**What are ElectroManetic Waves?**

 1) How are they produced?

 a) \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ fields are constantly changing

 b) EM waves are produced when electric charges vibrate or \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 2) How they travel

a) Since electric and magnetic fields are constantly changing, they \_\_\_\_\_\_\_\_\_\_\_\_ each other

b) EM waves can travel through a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (empty space) as well as through

matter

**Wavelength and Frequency:**

* Short wavelength -->
	+ high frequency
	+ high \_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Long wavelength -->
* small \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* low energy

**Radio Waves**

 -\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ wavelength

 -Lowest Frequency

 1) Radio waves are used in radio & TV technologies, as well as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 a) Radio

 1) Amplitude modulation (AM)

 2) Frequency modulation (FM)

 b) Radar

 1) Send out short bursts of radio waves that \_\_\_\_\_\_\_\_\_\_ off objects & return to

receiver



**Check for Understanding: (Use the pictures in the Power Point to review the following answers.)**

Which has the longest wavelength: Radio Waves

Rank the following in order of increasing frequency:

Radio, microwaves, infared, red light, blue light, Uv light, x rays

**Waves:**

* Waves have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Use the Greek letter “nu”, n, for frequency, and units are “cycles per sec”
* All radiation: l • n = c
* c = velocity of light = 3.00 x 108 m/sec
* Long wavelength --> small \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ wavelength --> high frequency

**Visible Light**

* Each wavelength corresponds to a specific frequency
* Color **determined by\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Check for understanding:**

Short Wavelength light has: high frequency and high energy.

**Gamma Rays**

 -Shortest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 -Highest frequency

 - Gamma rays are used in the medical field to kill \_\_\_\_\_\_ cells and to make pictures of the brain

& in industrial situations as an inspection tool.

**Where does light come from?**

* Excited solids emit a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_spectrum of light
* Excited gas-phase atoms emit only specific \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of light (“lines”)

***Absorption of Light***

1. Atoms can also\_\_\_\_\_\_\_\_\_\_ light shined on them.
2. Any light not absorbed by the atoms in an object is scattered (reflected) back.
3. If only some colors are absorbed, the rest are scattered back.
4. We see the colors scattered back.
5. White objects don’t absorb any light, all colors \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. Black objects absorb most colors, little light reflected.
7. Transparent objects let most light pass through without being absorbed or scattered.

**Bohr Model of Hydrogen Atoms:**

* Light absorbed or emitted is from electrons moving \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy levels
* Only *certain* energies are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* *Therefore*, only certain energy levels exist
	+ This is the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of energy levels

***Atomic Emission Spectra***

1. Each element emits (gives off) its own, individual set of colors when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. This is called its *atomic emission spectrum*.
3. The colors show up as a series of *lines* when viewed through a prism.
4. Like a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for that element.
5. Used in astronomy to determine the composition of stars.
6. Around 60 elements have been identified in our sun.

**Gaseous Atoms:**

* Excited atoms emit \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of only certain wavelengths
* The wavelengths of emitted light depend on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

