Tuesday
December 13,2016

Note – Project – The review packet should be completed and turned in on 11/28 (Your final project grade, essential to pass this class)

GPS -

SPS9. Obtain, evaluate, and communicate information to explain the properties of waves. .

d. Analyze and interpret data to explain how different media affect the speed of sound and light waves

Catalyst: Given, Un Known , equation &Solution must be shown.

Define and describe the difference between transverse and longitudinal waves?

Learning targets,

I can **explain the dual nature of light**
I can **relate energy and frequency**
I can **compare different electromagnetic radiations**
I can **differentiate the various forms of energy**
I can **relate energy and work**
I can **relate determine the heat capacity of a substance**
I can **explain the difference in mass and weight**

And answer a question like this:

Topic: Electricity

Essential Question:

How is mechanical waves different from electro magnetic waves?

Identify the different types of energy transformation in each cases
a)Windmill b) Flash light 3)microwave

Agenda -

Milestones Domain/Weight: Atomic and Nuclear Theory and the Periodic Table 25%

Catalyst	10 min
Intro-reading a solubility chart	30 min
Tasty solution - Lab	30 min.
Video - conclusion	10min

Nature of Light

Unit 5 cont.

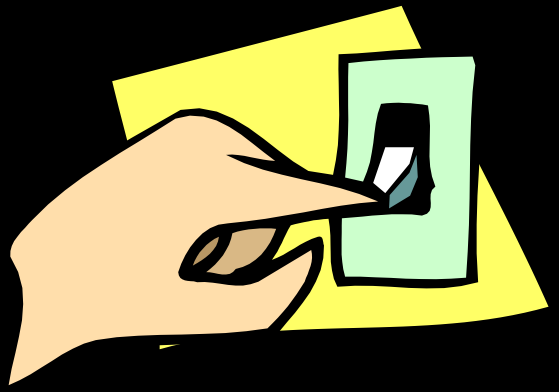
Dual Nature of light

- Light can be modeled as a stream of particles.
- The particles of light are called photons.
- Light can also behave as a wave.
- The best explanation of light is that it is particles that travel in waves.

Energy - frequency

- Light is a form of energy (photons – energy particles)
- Energy is directly proportional to the frequency of light.

Speed of Light



- All electromagnetic waves in empty space travel at the same speed.
- The speed of light is 3×10^8 m/s
  - 300,000,000 m/s
  - or 186,000 miles per second
- The speed of light is constant.
- Light is the fastest signal in the universe

- Light travels slower in a medium than in vacuum.
- Light (electromagnetic radiation) travels FASTEST in space
- Light travels slower in liquid than in air

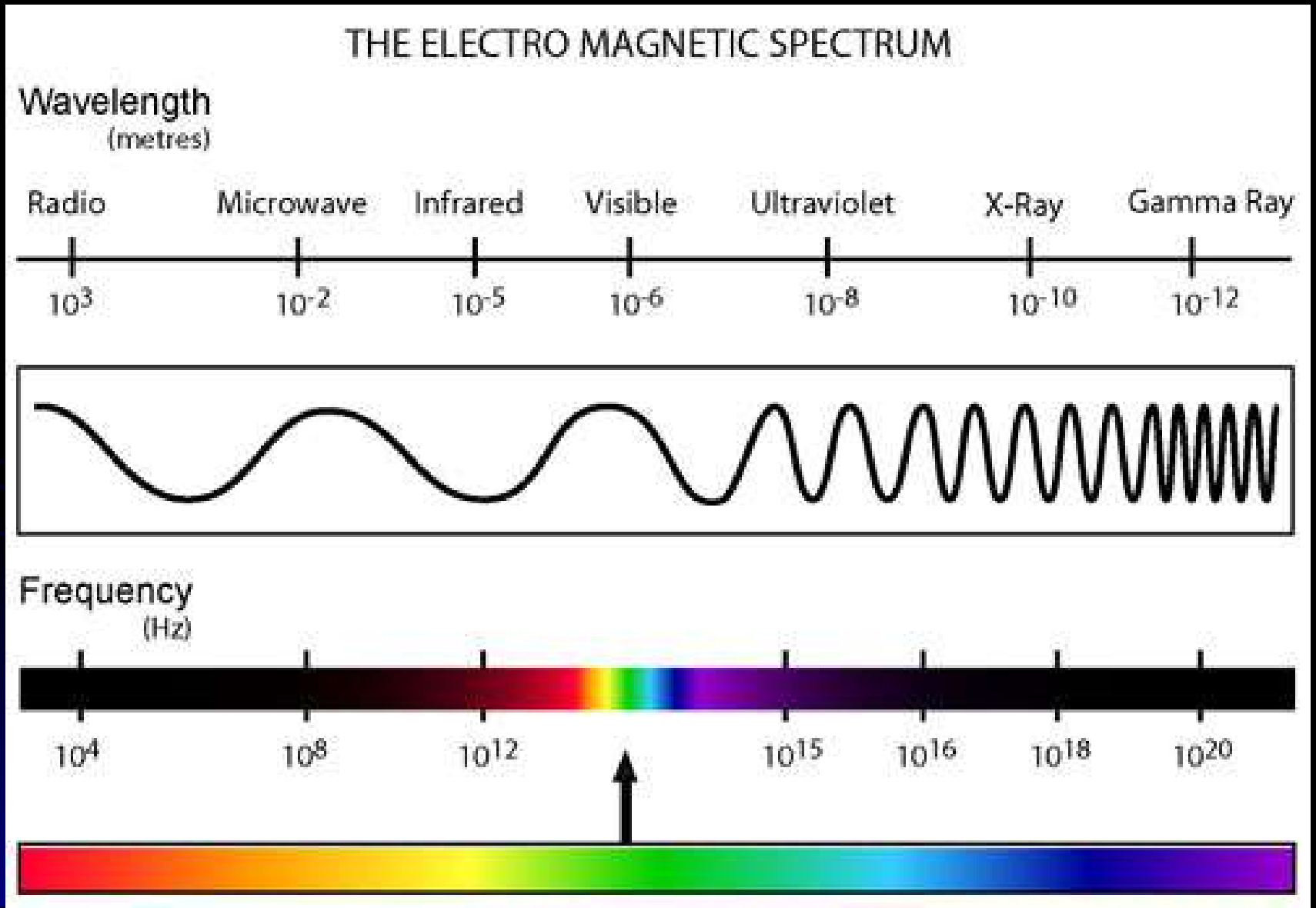
Brightness - Intensity

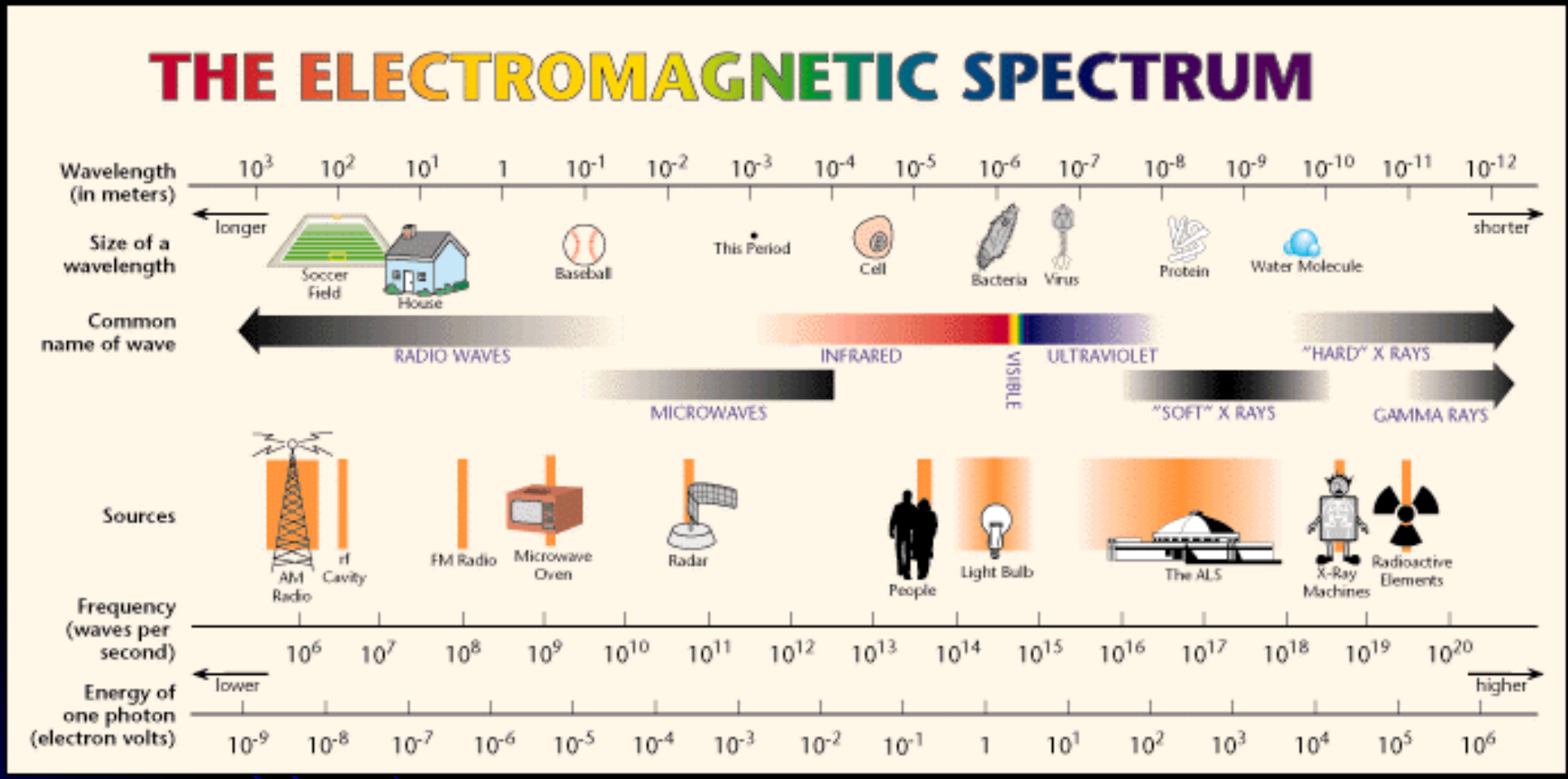
- Intensity depends on the # of photons or waves of light that pass certain area of space.
- The greater the distance from the source the dimmer the light.

THE ELECTROMAGNETIC SPECTRUM

- Human Visible Range: 400 nm (violet) – 700 nm (red).
- The electromagnetic spectrum consists of light at all possible energies, frequencies, wave lengths, properties.

E M Spectrum contd..





- The full range of light

EM spectrum in order

Radio Waves

Microwaves

Infrared

Visible light

Ultraviolet rays (UV)

X-Rays

Gamma Rays

R M I V U X G

Rabbits mate in very unusual x-citing gardens

Pneumonic

- To remember the EM spectrum in order just think
- Rabbits Mate In Very Unusual Xciting Gardens
- Radio Waves, Microwaves, Infrared Rays, Visible Light (ROYGBIV), Ultraviolet Rays, X-rays, Gamma Rays.
- That is in order from highest wavelength, lowest frequency
- And low energy and shortest wavelength to high frequency and high energy.

Radio waves

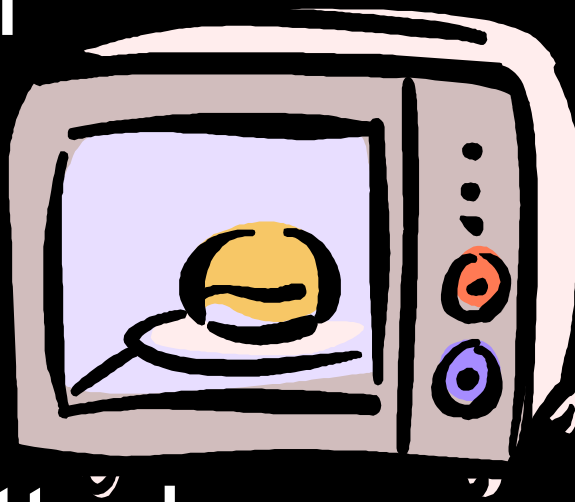
- Have the lowest frequency and the longest wavelength
- Includes TV signals, AM FM signals and other radio waves.

AM =
amplitude modulation
FM =
frequency modulation

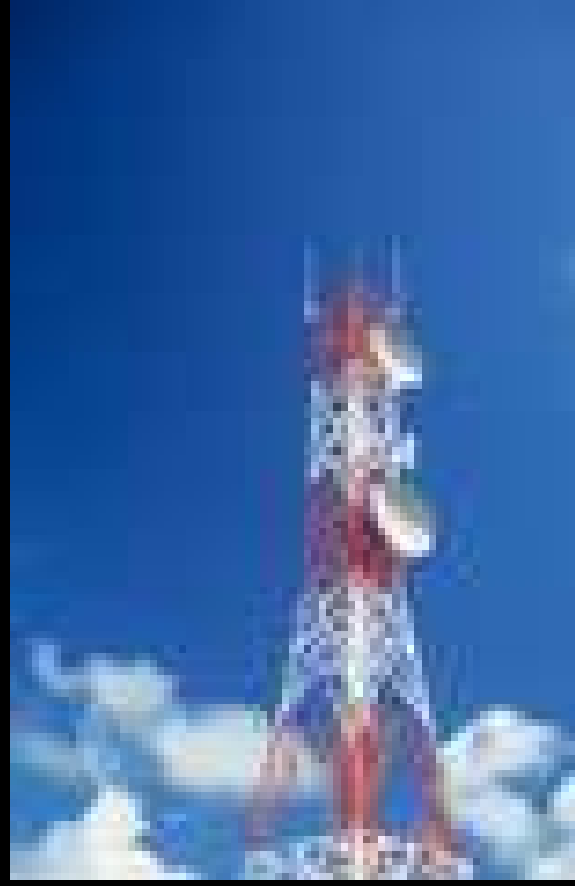
- RADAR – used by air traffic control towers at airports to determine the locations of aircrafts
- RADAR is also used by the police to monitor the speed of vehicles.
- Radar guns fire the signal with a frequency which is reflected back and the computer chip converts the difference in frequency into speed.

Microwaves

- Shorter wavelengths and higher frequencies than radio waves – used in cooking.
- They are reflected by metals and are transmitted through air, glass, paper, plastic – water ,fats and sugar absorb microwaves.



- Also used to carry telecommunication signals.

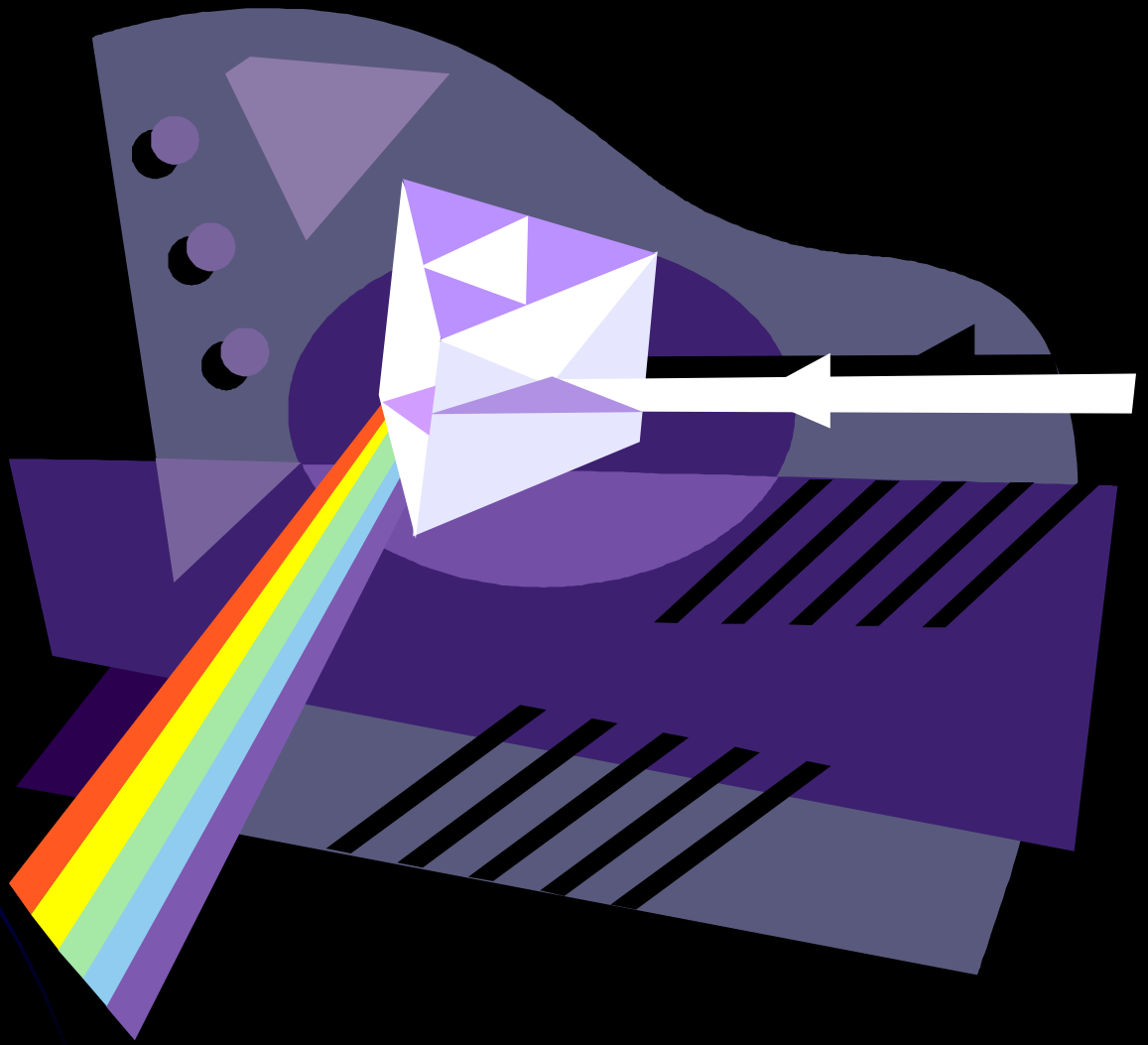


Infrared Light

- Shorter wavelengths and higher frequencies than microwaves – it can be felt as warmth.
- IR from sun or heat lamp warms our body, food without heating continuously (reddish lamps)

Visible Light

- ROY G BIV
  - Red
  - Orange
  - Yellow
  - Green
  - Blue
  - Indigo
  - Violet



Ultraviolet light

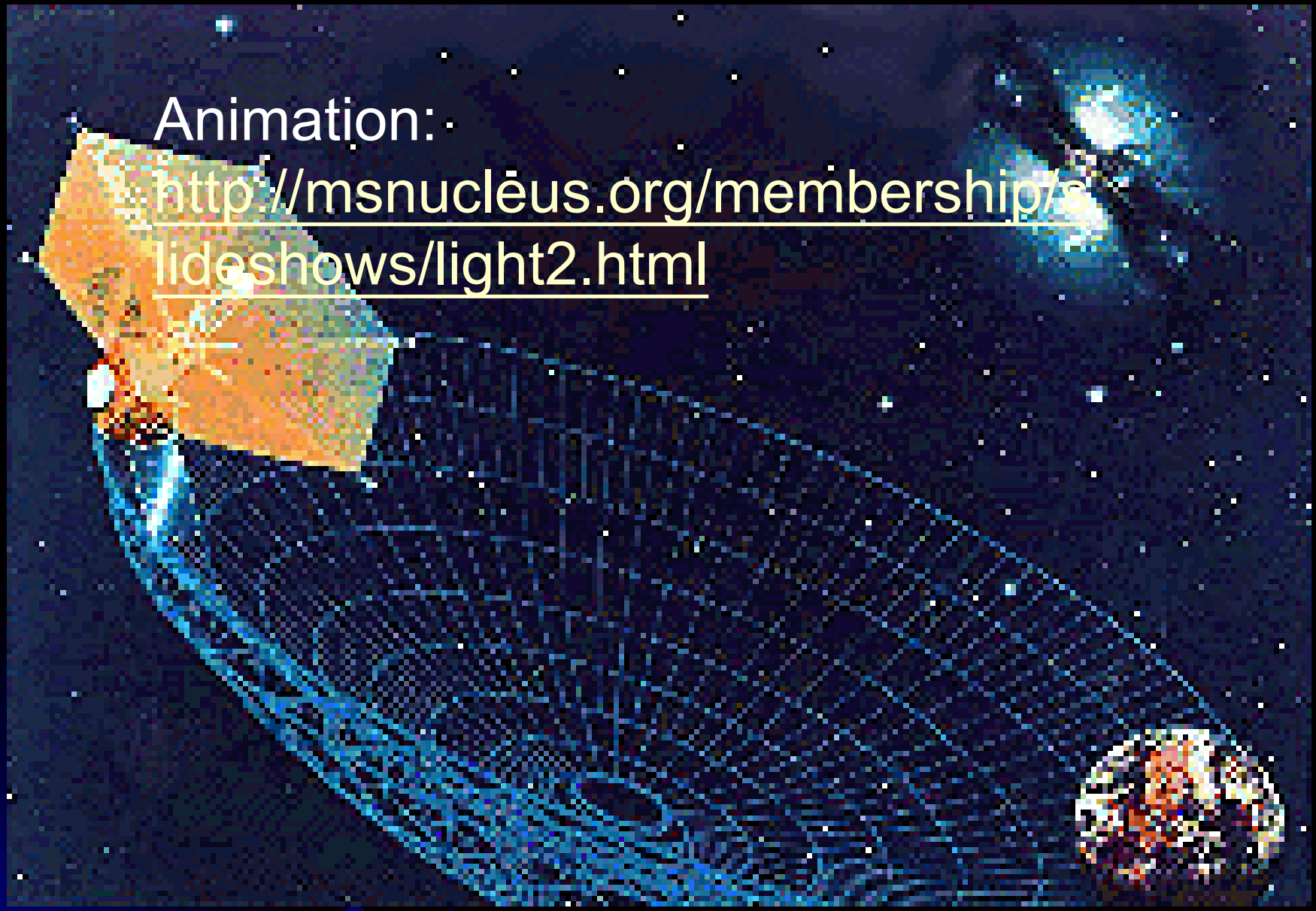
- Invisible light beyond violet
- Sun emits 9 % of UV rays
- May cause sun burns due to high energies.

X rays

- Beyond UV rays are X **rays** used to make body images. They pass through soft tissue but some are absorbed by the bones and tissues.
- The rays which pass through, form an image on the photographic plate.

Gamma Rays

- Beyond x-rays – highest energy waves.
- Both X and gamma rays may be dangerous as they can kill the living cells due to their high energies.
- However gamma rays may be used to treat cancer by killing the diseased cells


Animation:
http://msnucleus.org/membership/slideshows/light2.html

Review Questions????

1) Which of the waves in the electromagnetic spectrum has the greatest energy?
2) Which wave is used in the kitchen for cooking?
3) What is the expanded form of RADAR?
4) Which of the waves have the highest wavelength?

5) Which wave has the greatest frequency?

6) How are sun burns caused in human beings? Which waves are responsible for it?

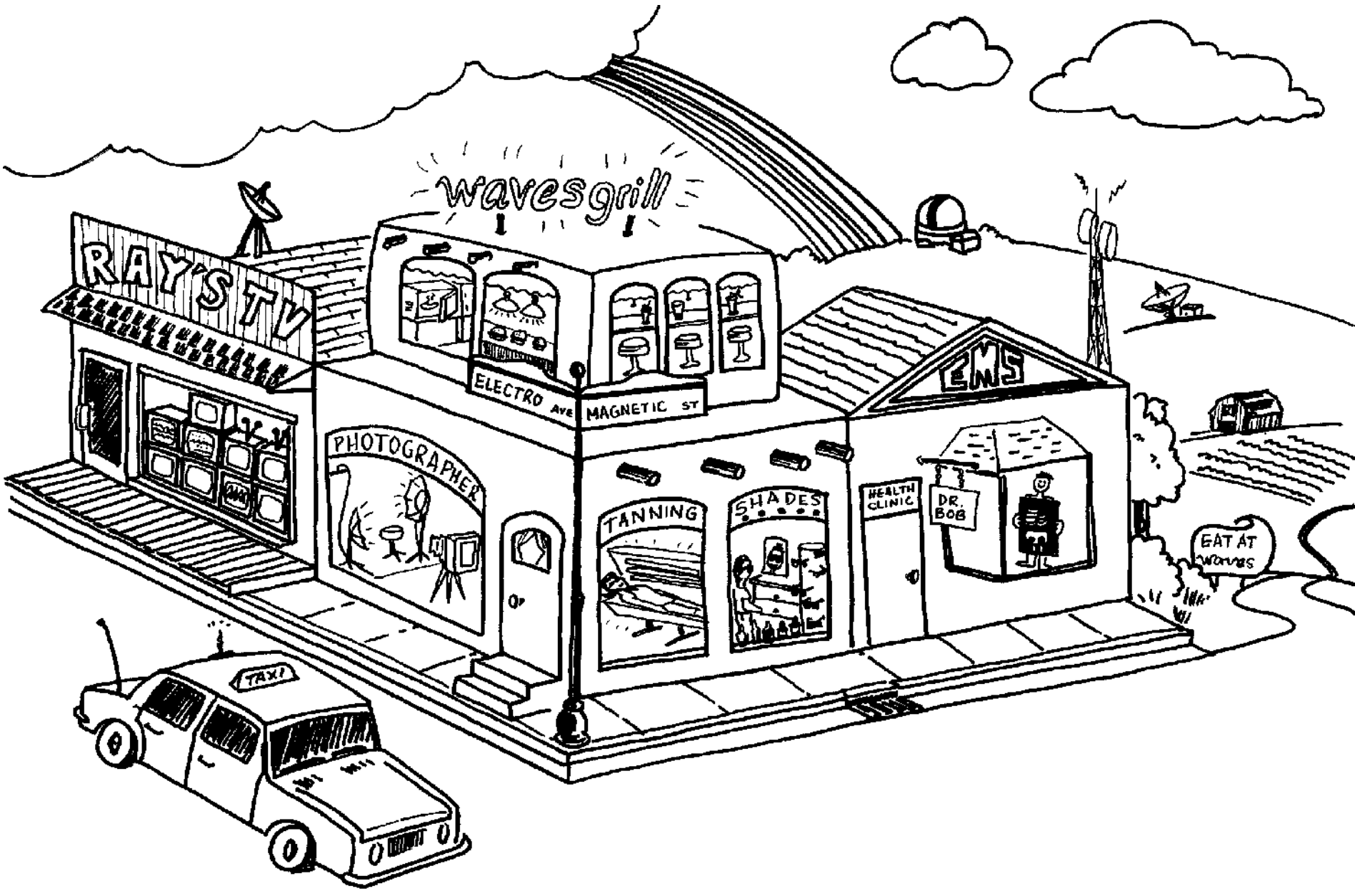
7) What part of the electromagnetic spectrum may be used to kill the cancer cells?

8) What is the use of the infrared waves?

Answers:

1) Gamma rays
2) Micro waves
3) RAdio Detection And Ranging
4) Radio waves
5) Gamma rays
6) UV rays from the sun
7) Gamma rays
8) Used for warmth ex: keeping food warm

Wavestown


wavesgrill
RAY'S TV
ELECTRO Ave
MAGNETIC ST
EMS
PHOTOGRAPHER
TANNING
SHADES
HEALTH CLINIC
DR. BOB
EAT AT
TAXI