Question Number	Answer	Acceptable answers	Mark
1(a)	D		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	substitution (1) 0.5 × 6.0 evaluation (1) 3 unit (1) W / watts	 give (2) for correct answer, no working 0.003 kW (3) 3 kW (2) J/s, VA Accept kW for unit with incorrect or no numerical answer	**(3)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	150 (J)	200 – 50 (J) 200 minus 50 (J)	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	substitution (1) 50 ÷ 200 (x 100%) evaluation (1) 25 (%)	 0.25, 1/4 give (2) marks for correct answer, no working	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(d)	(black) is a good {(thermal) emitter / radiator}	to keep the motor cool / eq ignore absorbing / conducting / insulating heat	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(ai)	(Bow and arrow:) kinetic (1) (Electric kettle:) heat (thermal) (1) (Microphone:) sound (1)	Heat/thermal	**(3)**

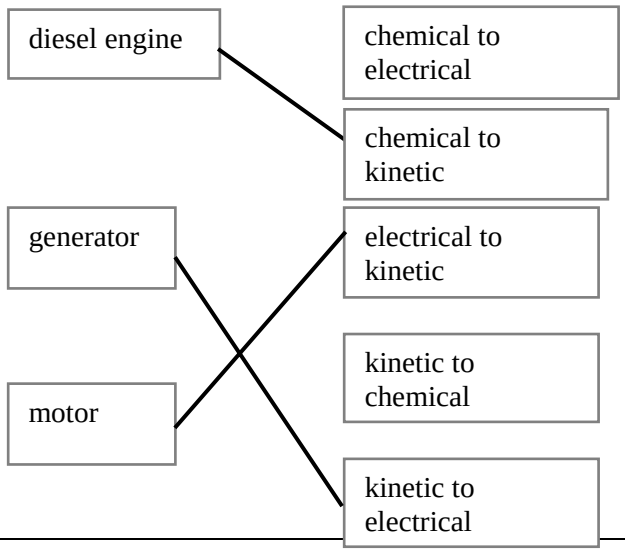
Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	Any **one** from (transferred into) {thermal/heat/sound}(energy) (1) (Energy) is dissipated (1)	Do not accept light energy or it disappears goes into surroundings/air (energy) is wasted/lost	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	12 (J) Ignore any unit given by candidate.	20 - 8 (J)	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	An explanation linking any **two** of • (For the) same amount of {electrical/supplied} (energy/power) (1) • (CFL/it) has a greater output (of light energy) (1) • (CFL/it) wastes less (electrical energy) (1)	Same input (energy) gives out/produces more {light/useful} (energy) Do not accept more energy is used in the (CFL/it) Ignore brightness. (CFL/it) produces less thermal/heat (energy) Accept explanations using data from the energy transfer diagrams as comparisons eg (CFL/it) is four times as efficient gains both marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)	An explanation linking • dissipating heat (1) • at same (rate)/as quickly as energy is being supplied (1)	{gives out/radiates/conducts/ convects /loses /produces} {heat/thermal/ energy} gives out as much energy/power as it takes in(each second) Gains both marks If no other marks scored: There is a constant current/ steady flow of energy into the heater gains one mark Ignore refs to thermostat	**(2)**

Total for Question 2 = 9 marks

Question Number	Answer	Acceptable answers	Mark
3 (ai)	A line connecting a train part with a useful energy transfer as shown below (1) Train part transfer useful energy  	Lines need not be straight Ignore any arrow heads drawn Note: if more than one line is drawn from a train part then zero mark for that train part.	**(3)**

Question Number	Answer	Acceptable answers	Mark
3 (aii)	(transfer of energy to) thermal (1)	heat/sound	**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (bi)	1400 – 1300 (= 100) (kJ) (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (bii)	Substitution (1) 1300 / 1400 x 100 Evaluation (1) 93(%) or 0.93	 A value which rounds to 93(%) or 0.93 Correct answer with no working scores 2 marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (c)	Any one from black is a good thermal radiator (1) (helps to) prevent motors overheating (1)	 (good) emitter (helps to) remove wasted energy/ heat (from the motor)	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)	A		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	6%	100 - 94	**(1)**
(ii)	comparing reflected amount for water with any one of the others (1)	saying one {named material (on the graph) is/all materials (on the graph) are} solid	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)(i)	An explanation to include the following • more thermal (heat) energy is absorbed (1) • because water (liquid) absorbs more than ice (solid) (1)	more radiation is absorbed because water (liquid) reflects less than ice (solid) because less ice surface to reflect because more water surface to absorb	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)(ii)	its temperature rises	gets hotter water level increases/gets higher Ignore '{water/it} {increases/rises}' **Reject** toxicity	**(1)**

Question Number		Indicative content	Mark
QWC	***4(d)**	A description including some of the following • solar / heat / light • photosynthesis • chemical / fossil fuel • burning • thermal • in steam • kinetic • in turbine • electrical • in generator	**(6)**
Level	**0**	no rewardable material	
1	**-2**	• a limited description which identifies an energy in an appropriate place e.g. thermal energy in the boiler OR e.g. the (same) energy flows from the boiler to the turbine • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**-4**	• a simple description which includes details of a relevant energy transfer e.g. (steam causing) the turbine to rotate turns the coil in the generator transferring kinetic energy into electrical energy • 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 description to includes details of a sequence of transfers e.g. chemical energy stored in the coal is transferred in the boiler to thermal energy producing steam. The steam turns the turbine which turns the coil. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
5(a)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(i)	Any **two** from the following points • cover box with transparent material (1) • use of reflector (1) • method to increase energy supplied (1) • method to reduce energy loss (1) • paint (box) black/dull/matt (1)	use glass box mirror / foil {angle to sun} / {warmer place}/lens use insulating box / wooden box / lagging Ignore answers to do with hosepipe	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)(ii)	An explanation linking the following points • pipe / water absorbs heat (1) • pipe radiates heat (1) • radiation (rate) increases with temperature(1) • (at constant temperature) absorption <u>rate</u> = radiation <u>rate</u> (1)	accept takes in for absorbs accept emits for radiates If no other marks given accept output = input or water boils for 1 mark	**(3)**

Question Number	Answer	Acceptable answers	Mark
5(c)	4000 (1) (4000)/200 (1)	20 (W) give full marks for correct answer, no working accept for 1 mark 4000 10000/200 6000/200 16000/200	**(2)**