2.1.1.3 What is the amplitude of a wave?

(A) The maximum displacement of a particle in the medium from its rest position.
(B) The distance the wave moves in one time period of the wave.
(C) The distance the wave moves in one second.
(D) The distance equal to one wavelength.

2.1.1.4 What is the term for the distance from crest of one wave pulse to the crest of the next wave pulse?

(A) Period. (B) Frequency. (C) Amplitude. (D) Wavelength.

2.1.1.5 After a wave has passed through a medium, how does the position of the particles of the medium compare to their original positions before the wave enters the medium?

(A) The particles' positions are about the same as their original position.
(B) The particles' positions depend on the type of wave that has passed through the medium.
(C) The particles' positions move in the direction of the wave.
(D) The particles' positions move perpendicular to their original position.

2.1.1.6 As a mechanical wave travels through a medium there is a net transfer of what?

(A) Energy only. (B) Mass only.
(C) Both mass and energy. (D) Neither mass nor energy.

2.1.1.7 What do mechanical waves transfer?

(A) Energy. (B) Liquid.
(C) Matter. (D) Particles of the medium.

2.1.1.8 Hertz is a measure of:

(A) Amplitude. (B) Frequency. (C) Period. (D) Wavelength .

2.1.1.9 Which of the following applies to the frequency of a wave?

(A) s (B) s^{-1} (C) m (D) m^{-1}

2.1.1.10 A wave that has a relatively high frequency will also have a relatively:

(A) Large amplitude. (B) Low amplitude. (C) Short wavelength. (D) Long period.

2.1.1.11 Which of the following affects the speed of the wave most?

(A) Its wavelength. (B) Its frequency.
(C) Its amplitude. (D) The medium it travels in.

2.1.1.12 What term describes the number of waves that occur in 1 s?

(A) Amplitude. (B) Frequency. (C) Period. (D) Wavelength.

2.1.1.13 What term do we give to the number of cycles of a periodic wave occurring per unit time?

(A) Wavelength. (B) Frequency. (C) Amplitude. (D) Period.

2.1.1.14 Which property of a mechanical wave measures the amount of particle vibration?

(A) Amplitude. (B) Period. (C) Frequency. (D) Wavelength.

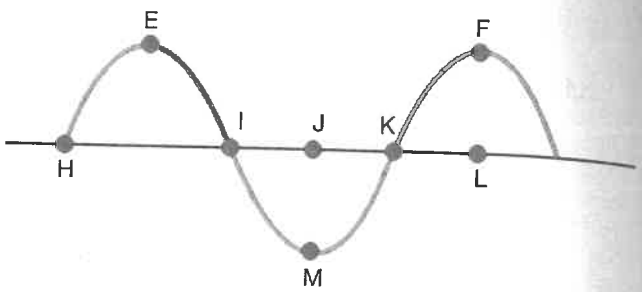
2.1.1.15 Many wave properties are dependent upon other wave properties. Yet, one wave property is independent of all other wave properties. Which one of the following properties of a wave is independent of all the others?

(A) Amplitude. (B) Frequency. (C) Period. (D) Wavelength.

2.1.1.16 What happens to the frequency of a wave in a constant medium if its amplitude increases?

(A) It becomes faster. (B) It increases.
(C) It decreases. (D) It remains constant.

2.1.2.4 Consider the transverse wave shown.



(a) Identify a wavelength. .....

(b) Identify an amplitude. .....

(c) Identify a crest. .....

(d) Identify a trough. .....

(e) Identify a particle which has zero displacement on this wave. .....

2.1.2.5 When asked to define the wavelength of a transverse matter wave, two students gave the following answers.

Student X: The wavelength is the distance from the crest of a pulse on the wave to the crest on the next pulse in the wave.

Student Y: The wavelength is the distance from any point on a pulse in the wave to the identical point on the next pulse in the wave.

Which student's definition is better? Justify your answer. .....

.....

.....

2.1.2.6 If two transverse matter waves have the same frequency, what also must they have that is the same?

(A) Amplitude.
(B) Energy.
(C) Period.
(D) Wavelength.

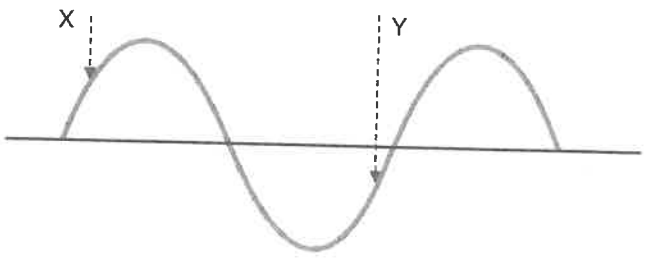
2.1.2.7 The distance between two successive troughs can be labelled as:

(A) Amplitude.
(B) Period.
(C) Velocity.
(D) Wavelength.

2.1.2.8 The amount of energy carried by a transverse matter wave is dependent on its:

(A) Amplitude.
(B) Period.
(C) Velocity.
(D) Wavelength.

2.1.2.9 On the wave shown, which correctly labels the distance between X and Y?



(A) $\frac{\lambda}{2}$

(B) $\frac{2\lambda}{3}$

(C) $\frac{3\lambda}{4}$

(D) λ

2.1.2.10 Wave X has wavelength λ and frequency f. Wave Y, in the same medium, has wavelength 2λ. What will be its frequency?

(A) $\frac{f}{2}$ (B) f (C) $2f$ (D) Unable to be determined.

2.1.3 Longitudinal matter waves.

2.1.3.1 The following statements all refer to longitudinal matter waves. Classify each statement as either true (T) or false (F).

	(a)	Longitudinal waves are mechanical waves.
	(b)	They pass readily through a vacuum.
	(c)	Longitudinal waves are produced when there is a source of vibration in a medium such as the vibration of a drum skin, the reed in a wind instrument, a piano string, a human larynx, all of which set the air near them vibrating.
	(d)	In a longitudinal wave, particles oscillate back and forth at right angles to the direction of energy transfer.
	(e)	A compression is a region where particles of the medium are closer together than when they are at their rest positions.
	(f)	A rarefaction is a region where the particles of the medium are further apart than when in their rest positions.
	(g)	The rest positions of particles are their positions when no energy is being transferred through the medium.
	(h)	The amplitude of a soundwave determines the loudness or softness of the sound, also known as its pitch.
	(i)	The larger the amplitude, the louder the sound.
	(j)	The frequency of a soundwave determines the highness or lowness of the sound, also known as its intensity.
	(k)	A high frequency wave produces a high pitch sound.
	(l)	When sound is reflected (bounced back) from a hard surface, we hear an echo.

2.1.3.2 For each of the statements above you classified as false, rewrite them so that they are true.

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2.1.5 The wave equation.

2.1.5.1 A wave has a wavelength of 0.25 m and a period of 4×10^{-4} s. What is its frequency and velocity?

.....

2.1.5.2 330 m s^{-1} soundwaves have a frequency of 600 Hz. What is their wavelength?

.....

2.1.5.3 A tuning fork has a frequency 384 Hz. If the velocity of sound in air is 320 m s^{-1}, find the wavelength and period of the sound it produces.

.....

2.1.5.4 A wave has a frequency of 2000 Hz and a wavelength of 0.2 cm. What is its velocity?

(A) 4 m s^{-1}
(B) 40 m s^{-1}
(C) 400 m s^{-1}
(D) 10 000 m s^{-1}

2.1.5.5 What is the wavelength of a 50 Hz periodic wave moving at 330 m s^{-1}?

(A) 0.15 m
(B) 6.6 m
(C) 280 m
(D) 16 500 m

2.1.5.6 If the frequency of a wave is 8.00 Hz and the wave speed is 48.00 m s^{-1}, what is the distance between successive wave crests on this wave?

(A) 0.17 m
(B) 6.0 m
(C) 40 m
(D) 384 m

2.1.5.7 A wave completes one vibration as it moves a distance of 1.2 metres at a speed of 15 m s^{-1}. What is the frequency of the wave?

(A) 0.08 Hz
(B) 12.5 Hz
(C) 16.2 Hz
(D) 18 Hz

2.1.5.8 330 m s^{-1} soundwaves have a frequency of 125 Hz. What is their wavelength?

(A) 6 4 × 10^{-5} m
(B) 0.38 m
(C) 2.64 m
(D) 4125 m

2.1.5.9 What is the frequency of a wave that has a speed of 0.3 m s^{-1} and a wavelength of 0.06 m?

(A) 0.018 Hz
(B) 0.05 Hz
(C) 0.2 Hz
(D) 5 Hz

2.1.5.10 What is the frequency of a wave with a period of 0.025 s?

(A) 4 Hz
(B) 40 Hz
(C) 400 Hz
(D) 4000 Hz

2.1.5.11 Find the speed of a wave with a wavelength of 2.5 cm and a frequency of 16 Hz.

(A) 0.40 m s^{-1}
(B) 0.86 m s^{-1}
(C) 4.0 m s^{-1}
(D) 40 m s^{-1}

2.1.5.12 A 350 Hz wave has a wavelength of 0.15 m. How long does it take to travel 200 m?

(A) 0.26 s
(B) 1.17 s
(C) 3.81 s
(D) 10.5 s

2.1.5.13 Consider a beam of red light where the photons have a wavelength of 750 nm. What will be their frequency?

(A) 225 Hz
(B) 400 000 Hz
(C) 4×10^{11} Hz
(D) 4×10^{14} Hz

2.1.5.14 A beam of blue photons has a frequency of 6×10^{14} Hz. What is their wavelength?

(A) 5 nm
(B) 50 nm
(C) 500 nm
(D) 5.0 m

2.2 Wave diagrams, period, amplitude, wavelength, frequency and velocity.

2.2.1 Analysing wave diagrams 1.

2.2.1.1 The graphs show the displacement of a particle in several waves, each of wavelength 1.25 m.

Determine, for each wave, the:

(a) Period.

(b) Frequency.

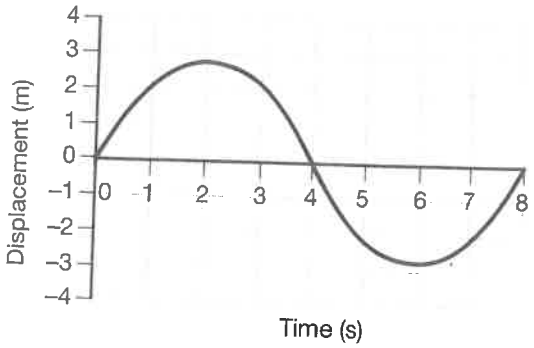
(c) Wavelength.

(d) Amplitude.

(e) Speed.

Write your answers in the table provided.

A



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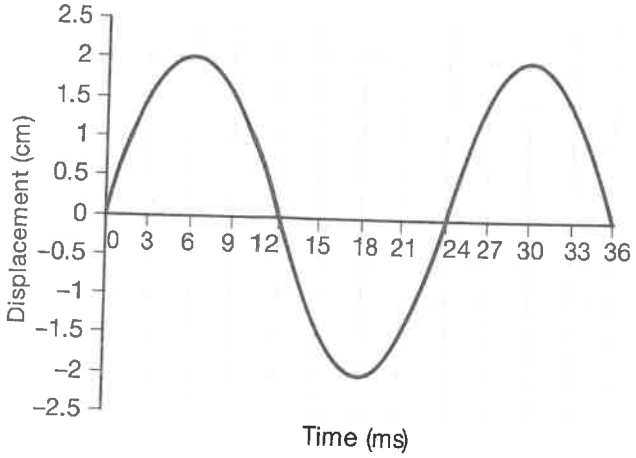

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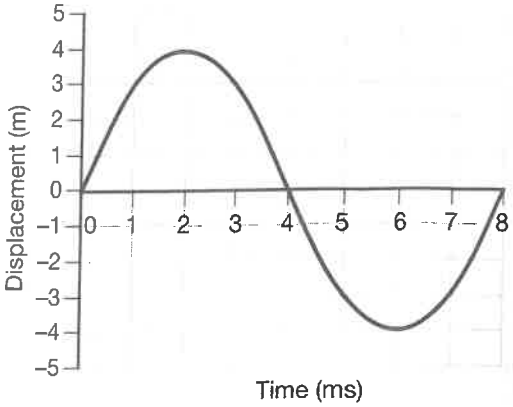

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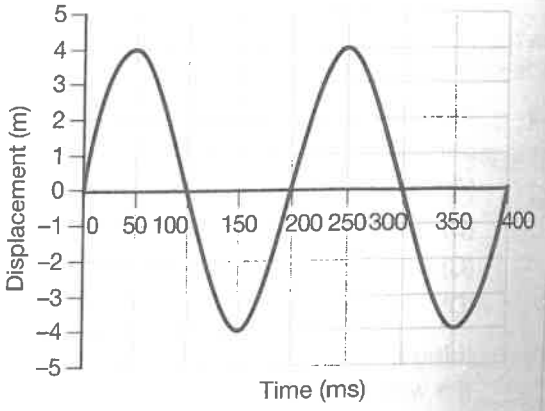

Wave	A	B	C	D
Period (s)				
Frequency (Hz)				
Wavelength (m)				
Amplitude (m)				
Velocity ($m\ s^{-1}$)				