



General Certificate of Secondary Education

**Applied Science (Double Award)
3861**

3860/2F Science for the Needs of Society

Mark Scheme

2007 examination - January series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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Foundation / 2F

question	answers	extra information	marks
1(a)	(cell) membrane cytoplasm nucleus		3
(b)(i)	photosynthesis		1
(ii)	chlorophyll		1
(iii)	magnesium		1
(iv)	soil		1
(c)	cotton		1
Total			8

question	answers	extra information	marks
2(a)(i)	sodium chloride/NaCl		1
(ii)	calcium carbonate/CaCO ₃		1
(iii)	lead oxide/PbO		1
(iv)	ammonia/NH ₃		1
(v)	hydrogen, sulphur, oxygen	all 3 correct for 2 marks 2 correct for 1 mark not symbols	2
(b)(i)	carbon	accept C not hydrogen	1
(ii)	accept answers concerning containers/bags/pipes/toys/waterproofing/wrapping	not clothes not insulation not furniture	1
Total			8

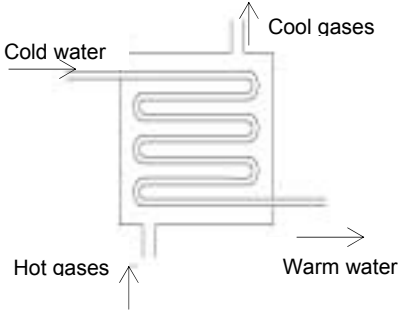
question	answers	extra information	marks
3(a)	hydroelectric power solar energy wind energy		3
(b)(i)	boil steam turbine generator		4
(ii)	either nuclear fuel (or 'it') causes less air pollution/less global warming (or associated problems) or CO ₂ causes air pollution/global warming/is a greenhouse gas	allow less acid rain allow causes acid rain	1
(iii)	any two from: • (harmful) radioactive emissions/radioactivity/radiation • disposal of (nuclear) waste • non-renewable/finite resource • costs (qualified eg building/dismantling/operation) • scale or use of space (qualified) • risk of nuclear explosions (qualified)	do not allow vague statements such as pollution/harmful	2
Total			10

question	answers	extra information	marks
4(a)	gas petrol naphtha kerosine gas oil	all 5 correct for 4 marks 4 correct for 3 marks 3 correct for 2 marks 2 correct for 1 mark 1 mark if order of fractions is reversed	4
(b)	eg petrol fuel for transport	allow any sensible use for specified fraction from table	1
(c)(i)	any three from: <ul style="list-style-type: none"> • heat/boil • until the liquid boils/bubbles • thermometer in liquid • record the temperature of the liquid 	accept 'boil' only once do not accept 'boiling point' ignore references to fractionation	3
(ii)	any sensible precaution (eg electrical heater/no naked flame/tie hair back/wear gloves/wear goggles) explanation linked to precaution	must be a positive action	1 1
Total			10

question	answers	extra information	marks
5(a)(i)	appropriate label on diagram		1
(ii)	appropriate label on diagram		1
(iii)	appropriate label on diagram	labels must be outside heart valves	1
(iv)	appropriate label on diagram	labels 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		1
	blood will be lost faster	ignore 'lose more blood'	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			12

question	answers	extra information	marks
6(a)	low density/lighter resists corrosion	not strength	2
(b)	(mixture of) two different materials (combined)	not elements	1
(c)(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 correct properties that are not relevant	1
(d)(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
Total			10

question	answers	extra information	marks
7(a)	either high concentration of water	one mark for high/low concentration	2
	low concentration of water	must specify water or solute for second mark	
	or low concentration of solute	allow dilute to concentrated/weak to strong	1
	high concentration of solute	not cell membrane not permeable	
(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	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
8(a)(i)	water/steam	<p>accept hydrogen oxide</p> <p>ignore H₂O</p>	1
(ii)	prevent corrosion / good heat conductor/does not rust/heats 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
8(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