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Exam Preparation and Free Resources

Name of the Student:_____

Max. **Marks : 23 Marks**   **Time : 23 Minutes**

Q1.

A note was played on an electric keyboard.

The frequency of the note was 440 Hz.

(a)   (i)   What does a frequency of 440 Hz mean?

_____

_____

(1)

(ii)   The sound waves produced by the keyboard travel at a speed of 340 m / s.

Calculate the wavelength of the note.

Give your answer to **three** significant figures.

_____

_____

_____

Wavelength = _____ metres

(3)

(b)   **Figure 1** shows a microphone connected to a cathode ray oscilloscope (CRO) being used to detect the note produced by the keyboard.
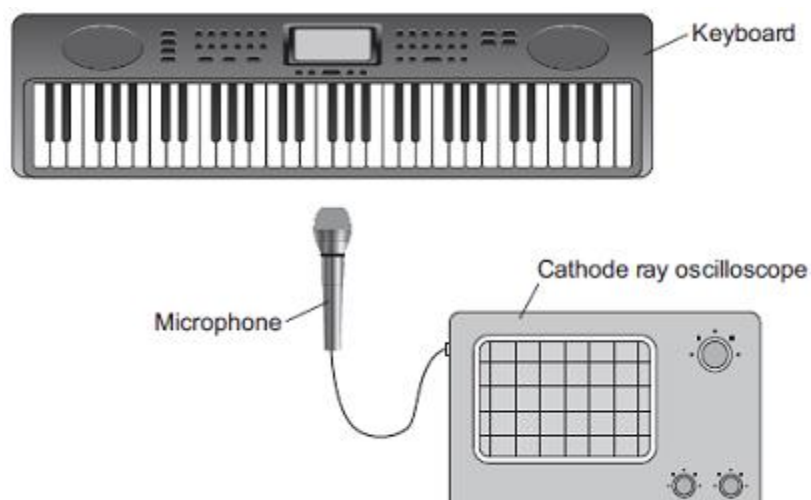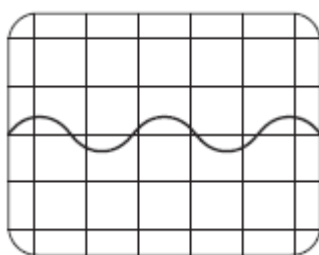
Figure 1

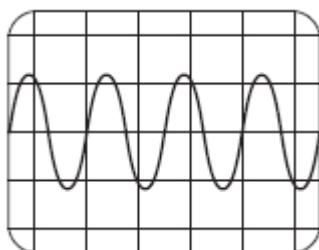**Figure 2** shows the trace produced by the sound wave on the CRO.

Figure 2

A second note, of different wavelength, was played on the keyboard.

Figure 3 shows the trace produced by the sound wave of the second note on the CRO.

Figure 3

The settings on the CRO were unchanged.

What **two** conclusions should be made about the **second** sound wave produced by the keyboard compared with the **first** sound wave?

Give a reason for each conclusion.

Conclusion 1 _____

_____

Reason _____

_____

Conclusion 2 _____

_____

Reason _____
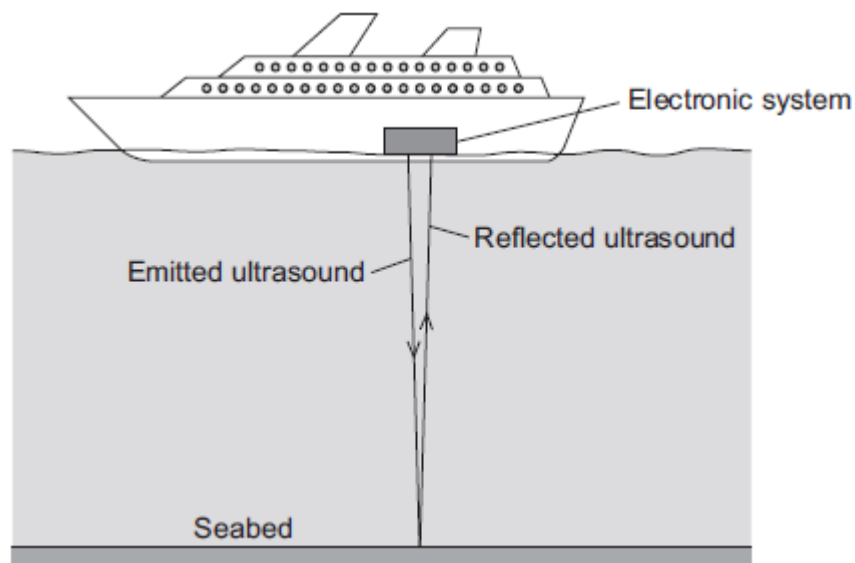
_____

(4)

(Total 8 marks)

Q2.

(a)   What is ultrasound?

_____

_____

(1)

(b)   **Figure 1** shows how ultrasound is used to measure the depth of water below a ship.

Figure 1

A pulse of ultrasound is sent out from an electronic system on-board the ship.

It takes 0.80 seconds for the emitted ultrasound to be received back at the ship.

Calculate the depth of the water.

Speed of ultrasound in water = 1600 m / s

_____

_____

_____

_____

Depth of water = _____ metres

(3)

(c)   Ultrasound can be used in medicine for scanning.

State **one** medical use of ultrasound scanning.

_____

(1)

(d) Images of the inside of the human body can be made using a Computerised Tomography (CT) scanner. The CT scanner in **Figure 2** uses X-rays to produce these images.

Figure 2

State **one** advantage and **one** disadvantage of using a CT scanner, compared with ultrasound scanning, for forming images of the inside of the human body.

Advantage of CT scanning _____

_____

_____

Disadvantage of CT scanning _____

_____

_____

(2)
(Total 7 marks)

Q3.

(a) Human ears can detect a range of sound frequencies.

(i) Use the correct answers from the box to complete the sentence.

2	20	200	2000	20 000

The range of human hearing is from about _____ Hz to _____ Hz.

(2)

(ii)   What is ultrasound?

_____

_____

(1)

(iii)   Ultrasound can be used to find the speed of blood flow in an artery.

State **one** other medical use of ultrasound.

_____

(1)

(b)   The speed of an ultrasound wave in soft tissue in the human body is 1.5×10^3 m / s and the frequency of the wave is 2.0×10^6 Hz.

Calculate the wavelength of the ultrasound wave.

_____

_____

Wavelength = _____ m

(2)

(c)   When ultrasound is used to find the speed of blood flow in an artery:

•   an ultrasound transducer is placed on a person's arm

•   ultrasound is emitted by the transducer

•   the ultrasound is reflected from blood cells moving **away** from the transducer

•   the reflected ultrasound is detected at the transducer.

Describe the differences between the ultrasound waves emitted by the transducer and the reflected waves detected at the transducer.

_____

_____

_____

_____

(2)
(Total 8 marks)