

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 <ul style="list-style-type: none"> (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 <ul style="list-style-type: none"> • 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)	<p>A line connecting a train part with a useful energy transfer as shown below (1)</p> <p>Train part transfer</p> <pre> graph LR subgraph Train_parts [Train part transfer] DE[diesel engine] G[generator] M[motor] end subgraph Useful_energy [useful energy] CE1[chemical to electrical] CK1[chemical to kinetic] EK1[electrical to kinetic] KC1[kinetic to chemical] KE1[kinetic to electrical] end DE --- CE1 DE --- CK1 G --- EK1 G --- KE1 M --- EK1 M --- KE1 </pre>	<p>Lines need not be straight</p> <p>Ignore any arrow heads drawn</p> <p>Note: if more than one line is drawn from a train part then zero mark for that train part.</p>	(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)	<p>Substitution (1) 1300 / 1400 x 100</p> <p>Evaluation (1) 93(%) or 0.93</p>	<p>A value which rounds to 93(%) or 0.93</p> <p>Correct answer with no working scores 2 marks</p>	(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 <ul style="list-style-type: none"> • more thermal (heat) energy is absorbed (1) • because water (liquid) absorbs more than ice (solid) (1) 	<p>more radiation is absorbed</p> <p>because water (liquid) reflects less than ice (solid)</p> <p>because less ice surface to reflect</p> <p>because more water surface to absorb</p>	(2)

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

Question Number		Indicative content	Mark
QWC	*4(d)	<p>A description including some of the following</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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)	<p>Any two from the following points</p> <ul style="list-style-type: none"> • 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) 	<p>use glass box</p> <p>mirror / foil</p> <p>{angle to sun} / {warmer place}/lens</p> <p>use insulating box / wooden box / lagging</p> <p>Ignore answers to do with hosepipe</p>	(2)

Question Number	Answer	Acceptable answers	Mark
5(b)(ii)	<p>An explanation linking the following points</p> <ul style="list-style-type: none"> • 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) 	<p>accept takes in for absorbs</p> <p>accept emits for radiates</p> <p>If no other marks given accept output = input or water boils for 1 mark</p>	(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)