

D.C. circuits

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.

10.2 Kirchhoff's laws

AS

Kirchhoff's first law

$$\Sigma I(\text{in}) = \Sigma I(\text{out})$$

I — current at a junction (A)

A consequence of conservation of charge.

AS

Kirchhoff's second law

$$\Sigma E = \Sigma IR$$

E — e.m.f. round a loop (V)

IR — potential difference across each component (V)

A consequence of conservation of energy.

AS

Resistors in series

$$R = R_1 + R_2 + \dots$$

R — combined resistance (Ω)

AS

Resistors in parallel

$$1/R = 1/R_1 + 1/R_2 + \dots$$

R — combined resistance (Ω)

10.3

Potential dividers

AS

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Potential divider

$$V_{\text{out}} = V_{\text{in}} \times R_2 / (R_1 + R_2)$$

V_{out} — p.d. across R_2 (V)

V_{in} — supply p.d. (V)

R_1, R_2 — the two resistances (Ω)

Not printed in the syllabus: it follows from $V = IR$ with the same current through both. The syllabus requires the potential divider and the potentiometer to be used.