

Question	Answer	Marks
6(a)(i)	$P = VI$	C1
	$I = 36 / 8.0$ $= 4.5 \text{ A}$	A1
6(a)(ii)	charge $= 4.5 \times 50$ $= 225$	C1
	number $= 225 / 1.6 \times 10^{-19}$ $= 1.4 \times 10^{21}$	A1
6(a)(iii)	$R = V^2 / P$ or $R = V / I$ or $R = P / I^2$ $= 8.0^2 / 36$ or $= 8.0 / 4.5$ or $= 36 / 4.5^2$	C1
	$= 1.8 \Omega$	A1

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6(b)	$R = \rho L / A$	C1
	$L = (1.8 \times 0.25 \times 10^{-6}) / 1.4 \times 10^{-6}$ $= 0.32 \text{ m}$	A1
6(c)	(larger cross-sectional area, same length, same resistivity and so) less resistance	M1
	(same p.d. and more current so) more power (dissipated)	A1
6(d)	current (in wire) is the same	M1
	(same p.d. across wire so) power stays the same	A1

Question	Answer	Marks
5(a)	(they travel in) opposite directions	B1
5(b)(i)	straight line from A to B, labelled P	B1
	line that is 'mirror image' of given line, labelled Q	B1
5(b)(ii)	$\lambda = 0.80 / 2$ (= 0.40 m)	C1
	$v = \lambda / T$ or $v = f\lambda$ and $f = 1 / T$	C1
	$v = 0.40 / 0.016$ or 62.5×0.40 $= 25 \text{ m s}^{-1}$	A1
5(c)(i)	$I_1 / I_0 = \cos^2 30^\circ$	C1
	$= 0.75$	A1
5(c)(ii)	$I_2 / I_1 = \cos^2 60^\circ$ $I_2 / I_0 = \cos^2 30^\circ \times \cos^2 60^\circ$ or $0.75 \times \cos^2 60^\circ$	C1
	$= 0.19$	A1

Question	Answer	Marks
2(a)	$F = \rho g V$ $0.071 = 1.2 \times 9.81 \times V$	C1
	$(V = 6.03 \times 10^{-3} \text{ m}^3)$ $\frac{4}{3} \times \pi \times r^3 = 6.03 \times 10^{-3}$ $r = 0.11 \text{ m}$	A1
2(b)	$m = 0.053 / 9.81$ $(= 5.4 \times 10^{-3} \text{ kg})$	C1
	$F = 0.071 - 0.053$ $(= 0.018 \text{ N})$	C1
	$a = (0.071 - 0.053) / (0.053 / 9.81)$ $= 3.3 \text{ m s}^{-2}$	A1
2(c)(i)	$v^2 = u^2 + 2as$ $3.6^2 = (-1.4)^2 + 2 \times 9.81 \times s$ or $3.6^2 = 1.4^2 + 2 \times 9.81 \times s$	C1
	$s = 0.56 \text{ m}$	A1
2(c)(ii)	single straight line from any positive non-zero value of v at $t = 0$ to any negative non-zero value of v at $t = T$	B1
	line starting at $(0, 1.4)$ and ending at $(T, -3.6)$	B1