4 Sound waves with a frequency above the range of human hearing are known as ultrasound.

(a) State the frequency range for human hearing.

(2)

(b) The frequency of ultrasound waves can be determined using an oscilloscope.

(i) Give the name of the piece of apparatus that could be connected to the oscilloscope to detect the ultrasound waves.

(1)

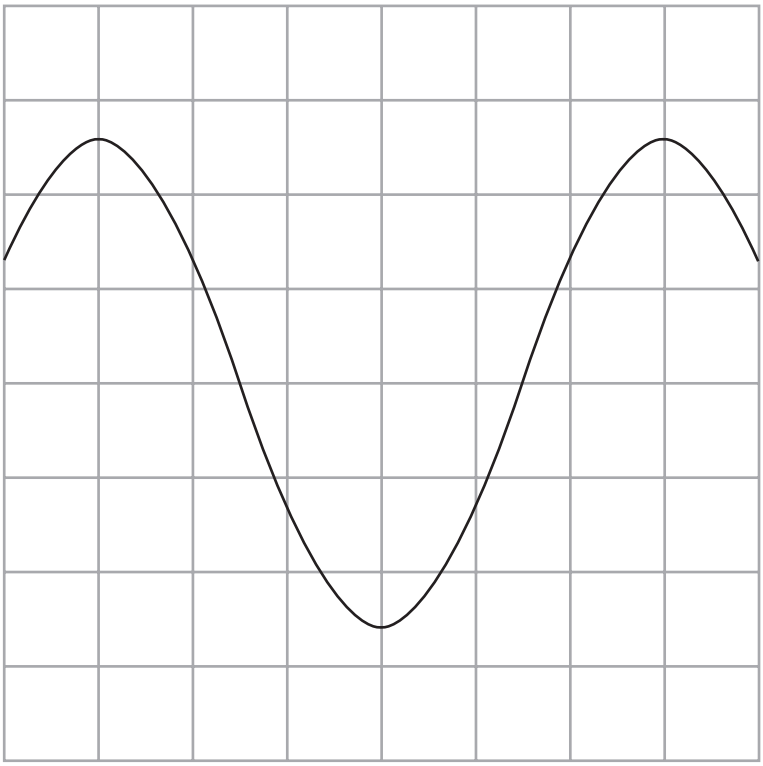
(ii) The time period of the ultrasound waves must be measured to determine their frequency.

Describe how the oscilloscope is used to measure the time period of the ultrasound waves.

(3)

(c) The diagram shows the oscilloscope screen when an ultrasound wave is detected.

The oscilloscope settings are also shown.



oscilloscope settings:

y direction: 1 square = 2V

x direction: 1 square = 5×10^{-6} s

(i) Determine the time period of the ultrasound waves.

(2)

time period = ... s

(ii) Calculate the frequency of the ultrasound waves.

(2)

frequency = ... Hz

(Total for Question 4 = 10 marks)