Sound – 2019 Nov IGCSE

1. 0625/31/O/N/19/No.8

(a) Fig. 8.1 shows a student listening to the sound produced by a tuning fork.

Fig. 8.1

(i) State how the tuning fork produces the sound.

..... [1]

(ii) Complete the following sentence. Choose a word from the box.

electromagnetic	longitudinal	transverse

A sound wave is ..... [1]

(iii) A loudspeaker produces a sound with a frequency of 25 kHz.

A student with healthy ears cannot hear this sound. Explain why.

.....

..... [2]

(b) Fig. 8.2 represents a sound wave travelling in air.

Fig. 8.2 (drawn full size)

(i) The air particles are moving. On Fig. 8.2, draw **two** arrows in opposite directions to show the movement of the air particles. [1]

(ii) Use Fig. 8.2 to determine the wavelength of the sound wave.

wavelength = ... cm [1]

(c) Describe a method of using water waves to demonstrate refraction.

.....

.....

.....

.....

.....

..... [4]

[Total: 10]

2. 0625/32/O/N/19/No.9

A boat race starts on the sea, but close to land. Fig. 9.1 shows the boats at the start of the race.

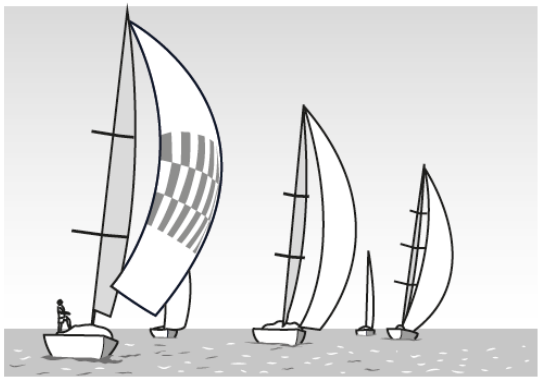

Fig. 9.1

On the land, a cannon produces a loud bang to start the race. There is a flash of light at the same time as the bang.

(a) (i) At the start of the race, the sailors watch for the flash of light from the cannon.

Suggest why the sailors watch for the flash of light rather than listen for the bang.

.....

..... [1]

(ii) One of the sailors is 500 m from the cannon. She measures a time difference of 1.6 seconds between seeing the flash of light and hearing the bang.

Calculate the speed of sound.

speed of sound = ... m/s [3]

(iii) The value of the speed of sound obtained in **(a)(ii)** is lower than expected.

Suggest a reason for this difference.

.....

..... [1]

(b) The race is held close to a part of the coast with high cliffs. A sailor hears a second bang shortly after the first bang.

State the term for the second bang and explain how it is produced.

term .....

explanation .....

[2]

[Total: 7]

3. 0625/41/O/N/19/No.4

Fig. 4.1 shows a loudspeaker that is producing a sound wave in air of frequency 15 000 Hz.

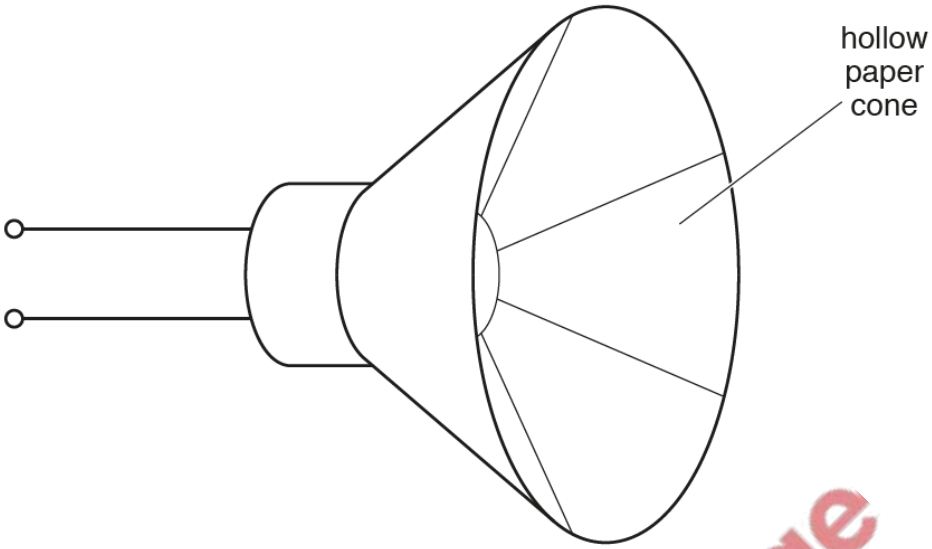

Fig. 4.1

(a) Describe how the cone of the loudspeaker produces this sound.

.....

.....

.....

..... [3]

(b) The speed of sound in air is 330 m/s.

Calculate the wavelength of this sound.

wavelength = ... [2]

(c) The loudspeaker is placed a considerable distance to the left of a barrier with a gap. The width of the gap is double the wavelength of the sound. Sound from the loudspeaker reaches the barrier and passes through the gap.

Fig. 4.2 shows the gap in the barrier.

Fig. 4.2 (not to scale)

On Fig. 4.2, sketch a diagram that represents the sound wave as a series of wavefronts

- travelling towards the barrier
- in the gap
- and travelling away from the barrier.

[3]

[Total: 8]

4. 0625/42/O/N/19/No.5

(a) One difference between a longitudinal wave and a transverse wave is that a longitudinal wave consists of compressions and rarefactions.

(i) Explain the terms compression and rarefaction using ideas about particles.

compression .....

.....

.....

rarefaction .....

.....

.....

[2]

(ii) Describe **one** other way in which longitudinal wave motion differs from transverse wave motion.

Longitudinal wave motion .....

.....

.....

Transverse wave motion .....

.....

.....

[2]

(b) **(i)** A sound wave of frequency 0.120 kHz travels through a rock at a speed of 3500 m/s.

Calculate the wavelength of the wave.

wavelength = ... [3]

(ii) The wave travels from the rock into the air.

State and explain whether the wave will be audible to a healthy human ear.

statement .....

explanation .....

.....

[2]

[Total:9]

Fig. 6.1 represents wavefronts of a sound wave travelling in air from left to right.

Fig. 6.1

(a) State the name given to the:

(i) region around A in the diagram ..... [1]

(ii) region around B in the diagram. ..... [1]

(b) On Fig. 6.1, draw a double-headed arrow to show **one** wavelength. [1]

(c) The loudness of the sound increases at the same pitch.

State and explain any change there would be in the pattern of wavefronts shown in Fig. 6.1.

.....

.....

.....

..... [3]

(d) The wave passes into water.

State and explain any change in the pattern of wavefronts shown in Fig. 6.1.

.....

.....

.....

..... [3]

[Total: 9]