

Revision Sheet

A-Level Physics · Unit 10 D.C. circuits

9 vocabulary items · 25 marks of exam questions (5 questions)

Part 1 · Vocabulary review answer key. Section A wants the exact English spelling.

Question	Answer	Marks
1	internal resistance	1
2	terminal p.d.	1
3	open circuit	1
4	conservation of charge	1
5	Kirchhoff's first law	1
6	Kirchhoff's second law	1
7	potentiometer	1
8	galvanometer	1
9	null method	1

Question 10 (Answer: **A**)

- In series the current is the same in both components, and their p.d.s must add to 12 V.
- So look along the graph for the current at which the thermistor's voltage plus the resistor's voltage is 12 V.
- That happens at 0.36 mA – neither component is ohmic, so you cannot simply use V/R .

Question 11 (Answer: **B**)

- The driver cell must sit across the *whole* wire XY, so there is a uniform potential gradient along it.
- The unknown cell goes in the other loop, in series with the galvanometer, joined to one end of the wire and to the sliding contact.
- The two cells must oppose each other, otherwise no balance point (zero deflection) can exist.

Question 12 (Answer: **B**)

- With the switch open no current flows, so nothing is lost across r and $V = E$.
- Closing the switch drives a current, so now Ir is dropped inside the cell.
- The terminal p.d. falls to $V = E - Ir$.

13(a)	sum of current(s) into junction = sum of current(s) out of junction or (algebraic) sum of current(s) at a junction is zero
13(b)(i)	same potential difference (across X and Y as in parallel)
	power = V^2 / R (and $R_X > R_Y$) or power = VI and $I_X < I_Y$
	(so) Y (dissipates more power)
13(b)(ii)	$R = \rho L / A$ (and $R_X > R_Y$)
	(so) Y (has the larger (cross-sectional) area)
13(c)(i)	current = $5.4 / 1800$ $= 3.0 \times 10^{-3} \text{ A}$
13(c)(ii)	$5.4 / 9.0 = 1800 / (1800 + R_L)$
	or $R_L = (9.0 - 5.4) / 3.0 \times 10^{-3}$
	$R_L = 1200 \Omega$
13(c)(iii)	resistance of LDR / R_L decreases
	current (in the circuit) increases (so) voltmeter reading increases

14(a)	energy per unit charge
	energy transferred by source driving charge around the complete circuit or energy transferred from other forms to electrical energy
14(b)	there is a p.d. across the internal resistance/ r
	change in current/ I results in a change in p.d. across the internal resistance
	$V = E - \text{p.d. across internal resistance}$ or change in p.d. across r causes a change in V (as e.m.f. is constant)
14(c)(i)	$E = 7.4 \text{ V}$
14(c)(ii)	maximum current = 0.92 A
14(c)(iii)	$r = E / I_{\text{MAX}}$ or $(-)\text{gradient}$
	e.g. $r = 7.4 / 0.92$ $= 8.0 \Omega$
14(d)	straight line with negative gradient that is smaller in magnitude than the original line
	line which would have intercept on V -axis below the original line