23 Which statement about waves is correct?

A Both longitudinal and transverse waves can travel through a vacuum.

B Both longitudinal and transverse waves transfer matter.

C Longitudinal progressive waves consist of alternate nodes and antinodes.

D The particles of a transverse wave vibrate perpendicular to the direction of energy propagation.

24 A stationary sound wave is formed in a pipe that is closed at one end and open at the other end. The wave has two antinodes. One of these antinodes is at the open end of the pipe.

The length of the pipe is 0.600 m. The speed of sound in the air column in the pipe is 340 $m\,s^{-1}$.

What is the frequency of the sound wave?

A 425 Hz **B** 850 Hz **C** 1130 Hz **D** 2270 Hz

25 A train travels at constant speed along a straight track. The train's horn emits sound of frequency 500 Hz.

A person standing by the side of the track hears sound of frequency 450 Hz.

The speed of sound in air is 340 $m\,s^{-1}$.

What is the speed of the train and in which direction is it travelling relative to the person?

	speed / $m\,s^{-1}$	direction
A	34	away from the person
B	34	towards the person
C	38	away from the person
D	38	towards the person

26 A smooth surface has bumps on the surface that are smaller than the wavelength of visible light.

What is the approximate maximum size of the largest bumps on the surface?

A 20 nm **B** 350 nm **C** 720 nm **D** 5.0 μm