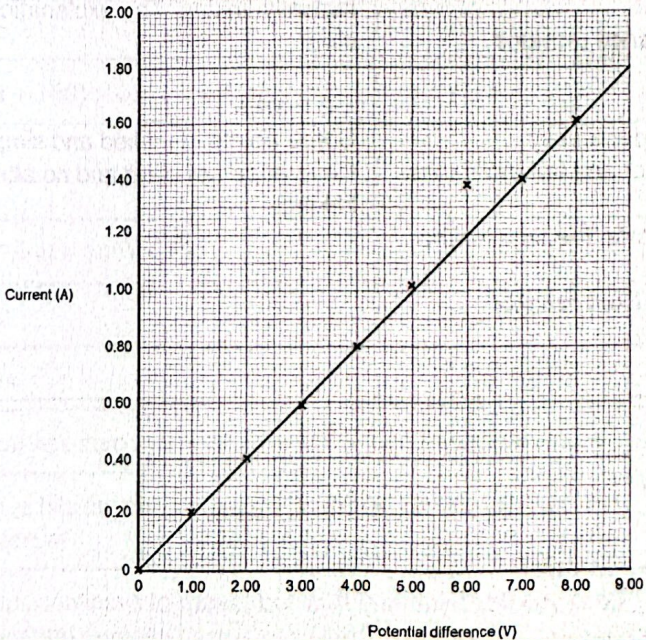


SOLUTIONS: Physics Paper 1H

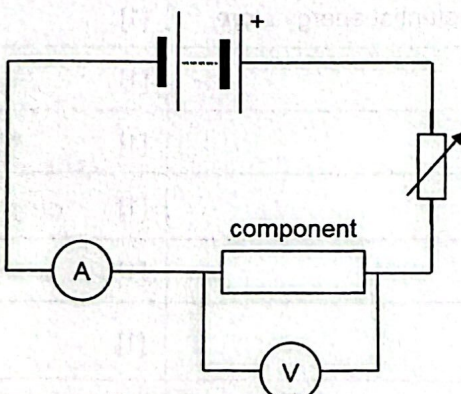


0 1.1		[3] 1 mark per correct line Lose 1 mark per extra line drawn
0 1.2	Gamma	[1]
0 1.3	Alpha Beta Gamma	[2] 2 marks for 3 correct 1 mark for 1 or 2 correct
0 1.4	Any 1 from: • (radioactive) source kept at arms length • (radioactive) source not pointed at others • (radioactive) source held with tongs • (radioactive) source outside box for minimum possible time necessary • Stand behind barriers that will absorb radiation (lead, concrete etc.) • Wear gloves	[1] allow any other suitable suggestion
0 1.5	10 (days)	[1]
	Line drawn across from 150 Bq	[1] Allow any other suitable method
0 2.1	Energy	[1]
0 2.2	Any 1 from: • Newspaper • Bubble wrap • Cotton wool	[1] allow any suitable alternatives
0 2.3	Any 1 from: • Experimental error / inaccurate readings • Some heat lost to surroundings	[1] allow any suitable alternatives
0 2.4	Repeat / take a mean or Increase amount of insulating material around block / use a better insulating material	[1]

0 2.5	$P = VI = 12 \times 10 = 120 \text{ (W)}$	[1]
	$E = Pt = 120 \times 100 = 12000 \text{ (J)}$	[1]
	$\Delta\theta = 31 - 25 = 6 \text{ (}^\circ\text{C)}$	[1]
	$c = \Delta E \div (m \times \Delta\theta) = 12000 \div (2.5 \times 6)$	[1]
	800 (J/kg $^\circ\text{C}$)	[1] allow answer of 800 for 5 marks
0 3.1	Nucleus (on left)	[1]
	Proton (top right)	[1]
	Orbit (middle right)	[1]
	Electron (bottom right)	[1]
0 3.2	$1 \times 10^{-10} \text{ m}$	[1]
0 3.3	Number of protons = number of electrons	[1]
0 3.4	$\frac{0.7}{100} \times 300000000$	[1] allow alternate calculation
	2100000 (m/s)	[1] allow answer of 2100000 for 2 marks
0 3.5	Indicative content: - Plum pudding model has charge scattered throughout atom (allow ball of positive charge with electrons scattered throughout) - Plum pudding model has mass spread throughout atom - Alpha particle scattering experiment - Alpha particles fired at (thin) sheet of gold (foil) - Most alpha particles pass through (so) most of atom is empty space - Some particles changed direction more than expected / some went backwards (so) nucleus positively charged (and) most mass at centre of atom / in nucleus - Nucleus surrounded by (cloud/orbit of) negative electrons	[6] 5-6 marks: Detailed and comprehensive explanation provided. Relevant points logically linked. Examples provided to give strong case and show understanding. 3-4 marks: Attempt at linking description of experiment and results to the differences between models. Examples given but observations may not be provided. Attempt at logically linking relevant points. 1-2 marks: Simple statements made arguing that nuclear model is better, that may not be logically linked. 0 marks: No relevant content.
0 4.1	Sublimation	[1]
0 4.2	There are almost no forces of attraction between the particles	[1]
0 4.3	$\frac{300 - 200}{200} = 0.5$	[1]
	0.5×100	[1]
	50 (%)	[1] an answer of 50 (%) scores 3 marks

0 4.4	The temperature has increased	[1]
	Which increases the kinetic energy / speed of the particles	[1]
	The particles collide with the container more often	[1] allow with more momentum
	Exerting a larger force, so the pressure increases	[1]
0 5.1	Energy is transferred from the balls gravitational potential energy store	[1]
	to its kinetic energy store	[1]
0 5.2	300 g = 0.30 kg	[1]
	$E_g = mgh = 0.30 \times 9.8 \times 25 = 73.5 \text{ (J)}$	[1]
	$E_k = 73.5 \text{ (J)}$	[1]
	$E_k = \frac{1}{2}mv^2$ so $v^2 = \frac{2E_k}{m}$	[1]
	$v^2 = \frac{2 \times 73.5}{0.30} = 490 \text{ (m}^2/\text{s}^2)$	[1]
	$v = \sqrt{490} = 22.1 \text{ (ms}^{-1})$	[1] an answer of 22.1 scores 6 marks
0 5.3	In reality air resistance acts against falling objects	[1]
	Causing some energy to be transferred to other / wasted energy stores	[1] Owtte
0 6.1	$R = \frac{V}{I} = 2 \div 0.40$	[1]
	5	[1] an answer of 5 scores 2 marks
	Ω (Ohms)	[1]
0 6.2		[4] 1 mark for suitable y axis scale 2 marks for correctly plotted points ± 0.5 small squares (lose 1 mark per incorrect point) 1 mark for correct line of best fit (allow similar lines but must ignore anomalous result)
0 6.3	Any 1 from: • Human error • Different temperature across component	[1] allow any suitable alternatives



0 6.4	Any 1 from: • Ohmic conductor • Resistor (at a constant temperature) • Wire (at a constant temperature)	[1]
	The current is directly proportional to the potential difference / the graph is a straight line	[1]
0 6.5		[3] 1 mark for battery (allow cell) 1 mark for ammeter and variable resistor 1 mark for voltmeter in parallel across component
0 6.6	Indicative content: • Identification of thermistor • Pd of power supply / cell is shared out between thermistor and loop of fixed resistor and fan • Fixed resistor and fan always have same potential difference across them • Resistance of thermistor changes when temperature changes • As temperature increases, the resistance of the thermistor decreases • Overall resistance of circuit decreases • Potential difference across total resistance remains unchanged • Potential difference across thermistor decreases • Potential difference across fixed resistor and fan increases • The lower the resistance of the thermistor, the smaller the share of the potential difference • The potential difference of the fan and fixed resistor increases • The fan goes faster	[6] 5-6 marks: Relevant points identified, given in detail and logically linked to form a comprehensive explanation. 3-4 marks: Relevant points identified, with attempts at logically linking. The explanation may not be clear. 1-2 marks: Some points identified and simply stated. Relevance not clear and no attempt at logically linking.