Question number	Answer	Additional guidance	Mark
3(a)	• connect ammeter in series (with thermistor) (1) • connect voltmeter in parallel (with thermistor) (1) • reverse (connections for) one of the cells (1)	allow idea that meters should be swapped for two marks (equivalent to first two points)	**(3)**

Question number	Answer	Additional guidance	Mark
3(b)(i)	Any one of the following reasons: • the thermistor and the water are at the same temperature (1) • large volume of water gives a steady temperature rise (1)	accept idea that only small part of thermometer would be in contact with a thermistor in air accept difficult to control change in temperature of thermistor when heated in air	**(1)**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	Any one of the following developments to the procedure: • add ice to increase lower limit of temperature range (1) • use liquid with higher boiling point to increase upper limit of temperature range (1)	accept named liquid with higher boiling point, e.g. oil	**(1)**

Question number	Answer	Additional guidance	Mark
3(c)(i)	A comparison and contrast that must include at least **one** similarity and **one** difference from the following points to a maximum of three marks: Similarities • resistance of both changes with temperature (1) • both graphs show a non-linear relationship (1) • data comparison, e.g. both have the same resistance at 80°C (1)		**(3)**

	Differences • resistance of **A** decreases with temperature but resistance of **B** increases with temperature (1) • for **A**, (largest slope/rate of change) is at lower temperature but for **B**, (largest slope/rate of change) is at higher temperature(s) (1) • for **B**, resistance is constant below 50°C but for **A** resistance is roughly constant above 60°C (1)	accept (smallest slope/rate of change) for A is at higher temperature but (smallest slope/rate of change) for B is at lower temperature	

Question number	Answer	Mark
3(c)(ii)	B	**(1)**

Question number	Answer	Mark
4(a)(i)	The earth wire discharges the aircraft to prevent sparking which could ignite the fuel/cause a fire	**(1)**

Question number	Answer	Additional guidance	Mark
4(a)(ii)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): • friction between aircraft and air (1) • causes electron transfer between aircraft and air (1)	accept idea of air rubbing against wings ignore 'charge' and 'static' do not allow (for second mark) idea of protons moving	**(2)**

Question number	Answer	Additional guidance	Mark
3(a)	• connect ammeter in series (with thermistor) (1) • connect voltmeter in parallel (with thermistor) (1) • reverse (connections for) one of the cells (1)	allow idea that meters should be swapped for two marks (equivalent to first two points)	**(3)**

Question number	Answer	Additional guidance	Mark
3(b)(i)	Any one of the following reasons: • the thermistor and the water are at the same temperature (1) • large volume of water gives a steady temperature rise (1)	accept idea that only small part of thermometer would be in contact with a thermistor in air accept difficult to control change in temperature of thermistor when heated in air	**(1)**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	Any one of the following developments to the procedure: • add ice to increase lower limit of temperature range (1) • use liquid with higher boiling point to increase upper limit of temperature range (1)	accept named liquid with higher boiling point, e.g. oil	**(1)**

Question number	Answer	Additional guidance	Mark
3(c)(i)	A comparison and contrast that must include at least **one** similarity and **one** difference from the following points to a maximum of three marks: Similarities • resistance of both changes with temperature (1) • both graphs show a non-linear relationship (1) • data comparison, e.g. both have the same resistance at 80°C (1)		**(3)**

	Differences • resistance of **A** decreases with temperature but resistance of **B** increases with temperature (1) • for **A**, (largest slope/rate of change) is at lower temperature but for **B**, (largest slope/rate of change) is at higher temperature(s) (1) • for **B**, resistance is constant below 50°C but for **A** resistance is roughly constant above 60°C (1)	accept (smallest slope/rate of change) for A is at higher temperature but (smallest slope/rate of change) for B is at lower temperature	

Question number	Answer	Mark
3(c)(ii)	B	**(1)**

Question number	Answer	Mark
4(a)(i)	The earth wire discharges the aircraft to prevent sparking which could ignite the fuel/cause a fire	**(1)**

Question number	Answer	Additional guidance	Mark
4(a)(ii)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): • friction between aircraft and air (1) • causes electron transfer between aircraft and air (1)	accept idea of air rubbing against wings ignore 'charge' and 'static' do not allow (for second mark) idea of protons moving	**(2)**

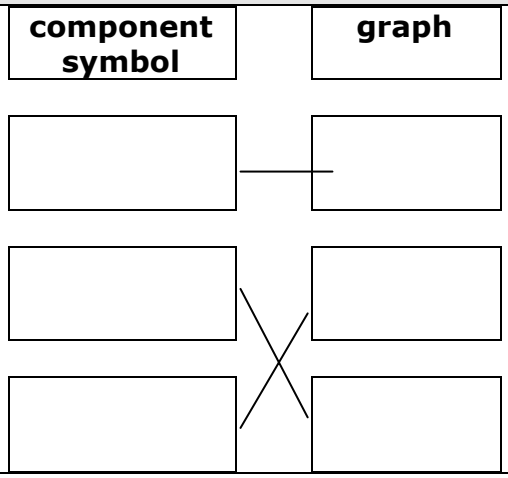
GCSE Physics 5PH2H/01 Mark Scheme – November 2012

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	B		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	substitution (1) V = 0.5 x 12 evaluation (1) V = 6 (V)	Correct answer with no working shown gains two marks.	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(a)(iii)	• P / ammeter reading would increase. (1) • Q / voltmeter reading would increase (1)	They(both) would increase for two marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(a)(iv)	(current/it) would decrease (1)	smaller/lower/reduce/less Ignore slowing down	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)		All three lines correct for 2 marks One or two lines correct for 1 mark More than one line against any box cannot score more than 1 mark in total.	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (a) (i)	Correctly plotted point (1)	+/- ½ a small square	**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (a)(ii)	Smooth line through most (at least 5) crosses / points (1)	Do not accept clearly dot-to-dot or excessive tramlining Ignore any part of line after 45	**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (a) (iii)	Substitution: (1) 12 = 0.047 x R Transposition: (1) R = 12/0.047 Evaluation: (1) R = 260	 transposition and substitution in either order substitution mark can be scored when incorrectly transposed word/symbol equation is given 255.3, 255 give full marks for correct answer no working power of 10 errors with no working score max 1 mark	 **(3)**

Question Number	Answer	Acceptable answers	Mark
3 (a) (iv)	An explanation linking • current increases with temperature (1) with • (so) resistance decreases(1) or • the voltage is constant (1) with • (so) resistance decreases (with temperature increase)(1)	 (for this first MP) ignore faster/slower (charge/current) ignore references to heat, current flows more can score both marks by quoting two suitable pairs of values from graph For full marks, there must be a reference to change of either I or R with temperature	 **(2)**

Question Number	Answer	Acceptable answers	Mark
3 (b)(i)	An explanation linking • {electrons / negative charges} (1) • collide with {ions/lattice/electrons} (1)	atoms / nuclei allow for 1 mark,electrical energy transferred to {thermal/heat} energy if no other scored	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (b) (ii)	A suggestion including energy transfer in {the thermistor/ any component part of the electrical circuit} causes a rise in temperature of thermistor (above surroundings)(1)	thermistor/resistor {gets hot/is heated}	**(1)**

Question Number	Answer	Acceptable answers	Mark
6 (a)(i)	**B**		**(1)**

Question Number	Answer	Acceptable answers	Mark
6 (a)(ii)	substitution V = 0.039 x 185 (1) evaluation 7.215 (which is about 7.2) (V) (1)	Substitution 7.2 = I x 185 (1) transposition I = 7.2 ÷ 185 (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
6 (a)(iii)	**C** (same as)		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(iv)	An explanation to include The resistance (of the LDR) changes Greater resistance when in the dark	 LDR has less resistance in the light	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(b)**	An explanation linking some of the following. • less current is used at night-time • Resistance (of LDR or circuit) would increase with less ambient light • Higher resistance will allow less current (in the circuit) (ORA) • Less current in circuit means less energy from the battery • Less power required in the dark ORA for light conditions • Less current means less energy transferred (per second) • Total energy transferred is less during night time (than it would otherwise have been) due to the higher resistance of the LDR	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited explanation linking the light level to EITHER resistance OR current. eg. It increases the resistance in the dark. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• A simple explanation linking the light level to TWO of resistance, current, energy. eg. At night-time its resistance would increase. This would reduce the current from the battery • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• A detailed explanation linking the light level to resistance AND current, AND energy. e.g. At night-time the resistance would be more. This would reduce the current and mean that the battery will not have to supply as much energy. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Question 6 = 12 marks