

Q1 (1 mark)

Transverse motion / transverse waves

Q2 (1 mark)

Reflection

Q3 (1 mark)

When waves meet and combine

Q4 (1 mark)

Hertz (Hz)

Q5 (1 mark)

Longitudinal wave

Q6 (1 mark)

A medium / particles / material

Q7 (1 mark)

About 340 m/s

Q8 (1 mark)

Ear drum / eardrum

Q9 (2 marks)

Waves move up and down (1)

Energy travels forwards (1)

Q10 (2 marks)

Waves combine (1)

Single temporary larger wave formed (amplitudes add) / or cancel them out (1)

Q11 (2 marks)

The wave bounces back from the surface (1)

It changes direction and travels back in the opposite direction (1)

Q12 (2 marks)

Sound needs particles/a medium (1)

Space is a vacuum/no particles (1)

Q13 (2 marks)

Loudspeaker vibrates (1)

Vibrations make surrounding air vibrate (1)

Q14 (3 marks)

- Sound waves vibrate diaphragm (1)
- Vibrations converted to electrical signals (1)
- Signals can be transmitted/recorded (1)

Q15 (3 marks)

- Sound travels faster in solids (1)
- Particles are closer together in solids (1)
- Vibrations transfer energy more quickly (1)

Q16 (2 marks)

Two from:

- Animals can hear different frequencies (1)
- Some hear higher/lower frequencies than humans (1)
- Human hearing range is limited (1)

Q17 (3 marks)

- 1000 Hz has more vibrations per second than 500 Hz (1)
- Higher frequency sound has a higher pitch (1)
- Frequency is the number of waves/vibrations each second (1)

Q18 (3 marks)

- Sound travels through particles (1)
- Water particles are closer together (1)
- Sound travels faster in water (1)

Q19 (3 marks)

- Process = reflection (1)
- Wave bounces off surface (1)
- Travels back in another direction (but stays same type of wave) (1)

Q20 (3 marks)

- The waves have combined (1)
- Their amplitudes cancel each other out / reduce the overall height (1)
- This is called destructive interference (1)

Q21 (4 marks)

- Sound waves travel from student (1)
- Sound reflects from canyon wall (1)
- Reflected sound travels back (1)
- Echo heard after short delay (1)

Q22 (4 marks)

- Ultrasound is high-frequency sound (1)
- Waves reflect from tissues/surfaces (1)

Reflected waves detected by machine (1)
 Images produced safely without harmful radiation (1)

Q23 (4 marks)

Sound waves enter microphone (1)
 Diaphragm vibrates (1)
 Vibrations converted into electrical signals (1)
 Signals sent to computer/recording device (1)

Q24 (4 marks)

In the empty room, sound reflects off hard surfaces (1)
 This causes multiple reflections / echoes (1)
 In the furnished room, soft materials absorb sound energy (1)
 So fewer reflections and reduced echoes / quieter sound (1)

Q25 (6 marks)

Level 1 (1-2 marks)

Basic statements about waves or sound
 Mentions energy transfer or reflection
 Simple scientific ideas

Level 2 (3-4 marks)

Some explanation of wave energy transfer
 Mentions sound waves or water waves correctly
 Includes reflection, absorption, microphones or ultrasound
 Some scientific vocabulary used

Level 3 (5-6 marks)

Water waves transfer energy through transverse motion
 Sound waves are longitudinal pressure waves
 Reflection causes echoes and waves can be absorbed
 Microphones convert sound waves into electrical signals
 Ultrasound transfers energy and is used in medicine/cleaning
 Waves transfer both energy and information
 Clear links between ideas with accurate scientific vocabulary

Model Answer:

Water waves transfer energy through transverse motion where the water moves up and down while the energy moves forwards. Sound waves are longitudinal pressure waves that travel through a medium such as air, water or solids. Sound can reflect from surfaces to produce echoes or be absorbed by soft materials. Microphones detect sound waves when vibrations move the diaphragm and are converted into electrical signals. Ultrasound is a high-frequency sound wave that transfers energy and is used for medical scans, cleaning and physiotherapy. Waves are useful because they can transfer both energy and information.

