

Capacitance

Cambridge International AS & A Level Physics

Unlike IGCSE, 9702 gives you a data sheet: it is page 2 of Papers 1, 2 and 4, with more formulae on page 3 of Paper 4. Everything marked GIVEN is printed for you; everything else you must recall. Compiled by GioPhysics from the published syllabus. This is an independent study aid, not a Cambridge document; the official syllabus is the authority.

19.1 Capacitors and capacitance

A LEVEL Capacitance

$$C = Q / V$$

- C — capacitance (F)
- Q — charge (C)
- V — potential difference (V)

A LEVEL Capacitors in series

$$1/C = 1/C_1 + 1/C_2 + \dots$$

- C — combined capacitance (F)

The opposite way round from resistors — the syllabus asks you to derive both from $C = Q/V$.

A LEVEL Capacitors in parallel

$$C = C_1 + C_2 + \dots$$

- C — combined capacitance (F)

19.2 Energy stored in a capacitor

A LEVEL Energy stored

$$W = \frac{1}{2}QV = \frac{1}{2}CV^2$$

- W — energy stored (J)
- Q — charge (C)
- V — potential difference (V)
- C — capacitance (F)

The area under a charge-p.d. graph.

19.3 Discharging a capacitor

A LEVEL Time constant

$$\tau = RC$$

- τ — time constant (s)
- R — resistance (Ω)
- C — capacitance (F)

A LEVEL Capacitor discharge

$$x = x_0 e^{(-t/RC)}$$

- x — current, charge or potential difference
- x_0 — its initial value
- t — time (s)