

Ultrasound

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)

- (b) An electronic system produces ultrasound with a frequency of 500 kHz. What does the symbol kHz stand for?

..... (1)

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

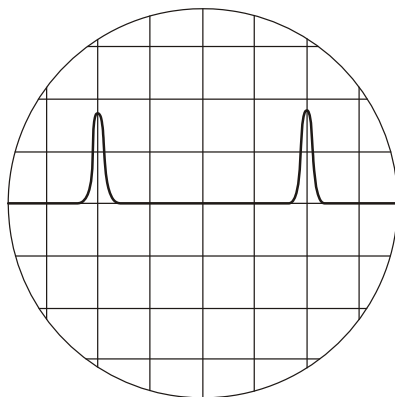
..... (1)

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

..... (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)

Unit P3, P3.1.2

- (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?

.....

(2)

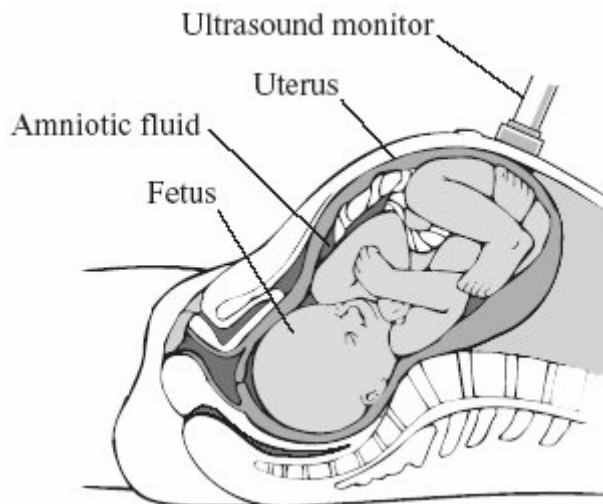
- (f) Explain what action scientists should take if they find evidence that ultrasonic waves may be harmful to human health.

.....

(2)

(Total 9 marks)

2. The diagram shows an ultrasound monitor being used to scan a fetus.



The table shows the velocity of ultrasound waves in different tissues of the fetus.

Tissue	Velocity of ultrasound in m/s
Amniotic fluid (liquid surrounding fetus)	1540
Bone	3080
Kidney	1561
Liver	1549
Muscle	1585

Unit P3, P3.1.2

Explain why we are able to see the different parts of the fetus in an ultrasound scan. You may use information from the table in your answer.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

.....

.....

.....

.....

.....

(Total 4 marks)