AQA GCSE Physics | 8463

SPECIFICATION POINT 4.7.2.4

Loudspeakers (physics only) (HT only)

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**4**
Available paper years	**2014–2023**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.7.2.4 Loudspeakers (physics only) (HT only)

Answer 01 · Mark scheme

June 2014 | PH3HP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO spec ref
8(a)	(a) hydraulic (system)		1	AO1 3.2.3b
8(b)	15.40×10^2 **or** 1540	allow **1** mark for correct substitution, ie $8.75 \times 10^4 = \frac{F}{1.76 \times 10^{-2}}$ **or** $87\,500 = \frac{F}{0.0176}$ **or** $F = 8.75 \times 10^4 \times 1.76 \times 10^{-2}$ **or** $F = 87\,500 \times 0.0176$	2	AO2 3.2.3
8(c)	any **one** environmental **advantage**: plant oil is renewable using plant oil will conserve (limited) supplies **or** extend lifetime of the usual/crude oil. plant oil releases less carbon dioxide (when it is being produced / processed) plant oil will add less carbon dioxide to the atmosphere (when it is being produced / processed, than the usual oil) plant oil removes carbon dioxide from **or** adds oxygen to the air when it is growing	stating a converse statement is insufficient, or a disadvantage of the usual oil, ie the usual oil is non-renewable stating that plant oil is carbon neutral is insufficient	1	AO2 3.2.3c

Question 8 continues on the next page . . .

4.7.2.4 Loudspeakers (physics only) (HT only)

Question 8 continued . . .

Question	Answers	Extra information	Mark	AO spec ref
8(d)	(the current flowing through the coil) creates a magnetic field (around the coil) (this magnetic field) interacts with the permanent magnetic field **or** current carrying conductor is in a (permanent) magnetic field this produces a (resultant) force (and coil / cone moves) when the direction of the current changes, the direction of the force changes to the opposite direction	it must be clear which magnetic field is which accept for **2** marks the magnetic field of the coil interacts with the permanent magnetic field	1 1 1 1	AO2 AO3 3.3.1a, b
Total			**8**	

4.7.2.4 Loudspeakers (physics only) (HT only)

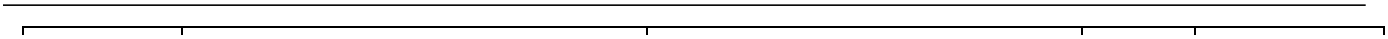
Answer 02 · Mark scheme June 2017 | PH3HP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)	any **two** from: • The number of turns on the coil • The strength of the magnet • The (stiffness of the) elastic bands	do not accept number of coils allow how tightly the turns are wrapped allow distance between the magnet and coil / cone allow strength/elasticity/tension for stiffness ignore references to size of paper cone change direction of current or magnet is insufficient	2	AO3 3.3.1c
1(b)(i)	1.3 (cm)	two values (1.4 and 2.7) correctly taken from the graph scores **1** mark	2	AO2 3.3.1b
1(b)(ii)	any **two** from: • (Below 1A) as the current increases the distance increases • Above 1A the distance does not change (with current) • Between 0.3A and 0.7A the relationship is linear	accept the maximum distance (that the cone can move) is 2.8 cm accept between 0.6 cm and 2.2 cm the relationship is linear ignore references to positive correlation and direct proportionality a description of the shape of the graph is insufficient eg the line levels off after 1A	2	AO3 3.3.1c
Total			**6**	

4.7.2.4 Loudspeakers (physics only) (HT only)

Answer 02 · Mark scheme

June 2017 | PH3HP | Original Q1 | Legacy



4.7.2.4 Loudspeakers (physics only) (HT only)

Answer 03 · Mark scheme

November 2021 | 8463/2H | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	motor (effect)		1	AO1 4.7.2.4
08.2	current creates a magnetic field (around the coil) (which) interacts with the permanent magnet field producing a (resultant) force causing the coil/cone to move (when the) direction of the current reverses, the direction of the (resultant) force reverses (producing a sound wave)	 allow coil/cone for force allow backwards for reverses	1 1 1 1	AO1 4.7.2.4
08.3	the student changed two variables at the same time (so) it is not possible to know the effect of each variable	allow only one variable should be changed at a time	1 1	AO3 4.6.1.2
Total			**7**	

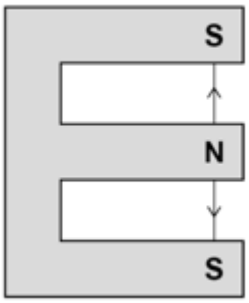
4.7.2.4 Loudspeakers (physics only) (HT only)

Answer 04 · Mark scheme

June 2023 | 8463/2H | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	current **or** potential difference	allow charge flow	1	AO1 4.7.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2			1	AO1 4.7.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	an induced magnet is a material that becomes a magnet when it is placed in a magnetic field **or** an induced magnet loses most / all of its magnetism (quickly) when removed from a magnetic field	allow ‘when close to another magnet’ for ‘when it is placed in a magnetic field’ allow ‘no magnets are nearby’ for ‘removed from a magnetic field’ ‘temporary magnet’ alone is insufficient	1	AO1 4.7.1.1

4.7.2.4 Loudspeakers (physics only) (HT only)

Answer 04 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	motor effect		1	AO1 4.7.2.2 4.7.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	16 mA = 0.016 A	allow 1.6×10^{-2} (A)	1	AO2 4.7.2.2
	$0.013 = B \times 0.016 \times 6.5$	allow correct substitution using incorrectly / not converted current	1	
	$B = \frac{0.013}{0.016 \times 6.5}$	allow correct re-arrangement using incorrectly / not converted current	1	
	$B = 0.125$ (T)	allow correct calculation using incorrectly / not converted current allow 0.13 (T)	1	

4.7.2.4 Loudspeakers (physics only) (HT only)

Answer 04 · Mark scheme

June 2023 | 8463/2H | Original Q4

Question	Answers	Mark	AO / Spec. Ref.
04.6	**Level 2**: Scientifically relevant features are identified; the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.	3-4	AO3 4.6.1.4
	Level 1: Relevant features are identified and differences noted.	1-2	
	No relevant content	0	
	Indicative content: • for all three people, the minimum sound level that can be heard increases as frequency increases **Age** • the minimum sound level that can be heard increases with age • between 2000 and 3000 Hz the minimum sound level that can be heard increases more in **B** compared to **C** • **C** has very little variation in the minimum sound level that can be heard at all frequencies **Working in a loud environment:** • increases the minimum sound level that can be heard at all frequencies above 2000 Hz compared to working in a quiet environment • the minimum sound level that can be heard increases more as frequency increases from 2000 to 4000 Hz compared to working in a quiet environment • doesn't affect the minimum sound level that can be heard at 2000 Hz to access **level 2** the answer must include at least **one** comparison for age **and one** comparison for working in a loud environment, using supporting data/information from the graph		

Total Question 4	**12**

4.7.2.4 Loudspeakers (physics only) (HT only)

Answer 03 · Examiner comments November 2021 | 8463/2H | Original Q8

Question 8

Very few of the students had any idea how a moving-coil loudspeaker works to produce a sound. Generally answers were partially explaining how electric motors, generators or microphones worked. In part **08.3** few of the students scored both marks with 60% scoring no marks. The most frequently seen incorrect answers were to do with lack of data, no repeats or loudness being in arbitrary units.

Answer 04 · Examiner comments June 2023 | 8463/2H | Original Q4

04.1

31% of students gained this mark. Many students responded with a selection of random Physics terms.

04.2

74% of students recognised the direction of the magnetic field.

4.7.2.4 Loudspeakers (physics only) (HT only)

Answer 04 · Examiner comments

June 2023 | 8463/2H | Original Q4

04.3

51% of students knew what an induced magnet is. Responses sometimes confused magnets and magnetic materials. Most correct answers were to do with placing a material into a field to become a magnet, compared with removing the material from the field.

04.4

88% of students knew that it is the motor effect that causes the coil to move..

04.5

46% of students scored all 4 marks for this calculation. There were a wide variety of incorrect conversions of mA, which gained 3 out of the 4 marks.

04.6

Most students were able to make generic statements about how age and environment affect hearing. 35% of students were able to use the data in the graph to support their statements. Some responses just gave information about person A, B and C, without any comparisons. Students did not use the patterns in the graph to back up conclusions. There was some confusion over sensitivity, and a number tried to explain the variables to the extent that the response became incorrect. Examples of this included saying that a higher minimum sound level shows better hearing.
A proportion of the responses mentioned ideas about being "used to a loud sound" so "could hear loud sounds better" and younger people not having had the experience of a full range of frequencies due to their age. Alternatively, the idea that being in a quiet environment means you can only hear quiet sounds was another misunderstanding which was often seen.