



General Certificate of Secondary Education

Applied Science (Double Award) 3861

3860/2H Science for the Needs of Society

Mark Scheme

2007 examination – January series

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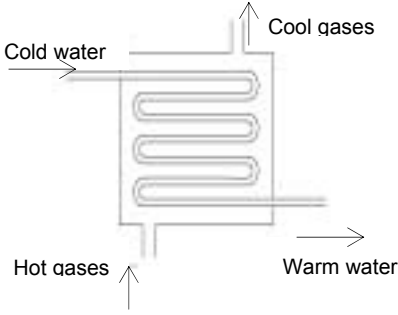
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Higher / 2H

question	answers	extra information	marks
1(a)(i)	appropriate label on diagram	label must be outside heart valves	1
(ii)	appropriate label on diagram	label must be outside heart valves	1
(b)(i)	any two from: <ul style="list-style-type: none"> • less CO₂ • more O₂/oxygenated • pressure drops/decreases • less acidic/pH rises 	ignore references to colour/speed/thickness/route	2
(b)(ii)	any two from: <ul style="list-style-type: none"> • more CO₂ • less O₂/deoxygenated • pressure drops/decreases • more acidic/pH falls 	ignore references to colour/speed/thickness/route	2
(c)	arteries carry blood under pressure	ignore 'lose more blood'	1
	blood will be lost faster		1
(d)	any two precautions by first aider from: <ul style="list-style-type: none"> • wash/clean the cut • use antiseptic/antibacterial • cover (with bandage plaster) • (wear) gloves/wash hands 	not disinfectant	2
Total			10

question	answers	extra information	marks
2(a)	(mixture of) two different materials (combined)	not elements	1
(b)(i)	too flexible/soft/not strong/not hard/easily scratched	ignore tough ignore references to melting point	1
(ii)	too brittle/stiff/breaks easily/low tensile strength/difficult to shape	ignore any correct properties that are not relevant	1
(c)(i)	measure side(s) using a ruler length \times breadth \times width or place in water measure volume of water displaced/see how much water has risen using/in a measuring cylinder		1 1 1
(ii)	31.2/12 or density = mass/volume = 2.6 (g/cm ³)		2
(d)	copper atoms have different size rows/layers of atoms slide/slip different size prevents slide/slip of layers	first mark can be scored in diagram	1 1 1
Total			11

question	answers	extra information	marks
3(a)	either high concentration of water low concentration of water	one mark for high/low concentration must specify water or solute for second mark	2
	or low concentration of solute high concentration of solute	allow dilute to concentrated/weak to strong	
	semi-permeable/partially permeable membrane	not cell membrane not permeable	1
(b)(i)	suitable scale for height – must be written on graph	all points plotted correctly = 2 marks	1
	all points plotted	5 or 6 points correct = 1 mark less than 5 correct = 0 marks	2
(ii)	smooth curve passes through candidates points		1
(iii)	95 (mm)	accept 94–96 or candidate's own value	1
(iv)	water in the beaker moves into (the visking tubing)		1
(v)	line below first one		1
	line is similar shape to first one (must go through origin)		1
Total			11

question	answers	extra information	marks
4(a)(i)	water / steam	<p>accept hydrogen oxide</p> <p>ignore H₂O</p>	1
(ii)	prevent corrosion/good heat conductor/does not rust/heat up quickly	ignore strong	1
(b)	<p>any two from:</p> <ul style="list-style-type: none"> • heats the air • hot air rises/convection currents • radiation (in context) • conduction (in context) 		1 1
(c)(i)	<p>cold and cool adjacent/ warm and hot adjacent at top or bottom of diagram</p> <p>water labels connected/gas labels connected</p> <p>arrows correct – counter current flow</p>		1 1 1
(d)	<p>any two from:</p> <ul style="list-style-type: none"> • pre-heats the water • less fuel needed to heat water • less energy wasted/heat recycled 	ignore references to time, installation, maintenance or cost	1 1

question	answers	extra information	marks
4(e)	any two from: <ul style="list-style-type: none">• cavity wall insulation/thicker walls• double glazing/smaller windows• low energy light bulbs/more efficient appliances• reference to draught proofing• loft insulation• silver foil behind radiators• carpets• curtains• solar panels/wind turbines	ignore actions by the homeowner	2
Total			11

question	answers	extra information	marks
5(a)	<p>diseases caused by viruses</p> <p>antibiotics only kill bacteria</p>	<p>antibiotics do not kill viruses = 2 marks</p> <p>antibiotics only kill some microorganisms = 1 mark</p> <p>not diseases too strong/immune to antibiotics</p> <p>ignore reference to vaccination</p>	<p>1</p> <p>1</p>
(b)	<p>dead/weakened/attenuated/part of bacteria/virus/pathogen/antigen</p> <p>injected into/taken by patient to prevent infection</p>	<p>not bacteria/antibodies/disease</p>	<p>1</p> <p>1</p>
(c)	<p>any three from:</p> <ul style="list-style-type: none"> • white blood cells • produce antibodies • recognition of infecting organism • antibodies produced quickly/remain in blood • kill/destroy infecting organism 	<p>not injection of antibodies</p>	<p>3</p>
(d)(i)	<p>measles, mumps, rubella</p>	<p>all three needed for 2 marks two for 1 mark apply list principle</p>	<p>2</p>

question	answers	extra information	marks
5(d)(ii)	to build up antibodies		1
(e)(i)	fewer people vaccinated/foreign travel/mutation/overcrowding	not vaccine not working not hygiene	1
(ii)	any sensible suggestion (eg increase vaccination/quarantine/further research/better vaccine	not restricted access to vaccine	1
Total			12

question	answers	extra information	marks
6(a)	produces heat energy/energy released or more energy given out than taken in		1
(b)	covalent (correct spelling) shared electrons or diagram showing shared pair of electrons the rest of the diagram is correct (three lone pairs)		1 1
(c)(i)	$436 + 243$ $= 679$	correct answer alone scores 2 marks	1 1
(ii)	$432 + 432$ $= 864$	correct answer alone scores 2 marks	1 1
(iii)	$864 - 679$ $= 185$	allow error carried forward correct answer alone scores 2 marks ignore sign	1 1
(iv)	more energy given out when bonds are formed than energy taken in when bonds are broken	more energy given out than taken in = 2 marks more energy given out/less energy taken in = 1 mark energy is given out when bonds are formed = 1 mark not just energy is released	1 1

question	answers	extra information	marks
6(d)	any four from: <ul style="list-style-type: none">• at least two concentrations/strengths of acid• same size/mass/amount of zinc• same shape zinc• same temperature• time how long it takes to dissolve/rate of gas production or compare size/mass after fixed time	no marks for fair test ignore volume of acid	4
Total			15

question	answers	extra information	marks
7(a)	(power =) 1.8	no marks for the answer (0.9)	1
	(time =) 0.5		1
	$1.8 \times 0.5 (= 0.9)$		1
(b)	0.9×7	allow ecf from (a)	1
	= 6.3	correct answer alone = 2 marks	1
(c)	current = power/voltage	correct answer alone =	1
	= $1800/240$	3 marks	1
	= 7.5		1
(d)	efficiency = $\frac{\text{energy output}}{\text{energy input}} \times 100$	allow 77.7	1
	= $\frac{0.7}{0.9} \times 100$	allow full calculator display	1
	= 78% (0.78)	award maximum of 1 mark for $\frac{0.2}{0.9} \times 100$ or 22%	1
Total			11

question	answers	extra information	marks
8(a)(i)	less flexible/stiffer/stronger	not more viscous	1
	high melting point/ harder to melt	not takes longer to melt not less volatile two independent marks	1
(ii)	stronger forces (of attraction between chains)/more contact between chains		1
(b)(i)	more flexible/easier to shape/chains move more freely	two independent marks	1
	lower melting point/easier to melt		1
(ii)	weaker forces (of attraction between chains)/less contact between chains/chains less tightly packed		1
(c)(i)	less flexible/stiffer/stronger	two independent marks	1
	higher melting point/does not melt/harder to melt		1
(ii)	(strong/covalent) bonds between chains/chains bonded together/ giant structure/all chains connected	not chains cross-linked not the atoms are bonded together	1
Total			9