FREE REVISION PACK

Capacitance & Energy Stored

AQA A-level Physics · 7408 · Specification 3.7.4.1, 3.7.4.3

Easy | Medium | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Energy after charging with a constant current	AQA June 2019 · A-level Paper 2 · Q20	1 mark
2	Easy	What a straight V–Q graph shows	AQA June 2018 · A-level Paper 2 · Q25	1 mark
3	Easy	Capacitance from a constant charging current	AQA November 2020 · A-level Paper 2 · Q19	1 mark
4	Easy	Change in energy when the pd doubles	AQA June 2017 · A-level Paper 2 · Q19	1 mark
5	Medium	Average current from repeated discharges	AQA June 2022 · A-level Paper 2 · Q17	1 mark

Key ideas to have ready

- Capacitance C = Q / V (farads). A graph of V against Q for a capacitor is a straight line through the origin.
- Energy stored = area under the V–Q graph = ½QV = ½CV^2 = Q^2 / (2C).
- Charge from a steady current: Q = It.
- Average current when a capacitor is charged and discharged f times a second: I = Qf = CVf.

How to use this pack

1. The questions are grouped into levels (Easy and Medium). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in AQA's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

Questions are reproduced from AQA past papers; AQA material is © AQA. Question numbers have been changed to suit this pack. Get Better At Physics is an independent tutor and is not affiliated with or endorsed by AQA. Free for personal revision and classroom use.

Easy

Definitions and one-step ideas. Most students get these right.

Questions 1–4

Only **one** answer per question is allowed. For each question, completely fill in the circle alongside the appropriate answer.

AQA June 2019 · A-level Paper 2 · Q20

1 A $1.0\ \mu F$ capacitor is charged for $20\ s$ using a constant current of $10\ \mu A$.

What is the energy transferred to the capacitor?

[1 mark]

A $5.0 \times 10^{-3}\ J$ ⬭

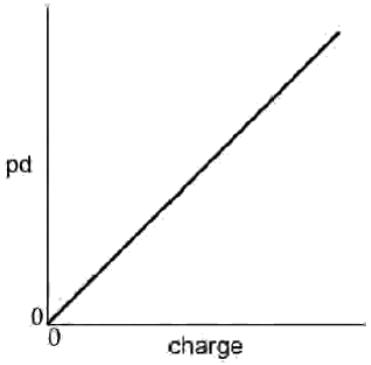
B $1.0 \times 10^{-2}\ J$ ⬭

C $2.0 \times 10^{-2}\ J$ ⬭

D $4.0 \times 10^{-2}\ J$ ⬭

AQA June 2018 · A-level Paper 2 · Q25

2 The graph shows the variation of potential difference (pd) with charge for a capacitor while it is charging.



Which statement can be deduced from the graph?

[1 mark]

A The charging current is constant. ⬭

B The energy stored in the capacitor increases uniformly with time. ⬭

C The capacitance of the capacitor is constant. ⬭

D The power supply used to charge the capacitor had a constant terminal pd. ⬭

AQA November 2020 · A-level Paper 2 · Q19

3 An uncharged capacitor is connected to a power supply which supplies a constant current of $10\ \mu A$.

After $100\ ms$, the potential difference across the capacitor is $5.0\ kV$.

What is the capacitance of the capacitor?

[1 mark]

A $2.0 \times 10^{-10}\ F$ ○

B $4.0 \times 10^{-10}\ F$ ○

C $2.5 \times 10^{9}\ F$ ○

D $5.0 \times 10^{9}\ F$ ○

AQA June 2017 · A-level Paper 2 · Q19

4 A capacitor of capacitance C has a charge of Q stored on the plates. The potential difference between the plates is doubled.

What is the change in the energy stored by the capacitor?

[1 mark]

A $\frac{Q^2}{2C}$ ○

B $\frac{Q^2}{C}$ ○

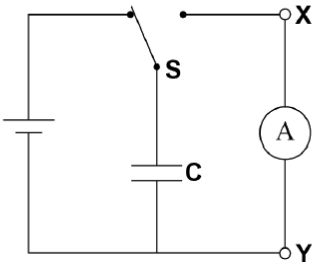
C $\frac{3Q^2}{2C}$ ○

D $\frac{2Q^2}{C}$ ○

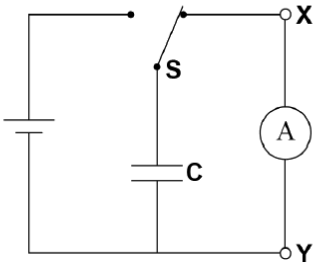
Medium Two or three steps. Roughly a third to a half of students get these right. **Question 5**

AQA June 2022 · A-level Paper 2 · Q17

5 A switch **S** allows capacitor **C** to be completely charged by a cell and then completely discharged through an ammeter.
The emf of the cell is $4.0\ \text{V}$ and it has negligible internal resistance.
The capacitance of **C** is $0.40\ \mu\text{F}$ and there are 8000 charge–discharge cycles every second.



charging



discharging

What are the magnitude and direction of the average conventional current in the ammeter?
[1 mark]

	Magnitude of current / A	Direction of current	
A	1.3×10^{-2}	**X** to **Y**	○
B	1.3×10^{-2}	**Y** to **X**	○
C	2.0×10^{-10}	**X** to **Y**	○
D	2.0×10^{-10}	**Y** to **X**	○

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition:
www.getbetteratphysics.co.uk