Question Number	Answer		Mark
1(a)(i)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	Any continuous line which has a section above and below the time axis without going (deliberately) back in time	Fractions of a cycle that meet the criteria Ignore anything appearing after the arrow on the time axis	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	substitution (1) $2400/200 = 230/ V_s$ transposition (1) $(V_s =) 230 \times 200/2400$ Evaluation (1) $(V_s =) 19$ (V)	 substitution and transposition in either order 230/12 = 2 marks (s&t) 200/10.43 = 2 marks (s&t) 19.2 (V) 19.17 (V) Give full marks for correct answer, no working 1.9 x any other power of 10 = 2	**(3)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	An explanation linking any **three** of the following • <u>step-up transformer</u>(s) (1) • increase voltages (1) • (this) reduces the current (1) • (which) reduces the {<u>heat</u> / <u>thermal</u>} {energy / power} losses (1)	 Assume 'they' refers to transformers 'steps up the voltage' scores second MP only Reject for MP2 and MP3: 'increases voltage <u>and</u> current.' but beware: 'increases voltage and current decreases' = 2 marks ignore unqualified energy losses Allow reverse arguments for last two points, e.g. high current wastes more heat energy = 2 marks Ignore references to efficiency ignore step-down statements except where they contradict	**(3)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	An explanation linking **two** of the following • {kite / string} touching the power line (1) • {movement of charge / current} (1) • (electricity) {to earth / through the kite-flyer} (1) • giving (the kite-flyer) an <u>electric</u> shock (1)	 anything which implies contact for touching eg 'caught up in' spark ignore energy ignore electricity to ground needs idea of 'through' not 'into' the person ignore 'completing the circuit' electrocution stopping heart	**(2)**

Question number	Answer	Mark
2(a)(i)	B	(1)

Question number	Answer	Mark
2(a)(ii)	A	(1)

Question number	Answer	Mark
2(b)(i)	substitution into correct equation (1) = 1.9 × 10.0 × 9.0 answer (1) 171 (J) (which is about 170 J) Answer must be shown to 3 significant figures	(2)

Question number	Answer	Additional guidance	Mark
2(b)(ii)	rearrangement (1) (useful energy transferred) = efficiency × total energy supplied substitution (1) = (70 × 170)÷100 answer (1) 119 (J)	award full marks for correct numerical answer without working accept (useful energy transferred) = 170 × 0.7 OR = 171 × 0.7 accept alternative answer from 171 (J) i.e. 120 (J)	(3)

Question number	Answer	Mark
2(c)	B	**(1)**

Question number	Answer	Mark
2(d)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (2 marks): • the coil contains wires which have a resistance (1) • and current in the wire is due to movement of electrons through (close-packed) lattice of positive ions (1) • hence collisions between electrons and ions in the lattice transfer energy from electrons to the lattice (causing the temperature of the wires/coil to rise) (1)	**(3)**