Conceptual Physics: Lab 20.0

Electromagnetic Spectrum

Name _____ Hour _____

Lab Partners _____

Purpose:

Identify relative wavelengths of different ranges within the electromagnetic spectrum.
Identify a variety of applications and sources of different types of electromagnetic waves.

Preparation:

Open the video The Electromagnetic Spectrum.

Procedures: Radio Waves. Watch the "*Radio Waves*" segment of The Electromagnetic Spectrum and answer the following questions:

1. What is the range of size of radio waves?

Largest Size: _____ Smallest Size: _____

2. Can you hear a radio wave? Explain how a radio receives a signal and turns it into sound.

3. What is needed in order to detect radio waves from space?

4. What things in outer space have been discovered as a result of radio waves?

5. Name two common objects that would use radio waves?

6. Do radio waves have short or long wavelengths?

7. Do a **Google search** for "FM radio frequency" and a search for "AM radio frequency". Record the lowest and highest frequency station for each band below. (Be sure to include the appropriate label!)

   AM Lowest Frequency: _____ AM Highest Frequency: _____

   FM Lowest Frequency: _____ FM Highest Frequency: _____

Procedures: Microwaves. Watch the "*Microwaves*" segment of The Electromagnetic Spectrum and answer the following questions:

1. What is the range of size of microwaves?

Largest Size: _____ Smallest Size: _____

2. How are microwaves used to predict the weather?

3. What other uses are there for microwaves in surveying the surface of the earth?

4. How are microwaves used in your car?

5. Do a **Google search** for "microwave oven wavelength". What is this wavelength? Why would we want to cook our food with a microwave instead of a radio wave?

Procedures: Infrared Waves. Watch the "*Infrared Waves*" segment of The Electromagnetic Spectrum and answer the following questions:

1. What is the range of size of infrared waves?

Largest Size: _____ Smallest Size: _____

2. What common household object uses an infrared wave?

3. Do you give off infrared waves? Explain.

4. Have you ever seen an infrared wave? What is needed in order to see an infrared wave?

Procedures: Visible Waves. Watch the "*Visible Waves*" segment of The Electromagnetic Spectrum and answer the following questions:

1. What is the range of size of visible waves? What colors of light are associated with these?

Largest Size: _____ Smallest Size: _____

Color of Largest wavelength: _____ Color of Smallest wavelength: _____

2. How do scientists figure out what types of gases make up the atmosphere of a planet?

3. What elements are present in the earth's atmosphere to make it look blue?

4. When objects burn hotter, what happens to the wavelength of the light they give off?

5. Which is burning hotter, a gas glowing blue or a gas glowing red?

Procedures: Ultraviolet Waves. Watch the "*Ultraviolet Waves*" segment of The Electromagnetic Spectrum and answer the following questions:

1. What is the range of size of ultraviolet waves?

Largest Size: _____ Smallest Size: _____

2. Can you see ultraviolet light? Explain.

3. A bug zapper uses ultraviolet light to attract insects. Explain why this works.

4. Which type of UV light is harmful, UV-A or UV-B ?

5. How does our atmosphere protect us from harmful UV waves? What part of the atmosphere absorbs harmful UV rays?

Procedures: X-Rays. Watch the "*X-Rays*" segment of The Electromagnetic Spectrum and answer the following questions:

1. What is the range of size of X-ray waves?

Largest Size: _____ Smallest Size: _____

2. What is the main purpose of X-rays in the medical field?

3. Many X-ray wavelengths are about the size of an individual _____.

4. What do you know about the temperature of an object giving off X-rays as opposed to an object giving off visible light?

5. How are X-rays used to observe stars and other distant objects in outer space?

Procedures: Gamma Rays. Watch the "*Gamma Rays*" segment of The Electromagnetic Spectrum and answer the following questions:

1. What is the range of size of Gamma Ray waves?

Largest Size: _____ Smallest Size: _____

2. Where do scientists need to observe gamma rays from outer space from? Why?

3. How are gamma rays created on earth?

4. Why is it dangerous to expose the human body to gamma rays?

5. Most gamma rays have wavelengths that are about the size of an atom's _____.

6. What is a gamma ray burst?