



Criteria A

Focus - Wave equation - $v = f\lambda$

Where v = velocity of wave,

f = frequency of wave = $1/T$, T is the time period of the wave, and

λ = wavelength of wave.

Learning goals - By the end of this exercise, students should be able to understand the connection between the three parameters of the wave, and should be able to apply the equation to real world situations.

ATL skills -

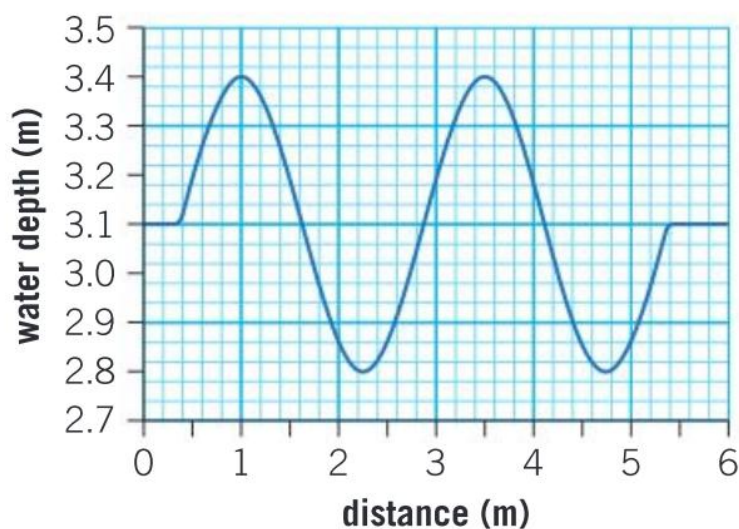
Subject specific skills - Linking mathematical skills to solve the unknown variable in simple algebraic equations.

Critical thinking skills - Applying theoretical formulas to practical situations.

1. Complete the table to show the quantities related and their units.

Symbol	Quantity	Unit
v		
f		
λ		

2. A particular sound wave has a frequency of 10 Hz.



- a. State how many waves pass a point in 1 second.



- b. Each wave as a wavelength of 3.3 m. Calculate the total length of the waves that pass a point in 1 second.
 - c. Calculate the speed of the sound wave.
3. Light travels at a speed of 3.0×10^8 . Red light has a wavelength of 7.0×10^{-7} . Calculate its frequency.
4. Infrared radiation travels at the same speed as light, but has a lower frequency than red light. State whether its wavelength is greater than or less than that of red light.
5. The graph below shows the depth of water in a harbour as a wave passes through.
 - a. From the graph, measure the wavelength of the wave.
 - b. Determine the amplitude of the wave.
 - c. The speed of the wave is 1.4 ms^{-1} . Calculate how long it will take a wave to pass a given point.
6. An FM radio station broadcasts signals of wavelength 1.5 meters and frequency 200 MHz. Calculate their speed.
7. A wave in air has a frequency of 110 Hz, an amplitude of 4 cm and a wavelength of 30 cm.
 - a. Calculate the speed of the wave.
 - b. Calculate the period of the wave.
8. Sound waves get faster when they go from air into water. What happens of their :
 - a. Wavelength
 - b. Frequency
 - c. Period
 - d. Speed
9. Water waves in a shallow dish are 6.0 cm long. At one point, the water moves up and down at a rate of 4.8 oscillations/second.
 - a. What is the speed of the water wave?
 - b. What is the period of the water wave?
10. A sound wave of length 0.6 m and a velocity of 330 ms^{-1} is produced for 0.5 s.
 - a. What is the frequency of the wave?
 - b. How many complete waves are emitted in this time interval ?
 - c. After 0.5 s, how far is the front of the wave from the source of the sound ?

References

- Cambridge press-physics for IGCSE - workbook/course book - David Sang and Darrell Hamilton
- MYP physics 4 and 5 - Oxford
- Physics - Principles and Problems - Glencoe Science.