Q1. Two points on a progressive wave are one-eighth of a wavelength apart. The distance between them is 0.5 m, and the frequency of the oscillation is 10 Hz. What is the minimum speed of the wave?

A 0.2 m s^{-1} ⬭

B 10 m s^{-1} ⬭

C 20 m s^{-1} ⬭

D 40 m s^{-1} ⬭

(Total 1 mark)

Q2. Which of the following waves **cannot** be polarised?

A radio ⬭

B ultrasonic ⬭

C microwave ⬭

D ultraviolet ⬭

(Total 1 mark)

Q3. Which of the following is correct for a stationary wave?

A Between two nodes the amplitude of the wave is constant. ⬭

B The two waves producing the stationary wave must always be 180° out of phase. ⬭

C The separation of the nodes for the second harmonic is double the separation of nodes for the first harmonic. ⬭

D Between two nodes all parts of the wave vibrate in phase. ⬭

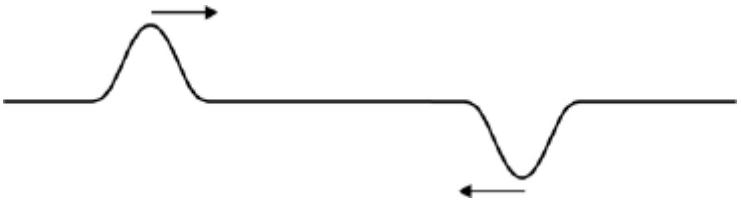
(Total 1 mark)

Q4. Sound waves cross a boundary between two media X and Y. The frequency of the waves in X is 400 Hz. The speed of the waves in X is 330 m s^{-1} and the speed of the waves in Y is 1320 m s^{-1}. What are the correct frequency and wavelength in Y?

	Frequency / Hz	**Wavelength / m**	
A	100	0.82	⬭
B	400	0.82	⬭
C	400	3.3	⬭
D	1600	3.3	⬭

(Total 1 mark)

Q5. The diagram shows two pulses on a string travelling towards each other.

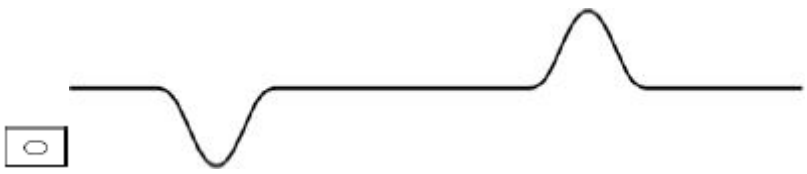


Which of the following diagrams shows the shape of the string when the pulses have passed through each other?

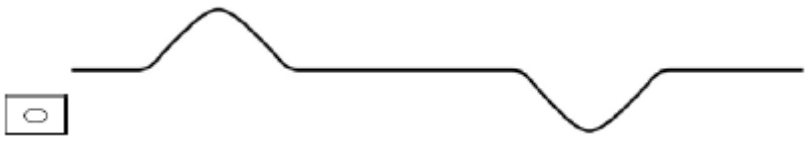
A

B

C



D



(Total 1 mark)

Q6. Which one of the following provides direct experimental evidence that light is a transverse wave motion rather than a longitudinal wave motion?

A Two light waves that are coherent can be made to interfere. ⬭

B Light can be diffracted. ⬭

C Light can be polarised. ⬭

D The intensity of light from a point source falls off inversely as the square of the distance from the source. ⬭

(Total 1 mark)

Q7. The sound quality of a portable radio is improved by adjusting the orientation of the aerial. Which statement is a correct explanation of this improvement?

A The radio waves from the transmitter are polarised.

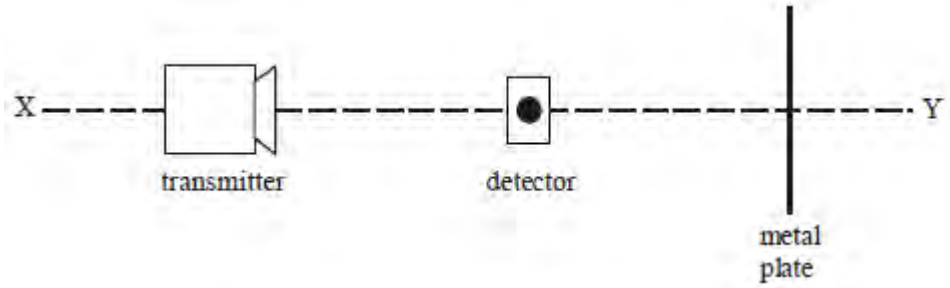
B The radio waves from the transmitter are unpolarised.

C The radio waves become polarised as a result of adjusting the aerial.

D The radio waves become unpolarised as a result of adjusting the aerial.

(Total 1 mark)

Q8. A microwave transmitter is used to direct microwaves of wavelength 30 mm along a line XY. A metal plate is positioned at right angles to XY with its mid-point on the line, as shown.



When a detector is moved gradually along XY, its reading alternates between maxima and minima. Which one of the following statements is **not** correct?

A The distance between two minima could be 15 mm.

B The distance between two maxima could be 30 mm.

C The distance between a minimum and a maximum could be 30 mm.

D The distance between a minimum and a maximum could be 37.5 mm.

(Total 1 mark)

Q9. By approximately how many times is the wavelength of audible sound waves greater than the wavelength of light waves?

A 10^{2}

B 10^{6}

C 10^{10}

D 10^{14}

(Total 1 mark)

Q10. A stationary wave is formed by two identical waves of frequency 300 Hz travelling in opposite directions along the same line. If the distance between adjacent nodes is 0.60 m, what is the speed of each wave?

A 180 m s^{-1}

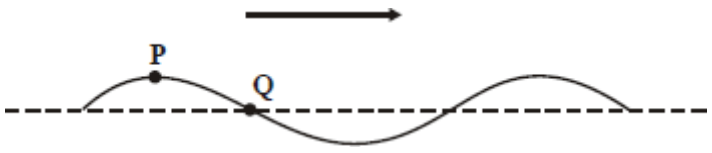
B 250 m s^{-1+}

C 360 m s^{-1}

D 500 m s^{-1}

(Total 1 mark)

Q11. The diagram shows a snapshot of a wave on a rope travelling from left to right.



At the instant shown, point **P** is at maximum displacement and point **Q** is at zero displacement. Which one of the following lines, **A** to **D**, in the table correctly describes the motion of **P** and **Q** in the next half-cycle?

	P	**Q**
A	falls then rises	rises
B	falls then rises	rises then falls
C	falls	falls
D	falls	rises then falls

(Total 1 mark)

Q12. The speed of sound in water is 1500 m s^{-1}. For a sound wave in water having frequency 2500 Hz, what is the minimum distance between two points at which the vibrations are $\frac{\pi}{3}$ rad out of phase?

A 0.05 m

B 0.10 m

C 0.15 m

D 0.20 m

(Total 1 mark)

Q13. Which one of the following properties of light waves do polarising sunglasses depend on for their action?

Light waves may

A interfere constructively.

B interfere destructively.

C be polarised when reflected from a surface.

D be polarised by the lens in the eye.

(Total 1 mark)

Q14. Which line, **A** to **D**, in the table shows correct relationships for the respective wavelengths, λ_L, λ_S, and frequencies, f_L, f_S, of light waves and sound waves?

	wavelengths	**frequencies**
A	$\lambda_L << \lambda_S$	$f_L >> f_S$
B	$\lambda_L << \lambda_S$	$f_L << f_S$
C	$\lambda_L >> \lambda_S$	$f_L >> f_S$
D	$\lambda_L >> \lambda_S$	$f_L << f_S$

(Total 1 mark)

Q15. Two points on a progressive wave differ in phase by $\frac{\pi}{4}$. The distance between them is 0.5 m, and the frequency of the oscillation is 10 Hz. What is the minimum speed of the wave?

A 0.2 m s^{-1}

C 10 m s^{-1}

C 20 m s^{-1}

D 40 m s^{-1}

(Total 1 mark)

Q16. Which line, **A** to **D**, in the table gives a correct difference between a progressive wave and a stationary wave?

	progressive wave	**stationary wave**
A	all the particles vibrate	some of the particles do not vibrate
B	none of the particles vibrate with the same amplitude	all the particles vibrate with the same amplitude
C	all the particles vibrate in phase with each other	none of the particles vibrate in phase with each other
D	some of the particles do not vibrate	all the particles vibrate in phase with each other

(Total 1 mark)

Q17. Stationary waves are set up on a length of rope fixed at both ends. Which one of the following statements is true?

A Between adjacent nodes, particles of the rope vibrate in phase with each other.

B The mid point of the rope is always stationary.

C Nodes need not necessarily be present at each end of the rope.

D Particles of the rope at adjacent antinodes always move in the same direction.

(Total 1 mark)

Q18. A wave of frequency 5 Hz travels at 8 km s^{-1} through a medium. What is the phase difference, in radians, between two points 2 km apart?

A 0

B $\frac{\pi}{2}$

C π

D $\frac{3\pi}{2}$

(Total 1 mark)

Q19. A source emits light of wavelength 600 nm as a train of waves lasting 0.01 μs. How many complete waves are sent out?
speed of light = 3×10^8 m s^{-1}

A 5×10^6

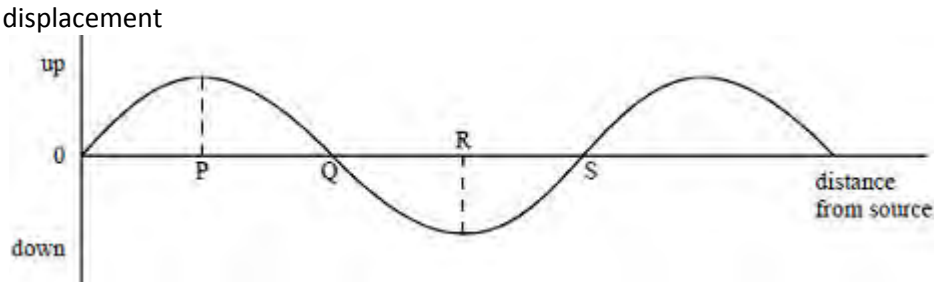
B 18×10^7

C 5×10^9

D 5×10^{22}

(Total 1 mark)

Q20.



The graph shows, at a particular instant, the variation of the displacement of the particles in a transverse progressive water wave, of wavelength 4 cm, travelling from left to right. Which one of the following statements is **not** true?

A The distance PS = 3 cm.

B The particle velocity at Q is a maximum.

C The particle at S is moving downwards

D Particles at P and R are in phase.

(Total 1 mark)

Q21. The audible range of a girl's hearing is 30 Hz to 16 500 Hz. If the speed of sound in air is 330 m s^{-1}, what is the shortest wavelength of sound in air which the girl can hear?

A $\frac{30}{330}$ m

B $\frac{16500}{330}$ m

C $\frac{330}{16500}$ m

D $\frac{330}{30}$ m

(Total 1 mark)

Q22. Which one of the following types of wave **cannot** be polarised?

A radio

B ultraviolet

C microwave

D ultrasonic

(Total 1 mark)

Q23. A uniform wire fixed at both ends is vibrating in its fundamental mode. Which one of the following statements is **not** correct for all the vibrating particles?

A They vibrate in phase.

B They vibrate with the same amplitude.

C They vibrate with the same frequency.

D They vibrate at right angles to the wire.

(Total 1 mark)

Q24. A wave motion has period T, frequency f, wavelength λ and speed v. Which one of the following equations is **incorrect**?

A $1 = Tf$

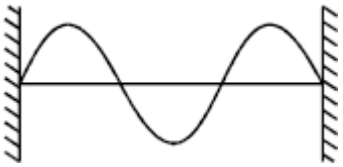
B $T = \frac{v}{\lambda}$

C $\lambda = \frac{v}{f}$

D $T\upsilon = \lambda$

(Total 1 mark)

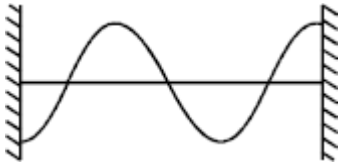
Q25.



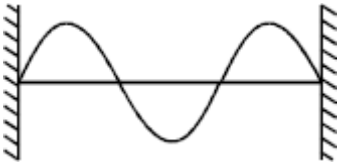
frequency of vibration = 50 Hz

The diagram above shows a stationary wave on a stretched string at a time t = 0. Which one of the diagrams, **A** to **D**, correctly shows the position of the string at a time t = 0.010 s?

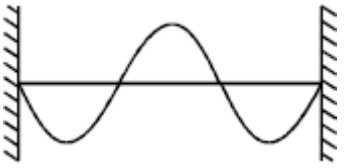
A



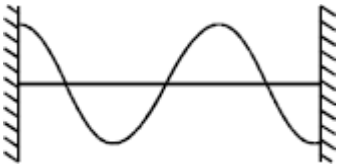
B



C



D



(Total 1 mark)

Q26. A progressive wave in a stretched string has a speed of 20 m s^{-1} and a frequency of 100 Hz. What is the phase difference between two points 25 mm apart?

A zero

B $\frac{\pi}{4}$ rad

C $\frac{\pi}{2}$ rad

D π rad

(Total 1 mark)

Q27. Which one of the following statements about stationary waves is true?

A Particles between adjacent nodes all have the same amplitude.

B Particles between adjacent nodes are out of phase with each other.

C Particles immediately on either side of a node are moving in opposite directions.

D There is a minimum disturbance of the medium at an antinode.

(Total 1 mark)

Q28. Which one of the following types of wave **cannot** be polarised?

A radio

B ultrasonic

C microwave

D ultraviolet

(Total 1 mark)

Q29. The least distance between two points of a progressive transverse wave which have a phase difference of $\frac{\pi}{3}$ rad is 0.050 m. If the frequency of the wave is 500 Hz, what is the speed of the wave?

A 25 m s^{-1}

B 75 m s^{-1}

C 150 m s^{-1}

D 1666 m s^{-1}

(Total 1 mark)

Q30. Which one of the following statements about stationary waves is true?

A Particles between adjacent nodes all have the same amplitude.

B Particles between adjacent nodes are out of phase with each other.

C Particles immediately on either side of a node are moving in opposite directions.

D There is minimum disturbance of the medium at an antinode.

(Total 1 mark)

Q31. Two waves with amplitudes a and $3a$ interfere.

The ratio $\frac{\text{amplitude at an interference maximum}}{\text{amplitude at an interference minimum}}$ is

A 2

B 3

C 4

D infinity

(Total 1 mark)