Assess Quizzes from the o-book – Explanations for the answers.

Chapter 8 Review – Support

Q	Reason
1	Ohmic means to have a constant relationship between V and I, thus it has to be linear and directly proportional. Hence, Graph A.
2	A fixed resistor means that its resistance doesn't vary no matter what voltage is applied or what current runs through it. In reality, it would be only guaranteed for a particular temperature such as 20°C or more commonly 70°C (maximum safe operating temperature).
3	Description of a metal and why it conducts. See page 209.
4	$V = IR$ $I = \frac{V}{R} = \frac{12}{100} = 0.12A$
5	$V = IR$ $R = \frac{V}{I} = \frac{8.0}{4.0 \times 10^{-3}} = 2000\,\Omega$
6	$V = IR$ $I = \frac{V}{R} = \frac{6}{3} = 2A$
7	$V = IR$ $I = \frac{V}{R} = \frac{12}{4} = 3A$ $3A = 3Cs^{-1}$ $Q = It = 3\,Cs^{-1} \times 1s = 3\,C$

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8	Voltage (case 1) = voltage (case 2) $V_1 = V_2$ $I_1 R_1 = I_2 R_2$ $\frac{I_1}{A_1} = \frac{I_2}{A_2}$ [as $R \propto \frac{1}{A}$] $\frac{I_1}{\pi(r_1)^2} = \frac{I_2}{\pi(r_2)^2}$ $\frac{I_1}{\pi(r_1)^2} = \frac{I_2}{\pi(2r_1)^2}$[diameter doubled means radius is doubled] $\frac{I_1}{\pi(r_1)^2} = \frac{I_2}{4\pi(r_1)^2}$ $\frac{I_1}{\cancel{\pi(r_1)^2}} = \frac{I_2}{4\cancel{\pi(r_1)^2}}$ $I_1 = \frac{I_2}{4}$ $I_2 = 4I_1 = 4 \times 0.4$ $= 1.6A$
9	$R_A = 6\Omega,$ $R_B = 3 + 6 = 9\Omega$ [*series*] $\frac{1}{R_C} = \frac{1}{3} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6} = \frac{3}{6}$ A $R_C = \frac{6}{3} = 2\Omega$ Order is C, A, B[$2, 6, 9\Omega$]
10	The resistance is just V/I for any point but it is linear so I could choose any pair of points. I have chosen 3 V, 0.6 A: $V = IR$ $R = \frac{V}{I} = \frac{3.0}{0.60} = 5\ \Omega$

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Chapter 8 Review – Consolidate

Q	Reason
1	$L_2 = 2L_1$ $R_2 = 2R_1$ [as $R \propto L$] See page 230 $R_1 = \frac{V}{I_1} = \frac{12}{4} = 3\Omega$ $R_2 = 2R_1 = 2 \times 3 = 6\Omega$ $I_2 = \frac{V}{R_2} = \frac{12}{6} = 2\,A$
2	V_1 = 3V (each branch is in series so V_{top} = 1.5 + 1.5 = 3 V; V_{bottom} = 1.5 + 1.5 = 3 V. These two branches are in parallel so don't add, just use either. V_1 = 3V. V_2 = 1.5 + 1.5 + 1.5 + 1.5 = **6 V** (in series so add) V_3 = 1.5 –1.5+1.5 – 1.5 = 0 V (in series but the direction of the 2nd and 4th cell is reversed so they are negative and cancel out) V_4 = four in parallel and all the same so V_4 = 1.5 V Answer is 2.
3	$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{6} + \frac{1}{2} = \frac{1+3}{6} = \frac{4}{6}$ $R_{eq} = \frac{6}{4} = 1.5\Omega$ $R_{total} = 1.5 + 6 = 7.5\Omega$ [*in series*]
4	Ohmic means a V/I graph (or I/V graph) is linear. If it is not linear it is non-ohmic.
5	At 0.55 V, the current is somewhere between 0.45 A and 0.5 A. Let's just say 0.5 A as it is not that clear. $R = \frac{V}{I} = \frac{0.55}{0.50}$

Chapter 8 Review – Extend

Q	Reason
1	Looks about 35 mA when using the top scale (0-50 mA scale).

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2	Conventional current is from + (longer line on battery) around the external circuit to the negative (–) the smaller line on the battery. So current is anticlockwise. Meter M1 is in series with the circuit current so must be an ammeter. See page 214. Meter M2 is in parallel with the circuit current so must be a voltmeter. See page 220.
3	R ∝ L so will be linear graph (A).
4	$R \propto \frac{1}{A}$ so will be inverse (D)
5	$R \propto L$ $\frac{V}{I} \propto L$ $\frac{1}{I} \propto L$[when V constant] $I \propto \frac{1}{L}$ [$y \propto \frac{1}{x}$] Inverse relationship so must be Graph D.