

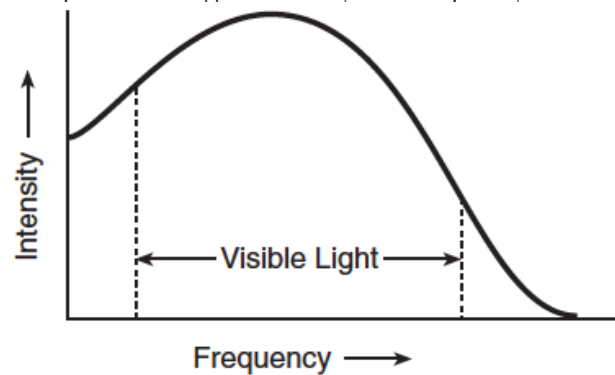
# Waves-EM Spectrum

- Compared to the speed of a sound wave in air, the speed of a radio wave in air is
  - less
  - greater
  - the same
- An electromagnetic AM-band radio wave could have a wavelength of
  - 0.005 m
  - 5 m
  - 500 m
  - 5,000,000 m
- Which color of light has a wavelength of  $5.0 \times 10^{-7}$  meter in air?
  - blue
  - green
  - orange
  - violet
- In a vacuum, all electromagnetic waves have the same
  - speed
  - phase
  - frequency
  - wavelength
- An electromagnetic wave traveling through a vacuum has a wavelength of  $1.5 \times 10^{-1}$  meter. What is the period of this electromagnetic wave?
  - $5.0 \times 10^{-10}$  s
  - $1.5 \times 10^{-1}$  s
  - $4.5 \times 10^7$  s
  - $2.0 \times 10^9$  s
- Which characteristic is the same for every color of light in a vacuum?
  - energy
  - frequency
  - speed
  - period
- Exposure to ultraviolet radiation can damage skin. Exposure to visible light does not damage skin. State one possible reason for this difference.

- An FM radio station broadcasts its signal at a frequency of  $9.15 \times 10^7$  hertz. Determine the wavelength of the signal in air.

Base your answers to questions 9 and 10 on the information and graph below.

Sunlight is composed of various intensities of all frequencies of visible light. The graph represents the relationship between light intensity and frequency.

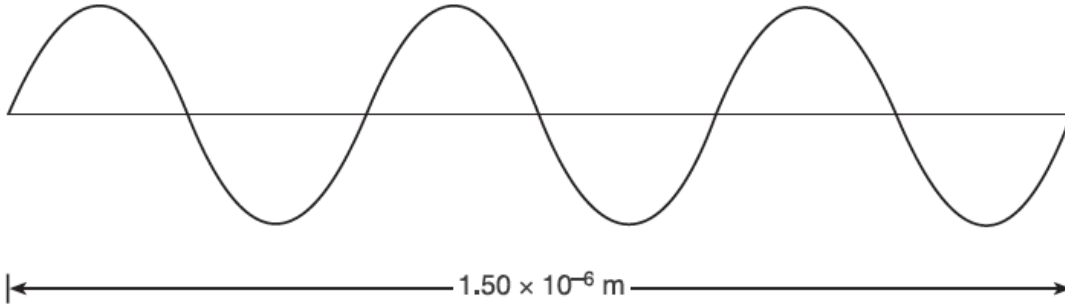


- Based on the graph, which color of visible light has the lowest intensity?
  - It has been suggested that fire trucks be painted yellow green instead of red. Using information from the graph, explain the advantage of using yellow-green paint.
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- Which wave characteristics is the same for all types of electromagnetic radiation traveling in a vacuum?
    - speed
    - wavelength
    - period
    - frequency
  - Calculate the wavelength in a vacuum of a radio wave having a frequency of  $2.2 \times 10^6$  hertz. [Show all work, including the equation and substitution with units.]

# Waves-EM Spectrum

Base your answers to questions 13 and 14 on the information and diagram below.

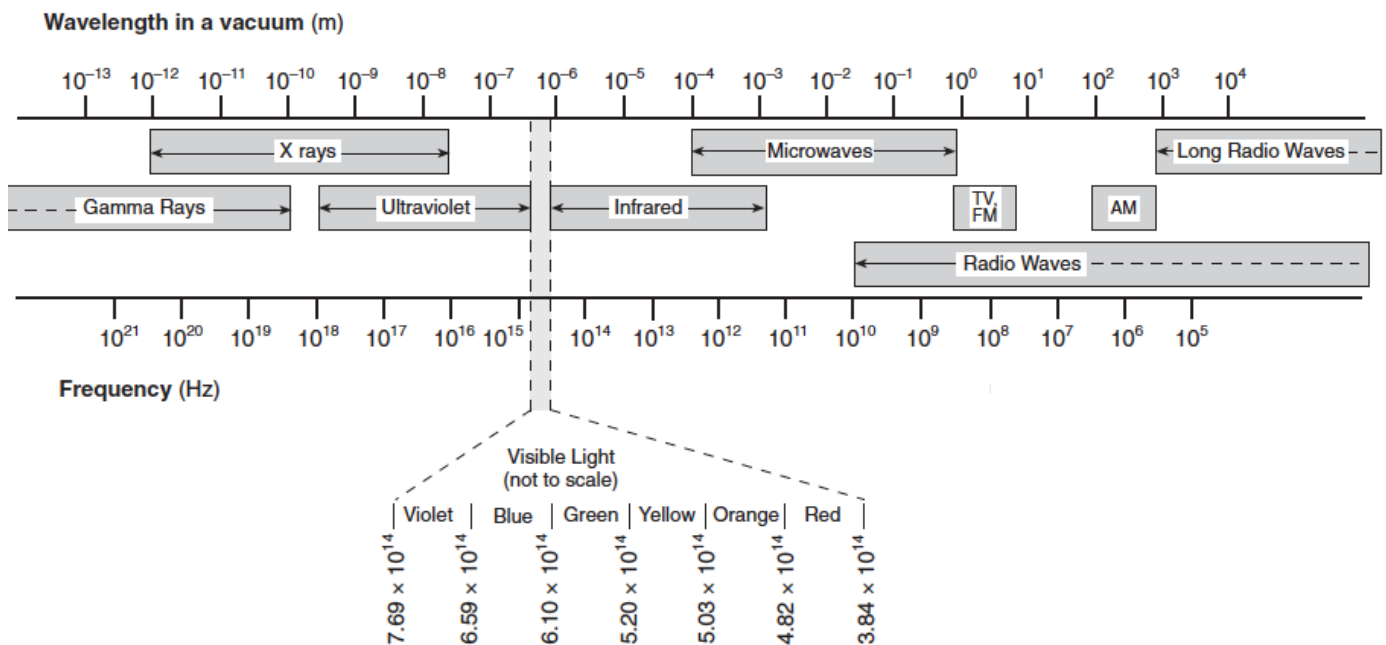
A  $1.50 \times 10^{-6}$ -meter-long segment of an electromagnetic wave having a frequency of  $6.00 \times 10^{14}$  hertz is represented below.



13. On the diagram above, mark two points on the wave that are in phase with each other. Label each point with the letter P.

14. Which type of electromagnetic wave does the segment in the diagram represent?

## The Electromagnetic Spectrum



# Waves-EM Spectrum

15. Radio waves and gamma rays traveling in space have the same
1. frequency
  2. wavelength
  3. period
  4. speed
16. Radio waves are propagated through the interaction of
1. nuclear and electric fields
  2. electric and magnetic fields
  3. gravitational and magnetic fields
  4. gravitational and electric fields
17. Which pair of terms best describes light waves traveling from the Sun to Earth?
1. electromagnetic and transverse
  2. electromagnetic and longitudinal
  3. mechanical and transverse
  4. mechanical and longitudinal
18. Which wavelength is in the infrared range of the electromagnetic spectrum?
1. 100 nm
  2. 100 mm
  3. 100 m
  4. 100  $\mu\text{m}$
19. Compared to the period of a wave of red light the period of a wave of green light is
1. less
  2. greater
  3. the same
20. Orange light has a frequency of  $5.0 \times 10^{14}$  hertz in a vacuum. What is the wavelength of this light?
1.  $1.5 \times 10^{23}$  m
  2.  $1.7 \times 10^6$  m
  3.  $6.0 \times 10^{-7}$  m
  4.  $2.0 \times 10^{-15}$  m
21. What is the speed of a radio wave in a vacuum?
1. 0 m/s
  2.  $3.31 \times 10^2$  m/s
  3.  $1.13 \times 10^3$  m/s
  4.  $3.00 \times 10^8$  m/s