# Chapter 18 – The Electromagnetic Spectrum and Light

**Section 18.1 – Electromagnetic Waves**

- _____ are _____ waves consisting of changing _____ and changing _____.
- An _____ in a region of space exerts electric forces on _____.
- A _____- in a region of space produces magnetic forces.
- Electromagnetic waves are produced when an _____.
- This is a _____ wave because the particles are vibrating to the direction of the _____.
- _____ can travel through a _____, as well as through matter.
- The _____ by electromagnetic waves traveling through matter or across space is called _____.
- The _____ in a vacuum is _____.
- In a _____, all electromagnetic waves travel at the same _____.
- Electromagnetic waves vary in _____.
- Formula for speed of a wave –

For electromagnetic waves, v is always the speed of light which is represented by a c.

c =

λ =

υ =

- A radio station broadcasts a radio wave with a wavelength of 3.0m. What is the frequency of the wave?
- The radio waves of a particular AM radio station vibrate 680,000 times per second. What is the wavelength of the wave?
- A global positioning satellite transmits a radio wave with a wavelength of 19cm. What is the frequency of the radio wave?

- _____ behaves sometimes like a _____ and sometimes like a _____.
- Evidence for a _____ includes the fact that light can produce _____.
- Evidence for a _____ includes the fact that light causes the _____.
- The emission of _____ from a _____ caused by light striking the metal is called the _____.
- In 1905, _____ proposed that light, and all electromagnetic radiation, consists of _____.
- Each _____ is proportional to the _____ of the light.
- _____ travel outward from a light source in all _____.
- The _____ of light _____ as photons travel from the source.

**Section 18.1 Assessment**

- How fast does light travel in a vacuum?
- What makes electromagnetic waves different from one another?
- What happens to the intensity of light as photons move away from the light source?
- What is the wavelength of an AM radio wave in a vacuum if its frequency is 810 kHz?

**Section 18.2 – The Electromagnetic Spectrum**

- A scientist observed that when light is passed through a _____ the temperature of the light is _____ at the blue end and _____ toward the red end.
- He also concluded that there was _____ beyond the visible spectrum.
- The full range of frequencies of electromagnetic radiation is called the _____.
- The electromagnetic spectrum includes _____ _____.
- _____ are used in radio and television technologies, as well as in _____.
- In _____ radio, the stations have signals with varying _____.
- In _____ radio, the stations have signals with varying _____.
- The _____ radio waves are called _____.
- Microwaves also carry _____ conversations.
- _____ are used as a source of _____ and to discover areas of heat differences.
- _____ are color-coded pictures that show variations in _____.
- _____ has higher frequencies than _____ light.
- Ultraviolet rays have _____ in health and medicine, and in agriculture.
- _____ have high energy and can penetrate matter that cannot.
- X-rays are used in _____, industry, and transportation to make of the inside of solid objects.
- _____ have the _____ wavelengths in the electromagnetic spectrum, about 0.005nm or less.
- Gamma rays are used in the medical field to kill _____ and make pictures of the _____, and in industrial situations as an inspection tool.
- This is an acronym that you can use to remember the order of low to high (or high to low _____).

**R**adio
**M**icrowave
**I**nfrared
**V**isible
**U**ltraviolet
**X**-Rays
**G**amma

**Section 18.2 Assessment**

- List the kinds of waves included in the electromagnetic spectrum, from longest to shortest wavelength.
- How are AM radio waves different from FM radio waves?
- What type of electromagnetic waves are microwaves?

**Section 18.3 – Behavior of Light**

- Materials can be _____.
- A _____ material transmits light, which means it allows most of the light that strikes to _____.
- A _____ material _____ light.

- An _____ material either _____ all of the light that strikes it.
- When light strikes a new medium, the light can be _____.
- When light is transmitted, it can be _____.
- An _____ is a copy of an object formed by _____ waves of light.
- _____ occurs when parallel light waves strike a surface and reflect all in the _____.
- _____ occurs when parallel light waves strike a rough surface, and reflect in _____.
- A _____ is a false or _____ image.
- Light with waves that vibrate in only _____ is _____.
- _____ means that light is _____ as it passes through a _____.
- Objects appear certain _____ because of the light waves that they _____.
- A _____ object _____ red light and _____ all other colors.
- A _____ object reflects _____ colors of light and absorbs _____.
- A _____ object _____ all colors of light and _____ none.

**Section 18.3 Assessment**

- Explain the differences among opaque, transparent, and translucent materials.

- List and explain three things that can happen to a light wave when it enters a new medium.

- What is the difference between diffuse reflection and regular reflection?

- What colors of light does a blue object reflect? What colors does it absorb?