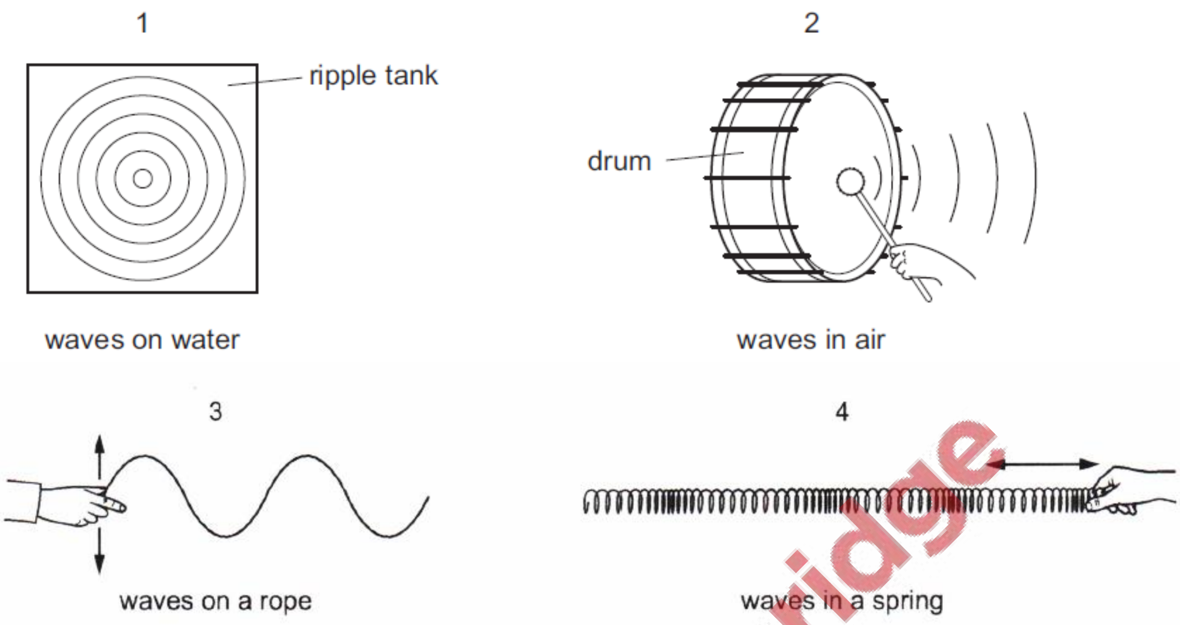
Sound – 2020 IGCSE 0625

1. March/2020/Paper_12/No.21

The diagrams show examples of wave motion.



Which waves are longitudinal?

A 1 only **B** 2 and 3 only **C** 2, 3 and 4 **D** 2 and 4 only

- Sound wave is longitudinal
- Water wave is transverse
- Rope wave is transverse
- Spring waves are longitudinal since the spring vibrates parallel to the direction in which the wave in the spring is moving

2. March/2020/Paper_12/No.25

The horn on a ship makes a sound. The captain on the ship hears an echo from a cliff 4.0 s later.

The speed of sound is 340 m/s.

How far away is the cliff from the ship?

A 170 m **B** 340 m **C** 680 m **D** 1360 m

$d = s \times t$
$= 340 \times 2$
$= 680\,m$

$t = \frac{4}{2} = 2\,s$ ← from the ship to the cliff.

3. March/2020/Paper_12/No.26

Bats produce ultrasound waves to navigate.

What is a possible frequency range for these waves?

KHz - means 1000HZ
↑prefix $10^3 = 1000$

A 0–20 Hz ← infrasound.

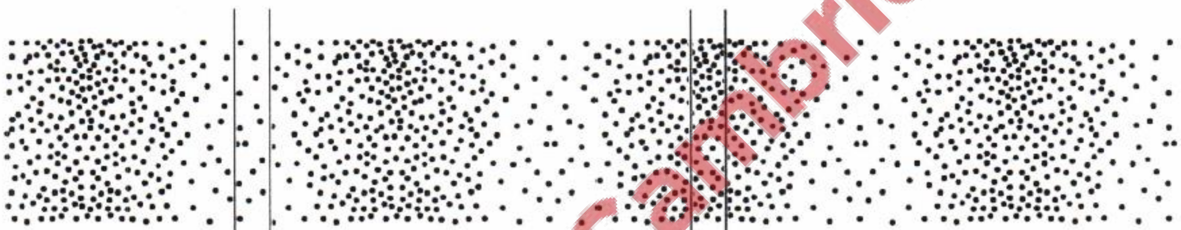
B 20 Hz–2000 Hz ← audible sound

C 2 kHz–20 kHz ← 2000 HZ — 20,000 HZ - audible sound.

D 20 kHz–120 kHz ← 20,000HZ — 120,000HZ ← ultrasound.

4. March/2020/Paper_22/No.28

The diagram shows compressions and rarefactions in air as a sound wave moves from left to right.



A quieter sound of the same frequency is made.

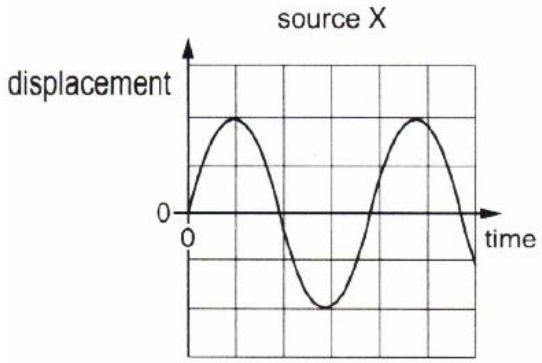
What will happen to the number of particles in a region of rarefaction and in a region of compression?

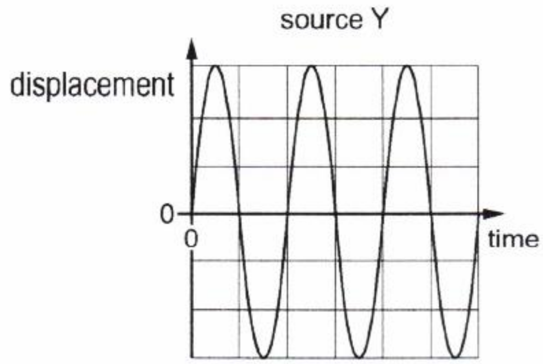
	number of particles in region of rarefaction	number of particles in region of compression
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

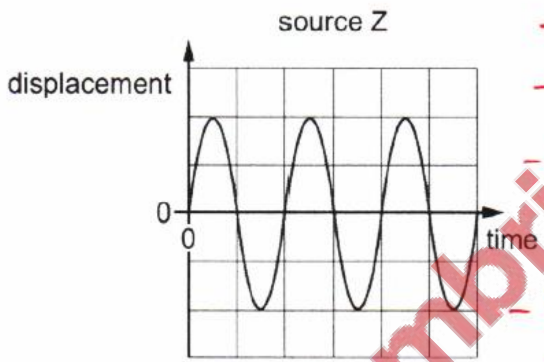
- The particle will spread less at quieter sound since the amplitude is less
- So in rarefaction region, particles will be more but in compression region they will be less.

5. June/2020/Paper_11/No.26

The graphs show the displacement of particles in sound waves from three sources X, Y and Z. The scales on the graphs are all identical.







– frequency → pitch
– amplitude → loudness
– Same pitch means they have same frequency
– Y & Z have same frequency.

Which sources are producing sound waves with the same pitch?

A X and Y only **(B)** Y and Z only **C** X and Z only **D** X, Y and Z

6. June/2020/Paper_12/No.26

A dolphin sends out a sound wave. An echo returns 0.010s later from a fish which is 7.5m from the dolphin.

$t = 0.01s$
$d = 7.5 \times 2$

$v = \frac{d}{t} = \frac{7.5 \times 2}{0.01} = \frac{15}{0.01} = 1500 m/s$

What is the speed of the sound wave in water?

A 0.075 m/s **B** 0.15 m/s **C** 750 m/s **(D)** 1500 m/s

7. June/2020/Paper_13/No.26

A tuning fork produces a sound when it vibrates.

What is the effect on the sound produced when the tuning fork vibrates more times every second and with a larger amplitude?

amplitude – loudness
frequency – pitch.
– So this tuning fork produces a loud sound of high pitch.

A higher pitch and less loud

(B) higher pitch and louder

C lower pitch and less loud

D lower pitch and louder

8. June/2020/Paper_21/No.25

Sound travels through air as a series of compressions and rarefactions.

Which statement correctly compares a compression with a rarefaction?

A In a compression the wavelength is longer than in a rarefaction.

B In a compression the wavelength is shorter than in a rarefaction.

C In a compression the density of the air is greater than in a rarefaction.

D In a compression the density of the air is lower than in a rarefaction.

density = mass / volume

– at compression, there is more air particles in a small region

– so more particles, means more mass.

9. June/2020/Paper_22/No.25

A dolphin sends out a sound wave. An echo returns 0.010 s later from a fish which is 7.5 m from the dolphin.

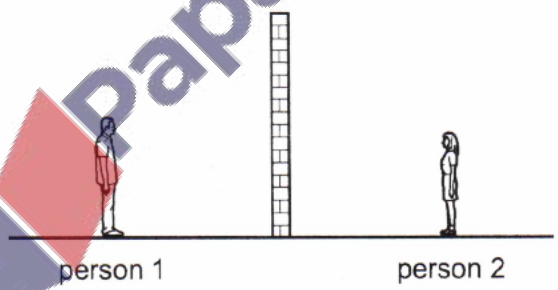
Speed = distance / time ; d = 7.5×2 = 15 m ; t = 0.010 s ; Speed = 15 m / 0.010 s = 1500 m/s

What is the speed of the sound wave in water?

A 0.075 m/s **B** 0.15 m/s **C** 750 m/s **D** 1500 m/s

10. June/2020/Paper_23/No.25

Two people are standing outdoors on either side of a high wall.



Person 1 can hear person 2 talking although he cannot see her.

Which statement explains this?

A The sound waves have diffracted around the wall.

B The sound waves have passed unaffected through the wall.

C The sound waves have reflected around the wall.

D The sound waves have refracted around the wall.

diffraction – bending of waves round obstacles or when through a gap.

11. June/2020/Paper_31/No.8

Fig. 8.1 represents the pressure at one instant along part of a sound wave.

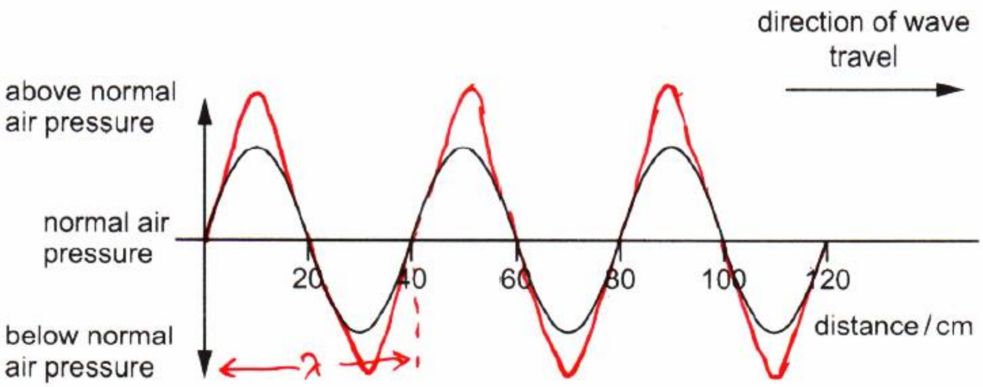


Fig. 8.1

(a) (i) Determine the wavelength of the sound wave.

wavelength of the sound wave = ...40........ cm [1]

(ii) On Fig. 8.1, draw a wave representing a louder sound of the same wavelength. [1]

(b) State the range of audible frequencies for a healthy human ear. Include the unit.

........20 Hz to 20,000 Hz........ [2]

[Total: 4]

Louder sound has a large amplitude for (a)(ii) drawing.

12. June/2020/Paper_32/No.8

Sound travels as a wave.

(a) Complete each sentence.

Sound is produced when an object ......vibrates......

An echo is produced when sound is ......reflected...... from a hard surface.

Compared with a quiet sound, a loud sound always has a greater ......amplitude......

Compared with a high pitched sound, a low pitched sound always has a smaller ......frequency......

Waves transfer energy without transferring ......matter...... [5]

(b) State the meaning of the term ultrasound.

Vibration with higher frequency than audible sound. [1]

[Total: 6]

13. June/2020/Paper_41/No.6

The speed of sound in air is 340 m/s.

$f = 20\,Hz - 20000\,Hz$

(a) Calculate the range of wavelengths for sounds that are audible by a healthy human ear.

$\lambda = \frac{v}{f} = \frac{340\,m/s}{20\,Hz} = 17\,m$; $\lambda = \frac{340\,m/s}{20000\,Hz} = 0.017\,m$

wavelengths range from ......17 m...... to ......0.017 m...... [2]

(b) Sound waves are longitudinal waves.

Describe how a longitudinal wave differs from a transverse wave.

– In longitudinal waves, vibrations are parallel to wave propagation

– In transverse, the vibrations are perpendicular to the direction of wave travel. [3]

(c) Fig. 6.1 shows a band in front of a building.

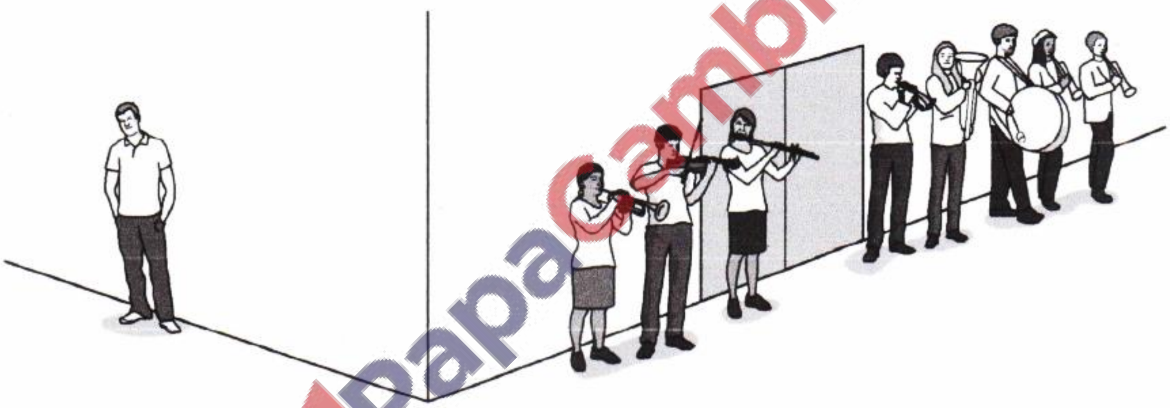


Fig. 6.1

The drum produces a low frequency sound. Other musical instruments produce a high frequency sound. These sounds are equally loud.

A young man at the side of the building hears the drum but not the high frequency sounds from the other musical instruments.

$v = f \times \lambda$.

Explain why this happens.

– The wavelength from the drum sound is greater than wavelength from other instrument

– So it has more diffraction and reaches the young man. [3]

[Total: 8]