FREE REVISION PACK

Charging & Discharging Capacitors

Pearson Edexcel International Advanced Level Physics · Unit 4 (WPH14) · Specification points 102–104

Easy | Multiple choice · past-paper questions

4	4	≈ 5 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Charging a capacitor through a resistor	Edexcel IAL January 2021 · Unit 4 · Q5	1 mark
2	Easy	Time constant from a discharge	Edexcel IAL June 2024 · Unit 4 · Q6	1 mark
3	Easy	Capacitance from a graph of ln I against time	Edexcel IAL January 2021 · Unit 4 · Q10	1 mark
4	Easy	Time for the charge to halve	Edexcel IAL October 2023 · Unit 4 · Q9	1 mark

Key ideas to have ready

- Discharge: $Q = Q_0 e^{-t/RC}$ (same form for V and I).
- Time constant $\tau = RC$; half-life $t_{½} = RC \ln 2$.
- ln I against t is a straight line of gradient $-1/RC$.
- Charging: Q rises towards a maximum while the current (and resistor p.d.) falls.

How to use this pack

1. The questions are grouped into levels (Easy). 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 Pearson's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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Easy

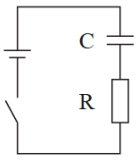
Definitions and one-step ideas. Most students get these right.

Questions 1–4

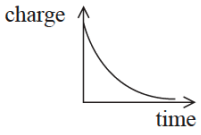
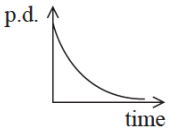
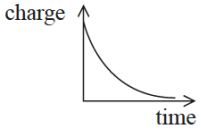
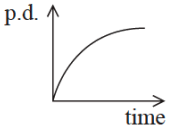
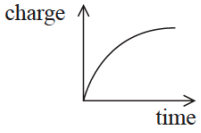
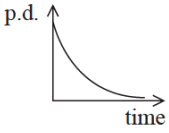
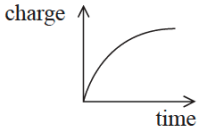
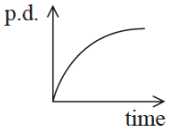
Choose **one** answer for each question and put a cross in the box next to it.

Edexcel IAL January 2021 · Unit 4 · Q5

1 An uncharged capacitor, a resistor, a switch and a cell are connected in series as shown.



Which of the following shows how the charge stored on the capacitor and the potential difference (p.d.) across the resistor vary with time, after the switch is closed?

	capacitor	resistor
☒ **A**		
☒ **B**		
☒ **C**		
☒ **D**		

Edexcel IAL June 2024 · Unit 4 · Q6

2 A capacitor of capacitance C is charged to a potential difference of V_0. The capacitor then discharges through a resistor of resistance R.

After time t the potential difference across the capacitor is V.

Which of the following gives the time constant for this circuit?

☒ **A** $\dfrac{-t}{\ln(V - V_0)}$

☒ **B** $\dfrac{-t}{\ln V + \ln V_0}$

☒ **C** $\dfrac{-t}{\left(\dfrac{\ln V}{\ln V_0}\right)}$

☒ **D** $\dfrac{-t}{\ln\left(\dfrac{V}{V_0}\right)}$

Edexcel IAL January 2021 · Unit 4 · Q10

3 A charged capacitor is connected across a resistor of resistance R and the current in the resistor is measured.

A graph of ln (current) against time is plotted and the gradient of the graph is determined.

Which of the following gives the capacitance of the capacitor?

☒ **A** $-\text{gradient} \times R$

☒ **B** $\dfrac{-1}{(\text{gradient} \times R)}$

☒ **C** $\dfrac{-R}{\text{gradient}}$

☒ **D** $\dfrac{-\text{gradient}}{R}$

Edexcel IAL October 2023 · Unit 4 · Q9

4 A capacitor discharges through a resistor. The time constant of the circuit is 5 s.

What is the time taken, in s, for the charge on the plates of the capacitor to halve?

☒ **A** $0.5 \ln 2$

☒ **B** $0.5 \ln 5$

☒ **C** $2 \ln 5$

☒ **D** $5 \ln 2$

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