

Astronomy Velocity of Waves Problems

$$V = \lambda f \quad \text{velocity} = (\text{wavelength})(\text{frequency})$$

Velocity is in m/s and for light is 3.0×10^8 m/s. Wavelength is in meters and 1×10^9 nm is 1 meter. Frequency is in hertz or s^{-1} .

1. If a microwave has a wavelength of 1.00×10^{-2} m, what is the frequency of this wave?
2. If gamma rays can have a frequency of 3.0×10^{18} Hz, what would the wavelength be?
3. If a light has a frequency of 1.0×10^{15} Hz, what is the wavelength and what type of light is it?
4. A wave of electromagnetic radiation has a wavelength of 3.4×10^{10} nm, what is the frequency of this light?
5. The Aurora Borealis is a night display in the Northern latitudes caused by ionizing radiation interacting with the Earth's magnetic field and the upper atmosphere. The distinctive green color is caused by the interaction of the radiation with oxygen and has a frequency of 5.38×10^{14} Hz. What is the wavelength of this light?
5. Which type of electromagnetic radiation has the longest wavelength? Shortest wavelength?
6. Which type of electromagnetic radiations has the smallest frequency? Greatest frequency?
7. Thinking about visible light, which color of light has the longest wavelength and the shortest wavelength?
8. Still thinking about visible light, which color has the greatest amount of energy? So which is more important to energy a greater frequency or a longer wavelength?