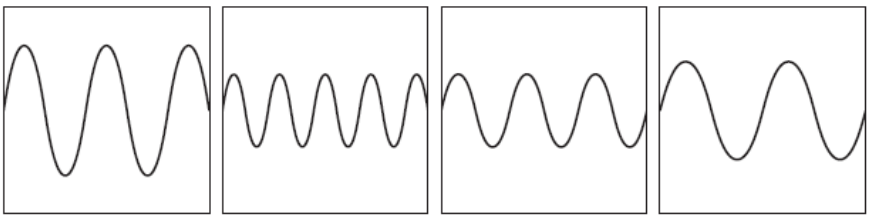
Exercise Sheet on Sound (20 marks)

Name

Question 1

The diagrams show the oscilloscope traces produced by four different sounds. Which sound has the highest pitch?

Question 1 ☐



A B C D

Question 2

What is the approximate range of audible frequencies?

A 20 Hz to 200 Hz

B 20 Hz to 20 kHz

C 200 Hz to 20 kHz

D 20 kHz to 200 kHz

Question 2 ☐

Question 3

Which of the following statements is **not** correct?

A Sound waves are longitudinal.

B Sound waves require a medium if they are to be transmitted.

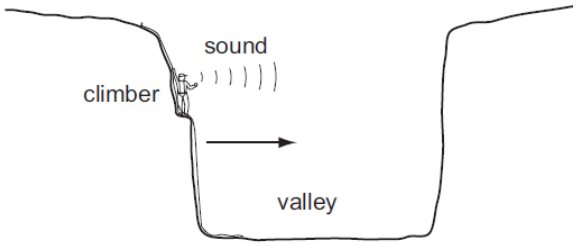
C Sound waves travel fastest through a vacuum.

D Sound waves are produced by a vibrating source.

Question 3 ☐

Question 4

To estimate the width of a valley, a climber starts a stopwatch as he shouts. He hears an echo from the opposite side of the valley after 1.0 s.



Question 4 ☐

The sound travels at 340 m/s.

What is the width of the valley?

A 85 m **B** 170 m **C** 340 m **D** 680 m

Question 5

A fire alarm is not loud enough. An engineer adjusts it so that it produces a note of the same pitch which is louder.

What effect does this have on the amplitude and on the frequency of the sound?

	amplitude	frequency
A	larger	larger
B	larger	same
C	same	larger
D	same	same

Question 5 ☐

Question 6

When the horn on a ship is sounded, the passengers hear an echo from a cliff after 4.0 s.

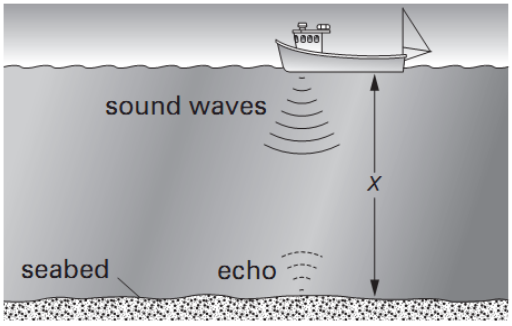
If the speed of sound is 340 m/s, how far away is the cliff?

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

Question 6 ☐

Question 7

A boat sends a sound wave down to the seabed at depth *X*. It detects the reflected sound wave (the echo) after time *T*.



Which of the following is the correct expression for the speed of sound in the water?

Question 7 ☐

A $\frac{X}{T}$

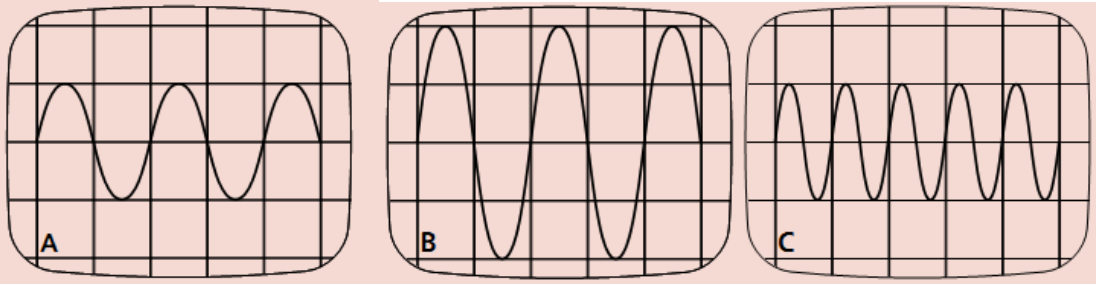
B $\frac{(2\times X)}{T}$

C $\frac{X}{(2\times T)}$

D $\frac{(2\times X)}{(2\times T)}$

Question 8

A microphone is connected to an oscilloscope (CRO). When different sounds, A, B, and C, are made, these are the waveforms seen on the screen:



a Comparing sounds A and B, how would they sound different? [2]

b Comparing sounds A and C, how would they sound different? [2]

c The speed of sound is 330 m/s. If sound A has a frequency of 220 Hz, what is its wavelength? [2]

d What is the frequency of sound C? [2]

Question 9

Fig. 5.1 shows a boat steaming along a river. The river is in a wide gorge and there are high cliffs on each side.

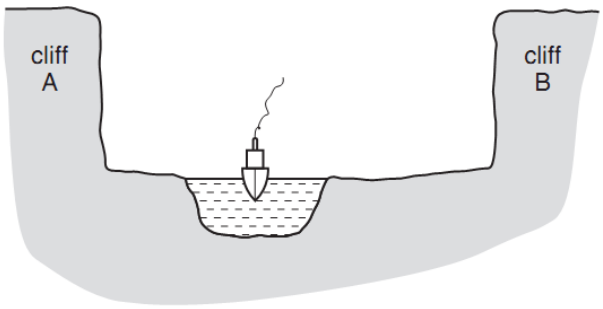


Fig. 5.1

The boat sounds its hooter once. Two clear echoes are heard by a person on the boat.

The first echo is 1.5 s after the hooter sounds. The second echo is 2.5 s after the hooter sounds.

(i) Which cliff caused the first echo? .....[1]

(ii) Sound travels at 330 m/s in air.

Calculate the distance between the two cliffs.

distance = ... m [4]