

Answer **all** questions in the spaces provided.

- 1 (a) This information is from a science magazine.

Electronic systems can be used to produce ultrasonic waves. These waves have a frequency higher than the upper limit for hearing in humans.

Complete the sentence by choosing the correct number from the box.

**20                      2000                      20 000                      200 000**

The upper limit for hearing in humans is a frequency of ..... Hz.  
(1 mark)

- 1 (b) An electronic system produces ultrasound with a frequency of 500 kHz.

What does the symbol kHz stand for?

.....  
(1 mark)

- 1 (c) (i) State **one** industrial use for ultrasound.

.....  
(1 mark)

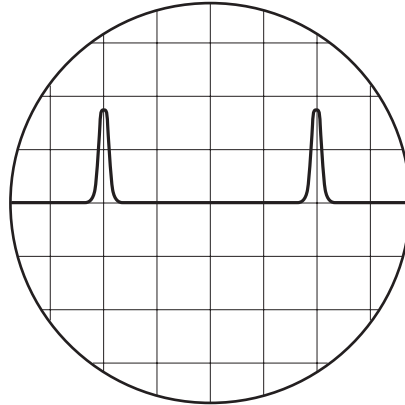
- 1 (c) (ii) State **one** medical use for ultrasound.

.....  
(1 mark)



- 1 (d) An ultrasound detector is connected to an oscilloscope.

The diagram shows centimetre squares on an oscilloscope screen. Each horizontal division represents 2 microseconds.



Calculate the time, in microseconds, between one peak of one ultrasound pulse and the peak of the next.

.....

Time = ..... microseconds  
(1 mark)

- 1 (e) Ultrasounds are partially reflected when they reach a boundary between two different media. The time taken for the reflection from the boundary to reach the detector can be seen from the screen.

What can be calculated from this time interval?

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(2 marks)

- 1 (f) Explain what action scientists should take if they find evidence that ultrasonic waves may be harmful to human health.

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(2 marks)

