes the direction of a wave?

- Reflection
  - the bouncing back of a wave from a surface
- Refraction
  - the bending of waves due to change in speed



# Prisms



<https://njctl.org/video/?v=dH1YH0zEAik>