AQA GCSE Physics | 8463

SPECIFICATION POINT 4.7.3.3

Microphones (HT only)

Past-paper questions

Tier	**Higher**
Question groups	**3**
Available paper years	**2019–2024**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.7.3.3 Microphones (HT only)

Question 01

June 2019 | 8463/2H | Original Q9

0 9 . 1 **Table 3** gives the frequencies in the hearing ranges of five different animals.

Table 3

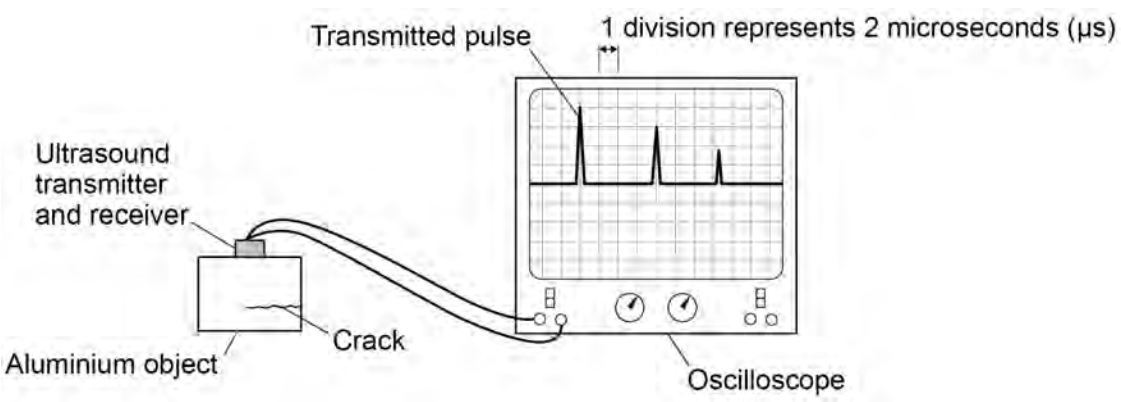
Animal	Frequencies of hearing range
Cat	55 Hz to 77 kHz
Chicken	125 Hz to 2 kHz
Dog	20 Hz to 30 kHz
Gerbil	56 Hz to 60 kHz
Horse	55 Hz to 33 kHz

Which **one** of the animals from **Table 3** would not be able to hear ultrasound?

[1 mark]

Figure 17 shows ultrasound being used to detect a hidden crack in a solid aluminium object. The transmitted and reflected pulses of ultrasound are shown on the screen.

Figure 17



4.7.3.3 Microphones (HT only)

Question 01 · continued

0 9 . 2 Which of the following is the same as 2 microseconds?

[1 mark]

Tick (✓) **one** box.

2×10^{3} s ☐

2×10^{-3} s ☐

2×10^{-6} s ☐

2×10^{-9} s ☐

0 9 . 3 Ultrasound travels at 6300 m/s in aluminium.

Determine the depth of the crack below the top surface of the aluminium.

Use information from **Figure 17**.

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

[4 marks]

Depth = _____ m

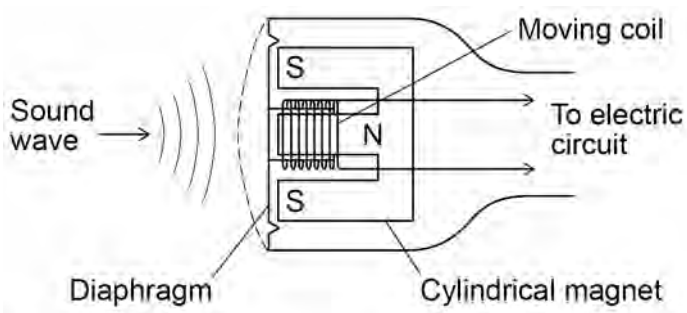
Question 9 continues on the next page

4.7.3.3 Microphones (HT only)

Question 01 · continued

Figure 18 shows the parts of a moving-coil microphone.

Figure 18



0 9 . 4 What is the function of a microphone?

[1 mark]

0 9 . 5 Explain how a moving-coil microphone works.

[4 marks]

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4.7.3.3 Microphones (HT only)

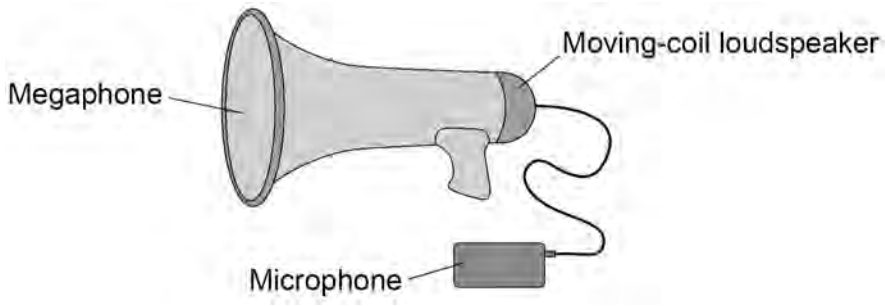
Question 02

June 2023 | 8463/2H | Original Q4

0 4 A megaphone uses a loudspeaker to amplify sounds that are detected by a microphone.

Figure 10 shows a megaphone and microphone.

Figure 10



0 4 . 1 Complete the sentence.

[1 mark]

The microphone is used to convert the pressure variations in sound waves into variations in _____ .

4.7.3.3 Microphones (HT only)

Question 02 · continued

0 4 . 2 The loudspeaker contains a permanent magnet.

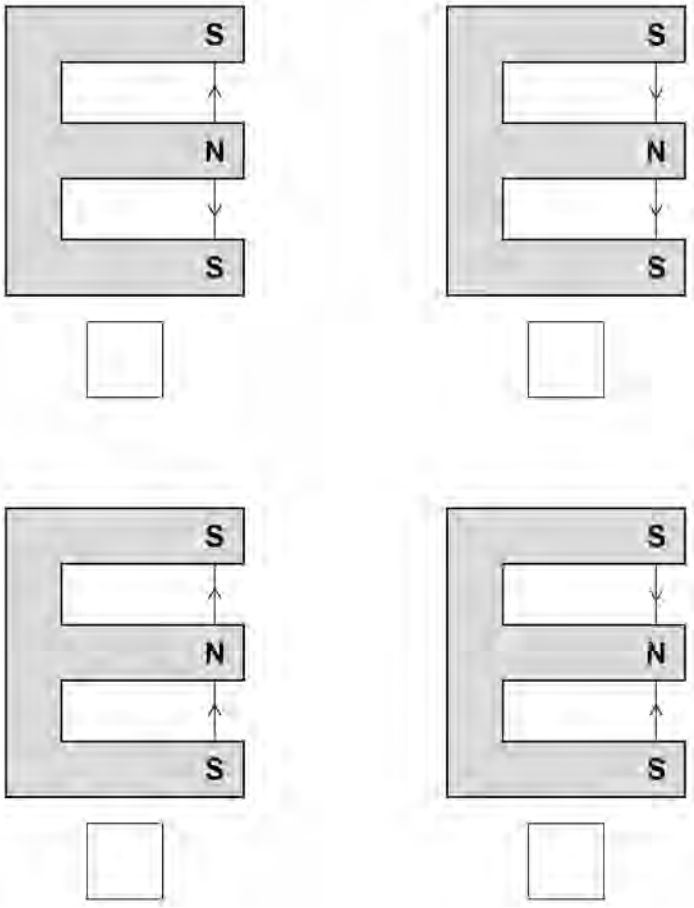
Which diagram in **Figure 11** shows the direction of the magnetic field between the north pole and the south pole of the magnet?

The magnets are shown in cross-section.

[1 mark]

Tick (✓) **one** box.

Figure 11



0 4 . 3 Some magnets are permanent magnets and some are induced magnets.

What is an induced magnet?

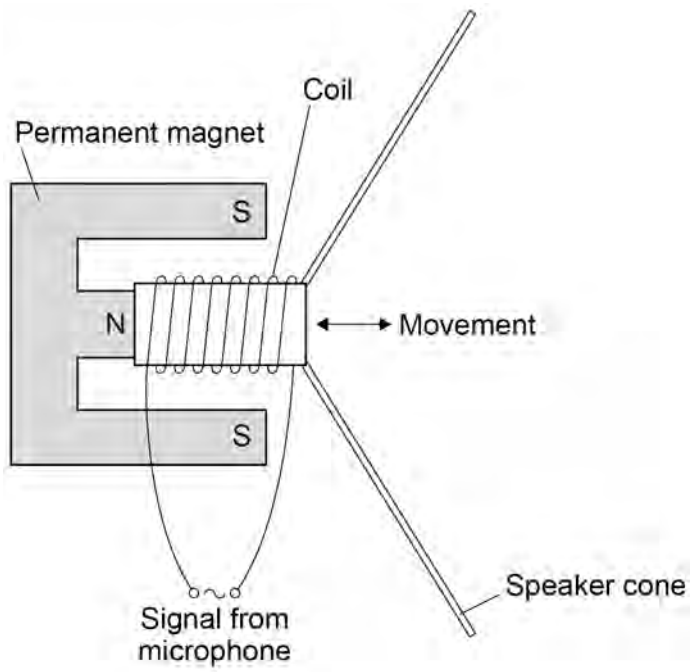
[1 mark]

4.7.3.3 Microphones (HT only)

Question 02 · continued

Figure 12 shows the parts of the loudspeaker in the megaphone.

Figure 12



A current in the coil of the loudspeaker causes the coil to move.

0 4 . 4 What is the name of the effect that causes the coil to move?

[1 mark]

Tick (✓) **one** box.

- Electromagnet effect ☐
- Induction effect ☐
- Motor effect ☐
- Speaker effect ☐

4.7.3.3 Microphones (HT only)

Question 02 · continued

0 4 . 5 When the current in the coil is 16 mA, the force on the coil is 0.013 N.

The length of the wire that makes up the coil is 6.5 m.

Calculate the magnetic flux density around the coil in the electromagnet.

Use the Physics Equations Sheet.

[4 marks]

Magnetic flux density = _____ T

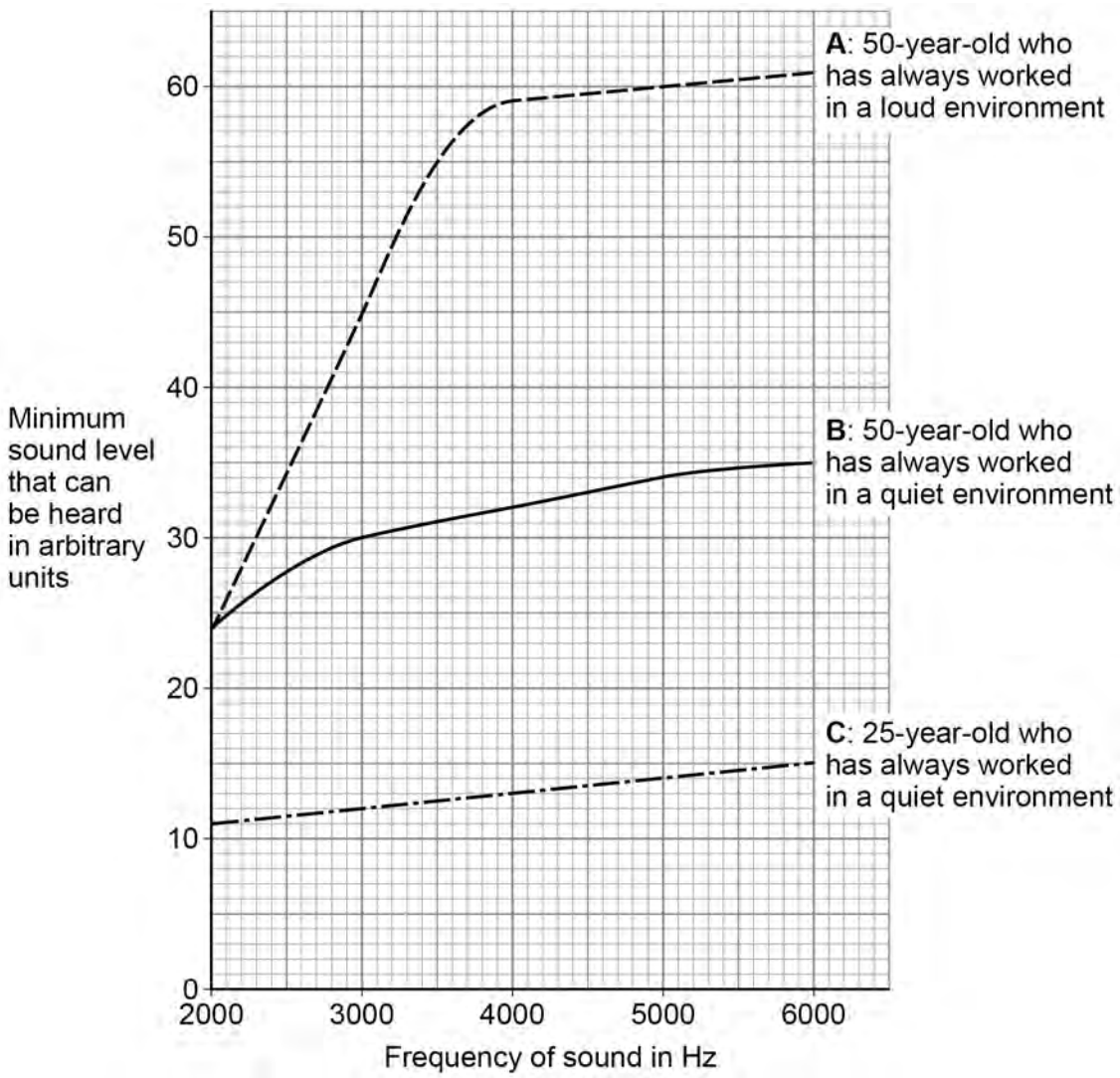
Question 4 continues on the next page

0 4 . 6 Megaphones can produce very loud sounds.

A person's hearing can be affected by age and by working in a loud environment.

Figure 13 shows how frequency affects the minimum sound level that can be heard by three different people, **A**, **B** and **C**.

Figure 13



4.7.3.3 Microphones (HT only)

Question 02 · continued

Compare how different factors affect the minimum sound level that these people can hear.

[4 marks]

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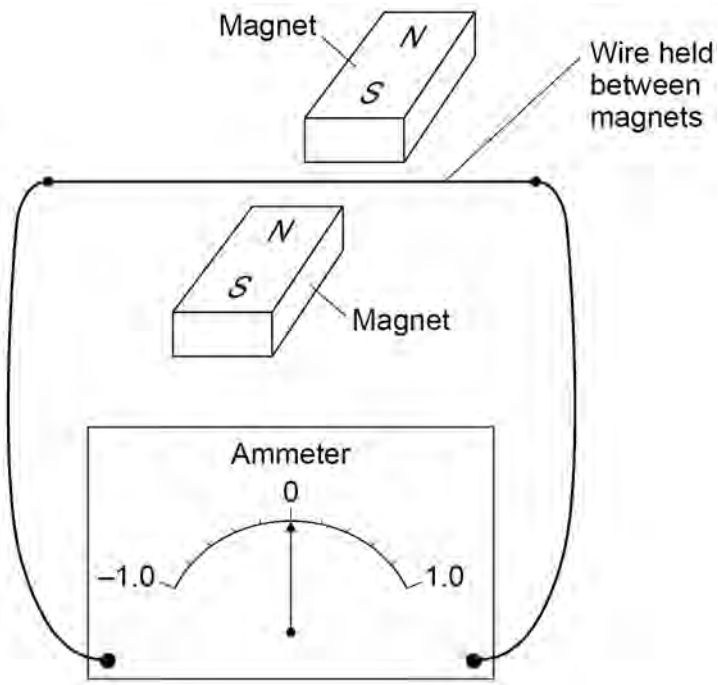
4.7.3.3 Microphones (HT only)

Question 03

June 2024 | 8463/2H | Original Q8

0 8 **Figure 13** shows some apparatus used by a teacher in a demonstration.

Figure 13



The teacher moved the wire upwards between the magnets.

The needle on the ammeter deflected to a value of +0.4 mA and then returned to zero.

0 8 . 1 What effect did this demonstrate?

[1 mark]

4.7.3.3 Microphones (HT only)

Question 03 · continued

0 8 . 2 Explain why a current was detected when the wire in **Figure 13** was moved upwards.

[3 marks]

0 8 . 3 The teacher reversed the direction of the magnetic field.

The teacher replaced the wire in its original position.

The teacher moved the wire upwards in the same way as before.

What was the deflection of the needle on the ammeter?

[1 mark]

Tick (✓) **one** box.

The needle will deflect to –0.4 mA. ☐

The needle will not move. ☐

The needle will deflect to +0.4 mA. ☐

Question 8 continues on the next page

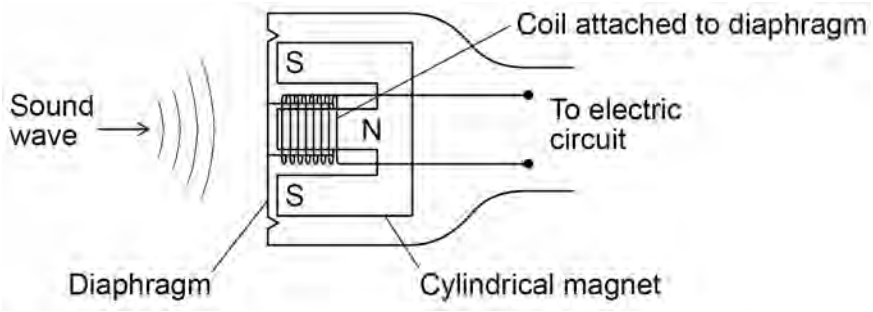
4.7.3.3 Microphones (HT only)

Question 03 · continued

0 8 . 4 **Figure 14** shows a sound wave incident on the diaphragm of a moving-coil microphone.

The inside of the microphone includes a small coil of wire and a magnet.

Figure 14



Explain why the sound waves have an effect on the electric circuit.

[3 marks]

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