

Frequency, Velocity, Wavelength, and Energy of Waves

(HW#1)
Due Tomorrow

Name _____ Date _____ Period _____

Equations: velocity = frequency x wavelength

Since the velocity of light is always the speed of light ($c = 2.9998 \times 10^8$ m/s,

$c = \text{frequency} \times \text{wavelength}$

$E = h \times \text{frequency}$, where $h = 6.626 \times 10^{-34}$ Jxsec

1. A tuning fork has a frequency of 256 hertz. The wavelength of the sound produced by the fork is 1.32 meters. Calculate the velocity of the wave.
2. A wave has a wavelength of 1.20 meters. Its velocity is 0.75 meters per second. What is the frequency of the wave?
3. What is the velocity of a wave with a frequency of 750 Hz and a wavelength of 0.45 m?
4. A wave has a velocity of 330 m/s. Its wavelength is 15 m. Calculate the frequency of the wave.
5. A wave has a velocity of 345 m/s. Its frequency is 2050 Hz. Find its wavelength.
6. A tuning fork has a frequency of 440 hertz. The wavelength of the sound produced by the fork is 0.77 meters. Calculate the velocity.
7. Find the frequency of red light given the wavelength is equal to 7.80×10^{-9} m
8. Find the frequency in violet light given wavelength is equal to 3.80×10^{-9} m
9. Find the frequency of light with a wavelength of 21 m.
10. Find the wavelength of light with a frequency of 3.80×10^{18} hertz.
11. The frequency of a type of light is 7.5×10^{14} hertz. What is its wavelength?

12. What is the wavelength of radiation with a frequency of 1.50×10^{13} Hz? Does this radiation have a longer or shorter wavelength than red light?
13. What is the frequency of radiation with a wavelength of 5.00×10^{-8} m? In what region of the electromagnetic spectrum is this radiation?
14. Determine the frequencies of electromagnetic radiation of the following wavelengths (all must be in m before you can plug into equation):
- a.) 0.10 nm
 - b) 5000 m
 - c) 4.4 nm
 - d) 89 m
 - e) 562 nm
15. Find the energy in violet light given wavelength is equal to 380×10^{-9} m
16. Find the energy of light with a wavelength of 21 m.
17. Find the energy of light with a wavelength of 2060 m.
18. Sodium vapor lamps are used to sometimes light streets. If the frequency of the light coming from them is 5.09×10^{14} Hz what is the energy in each photon?
19. What is the energy of each photon of red light that has a frequency of 4.0×10^{14} Hz?
20. A wave is moving with a velocity of 5.0 m/s. If its frequency is 2.5 hertz, what is its wavelength?
21. A wave is moving with a velocity of 15 m/s and has a wavelength of 3.5 meters. What is its frequency?
22. The speed of light is 3.0×10^8 m/s. Red light has a wavelength of 7×10^{-7} m. What is its frequency?
23. A wave has a frequency of 220 hertz and a wavelength of 140 meters. What is its velocity?