

Conduction and Convection 4 MS

QUESTION 1

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	The volume of boiling water.		1
a)ii)	any one from: <ul style="list-style-type: none"> • (more) precise • accurate • reliable • removes human / reading error 	do not accept better (reading) do not accept thermometer is unreliable accept easier to read accept take temperature more frequently	1
b)i)	B temperature falls faster because black is a better / good emitter	marks are for the explanation this mark point cannot score if A chosen ignore reference to better absorber accept for both marks an answer in terms of why A is the white can	1 1
c)i)	faster than		1
c)ii)	darker / black surfaces absorb heat faster	accept black is a better / good absorber dark surfaces attract heat negates this mark	1
c)iii)	air is a bad / poor conductor or air is a good insulator	accept air is an insulator	1
Total marks			7

QUESTION 2

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	Any two from <ul style="list-style-type: none"> • (air) particles / molecules / atoms gain energy • (air) particles / molecules / atoms move faster • (air) particles / molecules / atoms move apart 	do not accept move more do not accept move with a bigger amplitude / vibrate more ignore particles expand ignore particles become less dense	2

	<ul style="list-style-type: none"> air expands air becomes less dense <ul style="list-style-type: none"> warm / hot air / gases / particles rise 	<p>do not accept heat rises</p> <p>answers in terms of heat particles negates any of the mark points that includes particles</p>	
b)i)	<p>any two from</p> <ul style="list-style-type: none"> free / mobile electrons gain (kinetic) energy free electrons collide with other (free) electrons / ions / atoms / particles atoms / ions / particles collide with other atoms / ions / particles 	<p>accept free / mobile electrons move faster</p> <p>accept vibrate faster for gain energy</p> <p>answers in terms of heat particles negates this mark point</p>	2
b)ii)	(faster) energy / heat transfer to room(s) / house	<p>accept room(s) / house gets warm(er)</p> <p>accept lounge / bedroom / loft for rooms</p>	1
Total marks			5

QUESTION 3

QUESTION	ANSWER				EXTRA INFORMATION	MARKS
	0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)		
a)	No relevant content.	There is a basic explanation of one feature or a simple statement relating reduction in energy transfer to one feature.	There is a clear explanation of one feature or a simple statement relating reduction in energy transfer to two features.	There is a detailed explanation of at least two features or a simple statement relating reduction in energy transfer to all four features.		
	examples of the points made in response				<p>accept throughout: heat for energy loss for transfer accept insulator for poor conductor</p>	
	<ul style="list-style-type: none"> plastic is a poor conductor stops convection currents forming at the 					

	<p>top of the flask so stopping energy transfer by convection</p> <ul style="list-style-type: none"> • molecules / particles evaporating from <p>the (hot) liquid cannot move into the (surrounding) air so stops energy transfer by evaporation</p> <ul style="list-style-type: none"> • plastic cap reduces / stops energy transfer by conduction / convection / evaporation <p>glass container:</p> <ul style="list-style-type: none"> • glass is a poor conductor so reducing energy transfer by conduction • glass reduces / stops energy transfer by <p>Conduction</p> <p>vacuum:</p> <ul style="list-style-type: none"> • both conduction and convection require a medium / particles • so stops energy transfer between the two walls by conduction and convection • vacuum stops energy transfer by conduction / convection <p>silvered surfaces:</p> <ul style="list-style-type: none"> • silvered surfaces reflect infrared radiation • silvered surfaces are poor emitters of infrared radiation • infrared radiation (partly) reflected back (towards hot liquid) • silvered surfaces reduce / stop energy transfer by radiation 	accept heat for infrared	
b)	<p>(the ears have a) small surface area</p> <p>so reducing energy radiated / transferred (from the fox)</p>	<p>ears are small is insufficient</p> <p>accept heat lost for energy radiated</p> <p>do not accept stops heat loss</p>	<p>1</p> <p>1</p>
Total marks			8

QUESTION 4

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	(water) particles / molecules gain energy / move faster	accept atoms for molecules ignore move more do not accept move with a bigger amplitude / vibrate more	1
	and (the particles / molecules) move apart		1
	this causes the water to become less dense	accept water expands ignore particles become less dense	1
	and the warm / hot water rises (through the tank)	accept (more energetic water) particles rise to the top ignore heat rises	1
b)	conduction		
Total marks			5

QUESTION 5

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	solid		1
b)	decreased decreased	correct order only	1 1
	increased		1
c)i)	A	reason only scores if A chosen	1
	uses least / less energy (in 1 year)	a comparison is required	1
		accept uses least power accept uses least kWh	
c)ii)	greater the volume the greater the energy it uses (in 1 year)		1
c)iii)	a very small number sampled	accept only tested 3 accept insufficient evidence / data allow not all fridges have the same efficiency or a correct description implying different efficiencies only tested each fridge once is insufficient there are lots of different makes is insufficient	1
Total marks			8

QUESTION 6

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	(in a metal) free electrons gain kinetic energy (free electrons) transfer energy to other electrons / ions / atoms by collision	to gain full credit the answer must be in terms of free electrons accept move faster do not accept particles allow a maximum of 2 marks for answers in terms of atoms / ions / particles gaining kinetic energy or vibrating faster / more transferring energy by collisions	1 1 1 1
b)	(air) particles spread out (which causes the) air to become less dense / expand (so the) warm air rises	do not accept particles become less dense do not accept heat rises particles rise is insufficient	1 1 1
c)	large surface area black / dark (colour)	ignore references to type of metal or external conditions	1 1
Total marks			9

QUESTION 7

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	because they contain free electrons		1
a)ii)	because they are good absorbers of infrared radiation		1
b)ii)	insulators		1
b)ii)	the rate of energy transfer would be lower.		1
c)	power time	allow the temperature (of the oven) watts or wattage is insufficient	1 1
d)	it can be switched on / off remotely	accept sensible suggestions about remote operation eg can be turned on / off from work or food can be cooked before you get home	1

Total marks			7
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