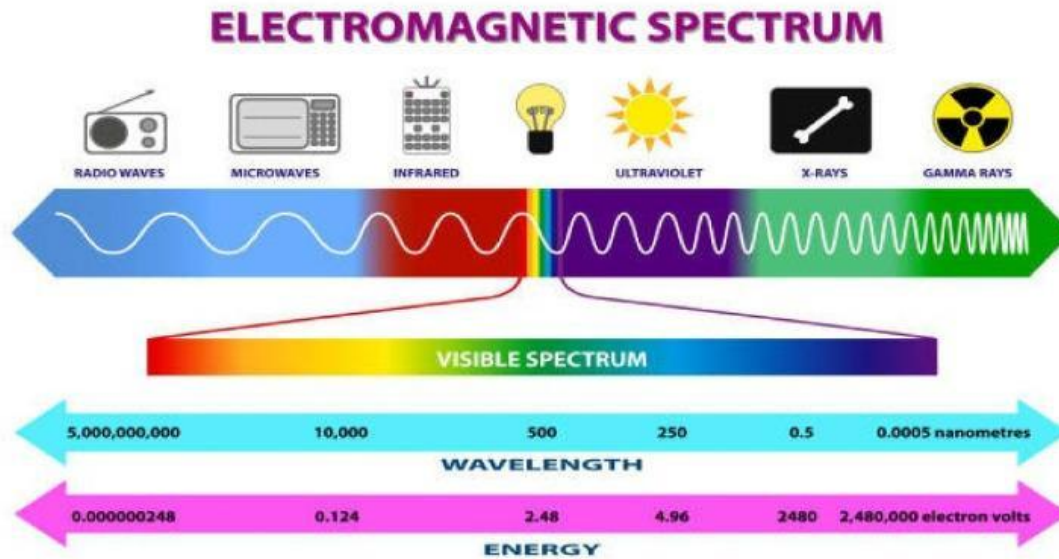


Learning Target: I can construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy.

Exploring the Electromagnetic Spectrum & Energy Interactive Activity



Part 1: Understanding the Electromagnetic Spectrum: Analyze the diagram to answer questions.



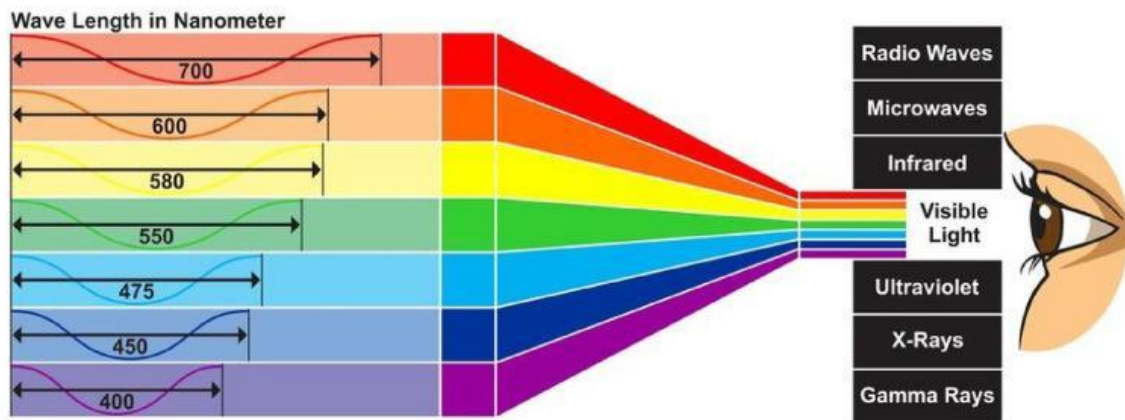
Questions:

- Which type of electromagnetic wave has the longest wavelength?
a. Gamma rays
b. Visible light
c. Radio waves
d. X-rays
- What does the wave with the longest wavelength tell us about the amount of energy of it is carrying?
a. It carries the most amount of energy
b. It has the highest frequency
c. It carries the least amount of energy
d. It travels faster than all of the other waves on the spectrum
- Arrange the following types of electromagnetic waves in order of increasing frequency: microwaves, ultraviolet, X-rays, and visible light. _____
- What is the relationship between the wavelength and energy of electromagnetic waves? _____
- Why are microwaves considered less dangerous than ultraviolet waves? _____
- Why are gamma rays considered more dangerous than radio waves? _____
- Which waves penetrate the furthest into the body? _____
Explain why. _____
- Which waves penetrate the least into the body? _____
Explain why. _____

Learning Target: I can construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy.

Part 2: Visible Light and Energy

Chart: Colors of Visible Light



Activity: Using the chart, answer the following:

1. Which color of light has the shortest wavelength? _____
What does that say about the energy of this color? _____
2. Which color of light has the longest wavelength? _____
What does that say about the energy of this color? _____
3. Which color of light has the lowest energy? _____
What does that say about the wavelength of this color? _____
Which color of light has the highest energy? _____
What does that say about the wavelength of this color? _____
4. If a light wave has a wavelength of 500 nm, what color is it likely to be? _____
700 nm _____ 400 nm _____ 600 nm _____

Critical Thinking:

Why do objects appear a specific color under white light? _____

Learning Target: I can construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy.

Part 3: Applications of Electromagnetic Waves

Scenario-Based Questions:

1. **Medical Imaging:** X-rays are commonly used to look inside the human body. Explain how the energy of X-rays makes them suitable for this purpose. _____
2. **Communication:** Cell phones use microwaves to transmit signals. Why are microwaves chosen over higher types of waves? _____
3. **Infrared Technology:** Night vision goggles detect infrared waves. What property of infrared waves allows this technology to work? _____

Part 4: Experiment Simulation

Data Table: Energy and Wavelength

Type of Wave	Wavelength (m)	Energy (J)
Radio Waves	10^3	10^{-12}
Microwaves	10^{-2}	10^{-8}
Infrared	10^{-5}	10^{-5}
Visible Light	10^{-7}	10^{-3}
Ultraviolet	10^{-8}	10^{-2}
X-rays	10^{-10}	10^2
Gamma Rays	10^{-12}	10^4

Analysis Questions:

1. What is the trend between wavelength and energy as you move from radio waves to gamma rays? _____
2. Calculate the difference of energy between X-rays and radio waves using the data in the table. _____
3. Calculate the difference of energy between microwaves and visible light using the data in the table. _____
4. Calculate the difference of energy between infrared and ultraviolet using the data in the table. _____