

Wave Calculations

<p style="text-align: center;">Speed of a wave = wavelength x frequency</p> <p style="text-align: center;">$v = \lambda f$</p> <p>v = velocity (speed), measured in meters/second (m/s) λ = wavelength, measured in meters (m) f = frequency, measured in Hertz (Hz = 1/s)</p>	<p>The speed of a wave depends on the medium that it is travelling through.</p> <p style="text-align: center;">$f = 1/T$</p> <p>f = frequency, measured in Hertz (Hz) T = period, measured in seconds (s)</p>
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1. A wave along a guitar string has a frequency of 540 Hz and a wavelength of 2.5 meters. Calculate the speed of the wave.

Given	Rearranged Equation	Work	Final Answer

2. The speed of sound in air is about 340 m/s. What is the wavelength of sound waves produced by a guitar string vibrating at 490 Hz?

Given	Rearranged Equation	Work	Final Answer

3. The speed of light is 300,000,000 m/s. What is the frequency of microwaves with a wavelength of 0.01 meter?

Given	Rearranged Equation	Work	Final Answer

4. What is the period of the microwaves in the question above?

Given	Rearranged Equation	Work	Final Answer

5. The string on a piano that produces an A sharp vibrates with a frequency of 235 Hz. If the sound waves produced by this string have a wavelength (in air) of 1.49 meters, what is the speed of sound in air?

Given	Rearranged Equation	Work	Final Answer

6. The average wavelength in a series of ocean waves is 15.0 meters. A wave crest arrives at the shore an average of every 10.0 seconds, so the frequency is 0.100 Hz. What is the average speed of the waves?

Given	Rearranged Equation	Work	Final Answer

7. An FM radio station broadcasts electromagnetic waves at a frequency of 94.5 MHz (equal to 94,500,000 Hz). These radio waves have a wavelength of 3.17 meters. What is the speed of the waves?

Given	Rearranged Equation	Work	Final Answer

8. Green light has a wavelength of 0.00000052 meters. The speed of light is 300,000,000 m/s. Calculate the frequency of green light waves with this wavelength.

Given	Rearranged Equation	Work	Final Answer

9. Calculate the period of the green light waves in the above question.

Given	Rearranged Equation	Work	Final Answer

10. What is the wavelength of a sound wave with a frequency of 220 Hz if its speed is 340 m/s?

Given	Rearranged Equation	Work	Final Answer

11. What is the period of the sound wave above?

Given	Rearranged Equation	Work	Final Answer

12. Ocean waves are hitting a beach at a rate of 3.5 Hz.

a. What is the period of the waves?

Given	Rearranged Equation	Work	Final Answer

b. Calculate the speed of the waves if the distance between wave crests is 1.3 meters.

Given	Rearranged Equation	Work	Final Answer

13. The note A above middle C on a piano emits a sound wave with a wavelength of 0.77 meters.

c. What is the frequency of the wave? Use 340 m/s as the speed of the sound wave.

Given	Rearranged Equation	Work	Final Answer

d. What is the period of the sound wave?

Given	Rearranged Equation	Work	Final Answer

14. If the distance between 2 troughs is 2.6 meters and a wave is traveling at a speed of 129 m/s, find the period of the wave.

Given	Rearranged Equation	Work	Final Answer