Name: _____ Score: _____ Date: _____

Rhythm of Ocean Waves: Wave Calculations

Speed of a wave = wavelength × frequency $v = f\lambda$ v = velocity (speed) of wave (m/sec) f = wavelength (1/sec or Hertz) λ = wavelength (m)	The speed of a wave depends on the wave's properties as it travels through a medium. $V = \sqrt{\frac{T}{\mu/L}}$ V = velocity (speed) of wave (m/sec) T = tension in the string (N) μ = mass (kg) / length (m) of the string

1. A wave along a certain string has a frequency of 5 Hz and a wavelength of 1.2 meters. Calculate the speed of the wave.

2. The speed of sound in air is about 340 m/s. What is the wavelength of sound that has a high pitch frequency of 440 Hz?

3. The speed of light is 300,000,000 m/s. What is the frequency of electromagnetic radiation with a wavelength of 0.002 m?

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

5. You swing on a playground swing so that it takes 2 seconds to go back and forth. If the swing's speed is 3 m/s and the length of the chain is 1.2 m, what is the gravitational acceleration?

6. The average wavelength of a wave is 4 meters and it has a frequency of 1.5 Hz. If a wave's amplitude is 2 meters, what is the average speed of the wave?

7. Two identical waves are traveling in opposite directions and have a frequency of 100 Hz and a wavelength of 0.5 m. If they cancel each other out (destructive interference), what is the speed of the waves?

8. Jamie Split has a wavelength of 0.0000001 meters. The speed of light is 300,000,000 m/s. Calculate the frequency of gamma light waves with this wavelength.

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

10. a. What is the wavelength of a sound wave with a frequency of 1 Hz? The speed of sound is 340 m/s?

11. What is the gravitational acceleration on Mars?

12. Roman was swinging a chair at a rate of 0.5 Hz.
    a. What is the period of the swing?
    b. Calculate the speed of the chair if the distance from the chair to the ceiling is 3 meters.

13. The wave function of a particle is $\psi(x,t) = A\sin(kx - \omega t)$ where A = amplitude, k = wave number, and ω = angular frequency.
    a. What is the frequency of the wave? How can we find the speed of the wave?
    b. What is the period of the wave?

14. If the distance between a wavelength of a wave is 0.5 meters and it has a frequency of 100 Hz, find the period of the wave.