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 = 3.0×10^{-3} A
13(c)(ii)	5.4 / 9.0 = 1800 / (1800 + R_L) **or** R_L = (9.0 – 5.4) / 3.0×10^{-3}
	R_L = 1200 Ω
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
	$V = E$ – 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)	$E = 7.4$ V
14(c)(ii)	maximum current = 0.92 A
14(c)(iii)	$r = E / I_{MAX}$ **or** (–)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