6 Magnetic Resonance Imaging (MRI) machines can take scans of the inside of a patient.

(a) There is an electromagnet inside the MRI machine.

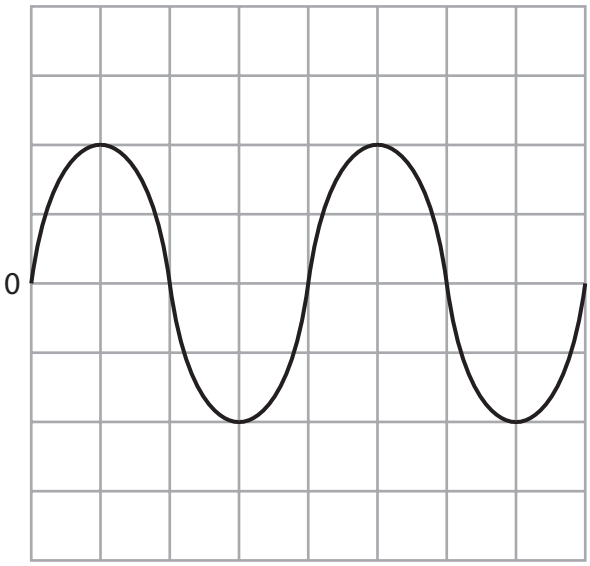
Describe the construction of an electromagnet.

You may draw a diagram to help your answer.

(4)

(b) During the scan, music can be played through a loudspeaker to the patient.

The oscilloscope trace in the diagram represents a sound played to the patient.



Oscilloscope settings:

y direction: 1 square = 0.5 V

x direction: 1 square = 0.5 ms

(i) Determine the period of the sound wave.

(3)

period = ... s

(ii) Calculate the frequency of the sound wave.

(2)

frequency = ... Hz

(iii) Deduce whether humans can hear the sound wave.

(2)

.....

.....

.....

.....

(iv) The current in the loudspeaker is alternating current (a.c.).

Give the evidence from the oscilloscope trace to support this statement.

(2)

.....

.....

.....

.....

(v) Draw the circuit symbol for an a.c. power supply.

(1)

(Total for Question 6 = 14 marks)