


I'm not robot  reCAPTCHA

Open

Wavelength and frequency calculation worksheet

SNYDER WORKSHEET 2005

Name: _____

Frequency/Wavelength/Energy

Equations: Speed = frequency x wavelength Frequency = Speed / Wavelength Wavelength = Speed / Frequency

Units: Speed: m/s Frequency: Hz (1/s) Wavelength: meters

Speed of Light [and all Electromagnetic Spectrum Waves] (c) = 3.0×10^8 m/s

Energy = h · frequency h (Planck's Constant) = 6.626×10^{-34} J · s
 Units: Energy: Joules frequency: Hz (1/s)

Problems:

1. Violet light has a wavelength of 4.10×10^{-12} m. What is the frequency?
2. Green light has a frequency of 6.01×10^{14} Hz. What is the wavelength?
3. What is the wavelength (in meters) of the electromagnetic carrier wave transmitted by **The Sports Fan** radio station at a frequency of 640 kHz? (Hint: convert kHz into Hz by multiplying by 10^3 .)
4. Calculate the wavelength of radiation with a frequency of 8.0×10^{14} Hz.
5. What is the wavelength of light with a frequency of 7.66×10^{14} Hz?
6. A helium laser emits light with a wavelength of 633 nm. What is the frequency of the light? [Hint: First, convert nanometers(nm) into meters by multiplying by 10^9]
7. What is the wavelength of X-rays having a frequency of 4.80×10^{17} Hz?
8. An FM radio station broadcasts at a frequency of 107.9 MHz. What is the wavelength of the radio signal? [Hint: First, convert Mega Hertz (MHz) into Hertz by multiplying by 10^6]
9. If the limits of human hearing are 20 Hz. to 20,000 Hz, what are the sound wavelengths that are associated with these two extremes, assuming the speed of sound is 345 m/s.
10. If a sound is produced at the orchestra standard frequency of 440 Hz. If the speed of sound is 345 m/s, what is the wavelength of the sound that is produced?
11. Calculate the energy of a photon of radiation with a frequency of 8.5×10^{14} Hz.
12. Calculate the energy of a photon of radiation with a wavelength of 6.4×10^{-7} m.

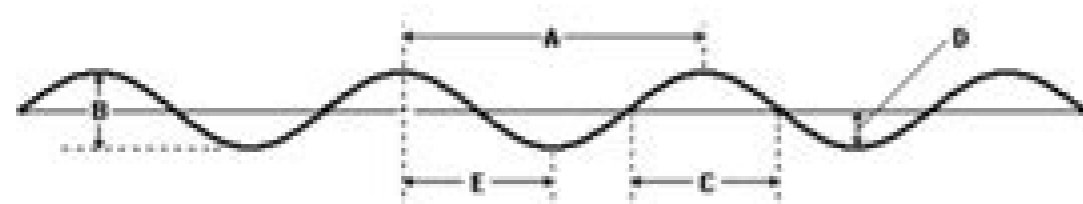
What is the frequency of violet light with wavelength 400 nm?

$$c = \lambda \nu$$

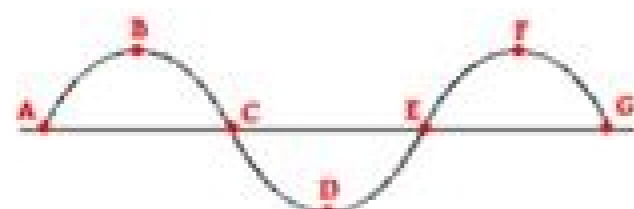
$$\nu = \frac{c}{\lambda} = \frac{3.00 \times 10^8 \text{ m/s}}{400 \times 10^{-9} \text{ m}} = 7.50 \times 10^{14} \text{ Hz}$$

Throughout this unit, internalize the meaning of terms such as period, frequency, and wavelength. Utilize the meaning of these terms to answer conceptual questions; avoid a *formula fixation*.

Consider the diagram below in order to answer questions #1-2.



1. The wavelength of the wave in the diagram above is given by letter _____.
2. The amplitude of the wave in the diagram above is given by letter _____.
3. Indicate the interval that represents one full wavelength.



- a. A to C
 - b. B to D
 - c. A to G
 - d. C to G
4. A wave is introduced into a thin wire held tight at each end. It has an amplitude of 3.8 cm, a frequency of 51.2 Hz and a distance from a crest to the neighboring trough of 12.8 cm. Determine the period of such a wave.
 5. Frieda the fly flaps its wings back and forth 121 times each second. The period of the wing flapping is _____ sec.
 6. A tennis coach paces back and forth along the sideline 10 times in 2 minutes. The frequency of her pacing is _____ Hz.
- a. 5.0 b. 0.20 c. 0.12 d. 0.083

