



QUESTION WORKBOOK

Charging and discharging

Capacitance · Year 13

AQA 3.7.4.4 · CIE 19.3 · OCR A 6.1.3

10 questions · 30 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 Describe the shape of the charge–time graph for a capacitor discharging through a resistor. [2]

A2 Describe how the current changes with time while a capacitor charges through a resistor. [2]

A3 State how the current in a capacitor circuit is related to the charge–time graph. [2]

SECTION B · Standard

B1 A capacitor charged to 12 V is discharged through a 1.0 k Ω resistor. Calculate the initial discharge current. [3]

- B2** A capacitor is charged from a 6.0 V supply through a 2.0 k Ω resistor. State the initial and final charging currents. [3]

- B3** Describe and explain the shapes of the potential difference–time and current–time graphs while a capacitor charges through a resistor. [4]

- B4** A 100 μF capacitor is fully charged to 9.0 V. Calculate the charge stored and the energy stored. [3]

SECTION C · Stretch

- C1** A $470\ \mu\text{F}$ capacitor charged to $10\ \text{V}$ is discharged through a $2.2\ \text{k}\Omega$ resistor. Calculate (a) the initial charge stored and (b) the initial discharge current. [4]

- C2** A $1000\ \mu\text{F}$ capacitor is charged to $12\ \text{V}$ and then fully discharged through a resistor. Calculate the total energy dissipated in the resistor. [4]

- C3** Explain why the discharge current of a capacitor decreases as time goes on. [3]