GENERAL

aqa exam style questions answers physics a2 chapter 10

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Unlocking AQA Physics A2 Chapter 10: Mastering Exam Style Questions and Answers

Preparing for the AQA Physics A2 exam can feel overwhelming, especially when you're tackling Chapter 10, which covers the complex world of electricity and magnetism. This guide is designed to give you a clear, structured approach to understanding the core concepts, spotting common pitfalls, and, most importantly, answering AQA exam style questions with confidence. Whether you're a student looking for a revision refresher or a teacher seeking a comprehensive resource, you'll find practical tips, example questions, and proven strategies to help you excel.

What Is Chapter /10 About?

In the AQA Physics A2 curriculum, Chapter 10 dives into the fascinating interplay between electric fields, magnetic fields, and the forces that arise from them. Topics include:

- Electric potential and voltage
- Capacitance and capacitors in series and parallel
- Electrostatic induction and charge distribution
- Magnetic fields produced by currents
- Faraday's law of induction and electromagnetic induction
- Applications such as transformers, electric motors, and generators

Understanding these concepts not only helps you tackle the exam but also builds a foundation for many real world technologies.

Exam Format and What AQA Looks For

When you sit for the AQA Physics A2 exam, you'll encounter a mix of question types designed to assess both conceptual understanding and problem solving skills:

1. Short answer questions – Often 1–2 lines, requiring precise definitions or calculations.
2. Long answer questions – Multi step problems where you need to show your reasoning and work.
3. Diagram based questions – Involve drawing or interpreting electric or magnetic field lines.
4. Data analysis questions – Use tables or graphs to answer questions about experimental results.

AQA values clear, logical explanations, correct use of symbols, and a tidy presentation of equations. Make sure you label your work, use consistent units, and show all steps in calculations.

Key Concepts You Must Master

Electric Potential and Voltage

Electric potential (V) is the energy per unit charge at a point in an electric field. Voltage is the difference in electric potential between two points. Remember:

- $V = W/q$ – where W is work done and q is charge.
- Positive potential means a higher energy state for a positive test charge.

- Voltage is measured in volts (V).

Capacitance and Capacitors

Capacitance (C) is a measure of a capacitor's ability to store charge:

- C = Q/V – where Q is charge stored.
- Capacitors can be connected in series or parallel, changing the total capacitance.
- In series, the total capacitance is less than any individual capacitor.
- In parallel, the total capacitance is the sum of individual capacitances.

Magnetic Fields and Current

A current carrying wire produces a magnetic field whose direction follows the right hand rule. Key points:

- Field strength B " I (current) and inversely " distance from the wire.
- Changing magnetic fields induce electric fields (Faraday's law).
- Electromagnetic induction is the principle behind transformers, motors, and generators.

Faraday's Law of Induction

Faraday's law states that the electromotive force (EMF) induced in a circuit is proportional to the rate of change of magnetic flux:

- EMF = -N (d:böGB' b v†W&R â —2 F†R àumber of turns and :b —2 Ö væWF–2 fÇW,à
- The negative sign indicates Lenz's law: the induced EMF opposes the change in flux.

Sample AQA Style Questions with Detailed Answers

Below are representative questions that reflect the style you'll encounter on the exam. Each question is followed by a thorough answer, including the reasoning and calculations required.

Question 1: Short Answer

Define the term "electric potential difference" and state its SI unit.

Answer: Electric potential difference, also known as voltage, is the difference in electric potential energy per unit charge between two points in an electric field. Its SI unit is the volt (V).

Question 2: Calculation – Capacitance

A capacitor with a capacitance of 8 /µF is connected in parallel with a 12 /µF capacitor. What is the total capacitance? Show your calculation.

Answer:

1. In parallel, capacitances add: C_total = C1 + C2.
2. C_total = 8 /µF + 12 /µF = 20 /µF.
3. Thus, the total capacitance is 20 /µF.

Question 3: Diagram Interpretation

Sketch the magnetic field lines around a straight current carrying wire and indicate the direction using the right hand rule.

Answer: **Insert a diagram**where the thumb points in the direction of current flow; the fingers curl around the wire, indicating the direction of the magnetic field lines. The field lines form concentric circles around the wire, with the direction perpendicular to the wire and following the right hand rule.

Question 4: Long Answer – Faraday's Law

A square loop of wire with side length 0.20 /m is placed in a uniform magnetic field that changes from 0.30 /T to 0.60 /T over 0.50 s. The loop has 5 turns. Calculate the induced EMF and explain whether it will cause current to flow in the loop.

Answer:

1. Magnetic flux through one turn: :b Ò " r Â v†W&R Ò 6–F[" Ò ƒ ã# öÒ›" Ò ã B öÛ"à
2. Initial flux :eö–æ—F– Â Ò ã3 õB r ã B öÛ" Ò ã " õv .
3. Final flux :eöf–æ Â Ò ãc õB r ã B öÛ" Ò ã #B õv .
4. Change in flux 9C¦ = :eöf–æ Â b ¦_initial = 0.024 /Wb – 0.012 /Wb = 0.012 /Wb.
5. Rate of change of flux d:böGB Ò ”:b ò ”t = 0.012 /Wb / 0.50 /s = 0.024 /Wb /s {¹.
6. Induced EMF for 5 turns: EMF = -N (d:böGB' Ò ÓR r ã #B õb Ò Ó ã " õ`.
7. The negative sign indicates the induced EMF opposes the increase in flux (Lenz's law). The magnitude is 0.12 /V, which is sufficient to drive a small current if a closed circuit is formed.

Question 5: Data Analysis

Using the provided table of resistance versus temperature for a metal wire, determine the temperature coefficient of resistance (; ' B # û 0. The table shows R € = 100 /:' B # û 2 æB " Ò ó© at 60 /°C. Explain your calculation.

Answer:

1. Temperature coefficient ; —2 FVf–æVB y R = R €[1 + ; …B b T €)].
2. Rearrange to solve for ; ; Ò …" b " ' ò µ" …B b T €)].
3. Insert values: ; Ò ƒ ó© – 100 /:'' ò ³ ó© × (60 /°C – 20 /°C)] = 10 /:' ò ƒ ó© × 40 /°C) = 10 / 4000 = 0.0025 /°C {¹.
4. Thus, ; Ò "ãR r »2 û 2 »'à

How to Approach AQA Style Questions Effectively

1. Read the Question Carefully

Take a moment to understand exactly what is being asked. Is the question looking for a definition, a calculation, or an explanation of a phenomenon? Misreading can lead to a wrong answer even if you know the concept.

2. Identify the Required Formulae

Write down the relevant equations before you start calculating. For example, if a problem involves magnetic flux, recall :b Ò " r à If it involves capacitance, remember C = Q/V.

3. Show All Work

AQA examiners appreciate clear, step by step solutions. Even if you know the answer, demonstrating your reasoning earns extra marks.

4. Check Units and Significant Figures

Always keep track of units—volts (V), coulombs (C), farads (F), teslas (T). Use correct significant figures to reflect the precision of the given data.

5. Use Diagrams Wisely

Where possible, sketch a diagram. A well labeled magnetic field diagram or a circuit diagram can clarify the problem and show you what you need to calculate.

6. Relate to Real World Applications

AQA sometimes asks you to connect theory to everyday devices. For instance, explain how a transformer steps up voltage or how a motor converts electrical energy into mechanical motion.

Common Mistakes and How to Avoid Them

- Forgetting the negative sign in Faraday's law – Remember Lenz's law: the induced EMF always opposes the change that produced it.
- Mixing up series and parallel configurations – In series, C_total = 1/(1/C1 + 1/C2); in parallel, C_total = C1 + C2.
- Mislabeling current direction in magnetic field problems – Use the right hand rule consistently.
- Ignoring the temperature coefficient in resistance problems – Even small temperature changes can significantly affect resistance.
- Not checking units – A common source of errors, especially when converting from microfarads to farads.

Study Resources for Chapter /10

Official AQA Revision Materials

Download the **AQA Physics A2 Revision Guide**from the official website. It includes past papers, mark schemes, and detailed explanations of key concepts.

Online Video Lectures

Platforms like *Physics Classroom* and *Khan Academy*offer concise video tutorials covering electricity and magnetism. Look for playlists specifically titled "AQA Physics A2 Chapter 10."

Interactive Simulations

Baca Juga (Artikel Terkait)

- **advanced engineering electromagnetics solution manual edition hardcover by balanis constantine a published by wiley**
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