<u>Heat Energy- Specific Heat Capacity and Latent Heat Past Paper Answers</u> <u>AQA Physics GCSE -Higher</u>

stion	answers	extra information	mark
(a)	(matt) black is a good emitter of infrared / radiation	accept heat for infrared / radiation ignore reference to good absorber attracts heat negates this marking point	1
	to give maximum (rate of) energy transfer (to surroundings)	accept temperature (of coolant) falls fast(er) accept black emits more radiation for 1 mark	1
		black emits most radiation / black is the best emitter of radiation for 2 marks	
(b)	the fins increase the surface area	accept heat for energy	1
	so increasing the (rate of) energy transfer or so more fins greater (rate of) energy transfer		1
(c)	114000	allow 1 mark for correct temperature change, ie 15 (°C) or allow 2 marks for correct substitution, ie 2 × 3800 × 15 answers of 851 200 or 737 200 gain 2 marks or substitution 2 × 3800 × 112 or 2 × 3800 × 97 gains 1 mark an answer of 114 kJ gains 3 marks	3

stion	answers	extra information	mark
(d)	increases the efficiency		1
	less (input) energy is wasted or more (input) energy is usefully used	accept some of the energy that would have been wasted is (usefully) used accept heat for energy	1
otal			9

stion	answers	extra information	mark
(a)	any two from:		2
	black is a good emitter of (infrared radiation)	accept heat for radiation ignore reference to absorbing radiation	
	large surface (area)		
	matt surfaces are better emitters (than shiny surfaces)	accept matt surfaces are good emitters	
		ignore reference to good conductor	
(b)		efficiency =	
		useful energy out (×100%) total energy in	
	90 % or 0.9(0)	allow 1 mark for correct substitution	2
		ie <u>13.5</u> 15	
		provided no subsequent step shown	
		an answer of 90 scores 1 mark	
		an answer of 90 / 0.90 with a unit scores 1 mark	
(c)	(producing) light	allow (producing) sound	1

stion	answers	extra information	mark
(d)	any two from: • wood is renewable • (using wood) conserves fossil fuels	accept wood grows again / quickly accept wood can be replanted accept doesn't use fossil fuels	2
	wood is carbon neutral	accept a description cheaper / saves money is insufficient	
(e)	2550000	$E = m \times c \times \theta$ allow 1 mark for correct substitution ie $100 \times 510 \times 50$ provided no subsequent step shown answers of 1 020 000, 3 570 000 gain 1 mark	2
	joules /J	accept kJ / MJ do not accept j for full credit the unit and numerical answer must be consistent	1
otal			10

stion	Answers	Extra information	Mark	AO spec ref
(a)	conduction		1	AO1 1.1.3
(b)	35 000		1	AO2 1.1.4a
(c)	500	their 7(b) = 2 x c x 35 correctly calculated scores 2 marks allow 1 mark for correct substitution, ie 35000 = 2 x c x 35 or their 7(b) = 2 x c x 35	2	AO1 AO2
	J/kg°C		1	
(d)	energy lost to surroundings or energy needed to warm heater	accept there is no insulation (on the copper block)	1	AO3 1.1.3d
		do not accept answers in terms of human error or poor results or defective equipment		
tal			6	

stion	Answers	Extra information	Mark	AO / Spec. Ref.
(a)	no particles (in a vacuum)		1	AO1 1.1.3a
	(so) no / reduced conduction and no / reduced convection	both energy transfer methods needed for the mark	1	
b)(i)	78 (°C)	allow 2 marks for correct temperature change ie 22 °C allow 1 mark for correct substitution ie 46 200 = 0.5 x 4200 x θ or $\frac{46200}{0.5 \times 4200} = \theta$	3	AO2 1.1.4d
o)(ii)	6.4 (W)	allow 2 marks for an answer that rounds to 6.4 allow 1 mark for correct substitution ie 46 200 = P x 7200 an answer of 23 000 or 23 100 or 385 gains 1 mark	2	AO2 1.3.1c
otal			7	1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)	wood / charcoal / peat	allow named solid dried plant material or animal product do not accept seashells	1	AO1 1.4.1a
5(b)	380 (°C)	allow 1 mark for correct substitution ie $8.36 \times 10^7 = 250 \times 880 \times \theta$	2	AO2 1.1.4d
5(c)	(white is a) poor emitter of IR radiation	ignore white is a good reflector only or poor absorber	1	AO1 AO2
	(curved surface) has a small surface area (to volume ratio)		1	1.1.4d 1.1.3c
	(high specific heat capacity means) large amount of energy needed to transfer to surroundings before temperature decreases (significantly)		1	
	(low U-value means) concrete is a poor conductor or a (good) insulator		1	
Total			7]

stion	answers	extra information	mark
(a)	because black is a good absorber of radiation		1
	therefore there will be a faster transfer of energy	allow therefore the temperature of the water rises faster	1
(b)	16 800 000	allow 1 mark for substitution into correct equation ie 100 x 4200 x 40	2