



General Certificate of Secondary Education

**Applied Science (Double Award)
4861**

APSC/2F Science for the Needs of Society

Mark Scheme

2009 examination – January series

STANDARDISATION

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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APSC2 Foundation / 2F

question	answers	extra information	marks
1(a) G	tree plant sheep cow	1 mark for 1 correct answer 2 marks for 2 or 3 correct answers 3 marks for all 4 correct	3
1(b) G	bacteria <i>fungi</i>		1 1
1(c)(i) E	yeast		1
1(c)(ii) E	bread/ wine/ <i>marmite/ soy sauce</i>	<i>Allow one mark for yoghurt/ cheese if bacteria has been named as the organism</i> <i>Not alcohol</i>	1
1(c)(iii) E	any two from: • Clean all equipment • <i>Use clean water</i> • Boil the mixture • Place a lid on the bucket		2
Total			9

question	answers	extra information	marks
2(a) E	1000/20 = 50 (cm ³)		1 1
2(b) G	sodium metabisulfite		1
2(c)(i) A	solution		1
2(c)(ii) A	suspension		1
2(d)(i) G	3, 5, 2, 4, (1)		1
2(d)(ii) E	1.9	<p><i>Correct answer with/without working = 3 marks</i></p> <p><i>Incorrect answer 1.57 – 1.38 = 1 mark</i></p> <p><i>Incorrect answer of = 0.19 or 0.19 x 10 = 1 mark</i></p>	3
Total			9

question	answers	extra information	marks
3(a)(i) G	bottled gas		1
3(a)(ii) G	batteries		1
3(a)(iii) E	mains gas/ <i>electricity/ bottled gas</i>		1
3(b)(i) A	wind		1
3(b)(ii) E	no greenhouse gases/ less/ <i>no</i> global warming/ conserve resources/ <i>less acid rain/ less <u>air</u></i> <i>pollution</i>	allow will not run out <i>Ignore cost</i>	1
3(c)(i) G	hydrogen carbon	any order	1 1
3(c)(ii) E	petrol diesel	(any order) allow other fractions/ <i>named</i> <i>alkane</i> <i>Allow jet fuel</i>	1 1
3(d)(i) A	CH ₄		1
3(d)(ii) E	blood / red blood cells/ <i>haemoglobin</i> oxygen		1 1
Total			12

question	answers	extra information	marks
4(a)(i) E	1 mark for sensible line		1
4(a)(ii) E	115000 – 130000	Allow correct value from their graph \pm one small square	1
4(a)(iii) E	any two from <i>examples of:</i> <ul style="list-style-type: none"> (physical) contact open wound/blood coughing / sneezing poor personal hygiene (sharing) needles 	Allow any <u>sensible</u> suggestion	2
4(b) E	cells/organs/ tissues white antibodies	Do <u>not</u> allow named cells/ organs/ tissues	1 1 1
4(c)(i) A	antibiotic		1
4(c)(ii) E	vaccine / antibiotic		1
Total			9

question	answers	extra information	marks
5(a) E	NaCl/Na ⁺ Cl ⁻		1
5(b) E	magnesium sulfate		1
5(c) G	evaporates low strong		1 1 1
5(d) E	any three from: <ul style="list-style-type: none"> weigh empty container measure out <i>the (sea) water/</i> (allow 100g & calculation) <i>use 1000g of (sea) water</i> heat/boil/evaporate to remove water weigh container/ <i>residue</i> at end 		3
5(e)(i) E	any two from: <ul style="list-style-type: none"> Improve growth / yield kill pests kill weeds kill fungus <i>stop disease</i> 		2

question	answers	extra information	marks
5(e)(ii) E	any three from: <ul style="list-style-type: none"> • rain • washes chemicals into rivers • chemicals are soluble • rivers drain into sea 	<i>Ignore wind/ spray</i>	3
Total			13

question	answers	extra information	marks
6(a)(i) A	convection		1
6(a)(ii) A	conduction		1
6(a)(iii) A	radiation		1
6(b)(i) E	Double/ <i>triple</i> glazing / curtains		1
6(b)(ii) E	carpets / underlay	<i>Ignore 'floor insulation'</i> <i>Allow suitable description</i>	1
6(b)(iii) E	cavity wall/ <i>insulation in/on walls</i>	<i>Allow named example</i>	1
6(c)(i) E	0.5×3 $= 1.5$		1 1
6(c)(ii) E	$(1.1/1.5) \times 100$ $= 73 \%$	<i>Allow ecf</i>	1 1
6(c)(iii) E	energy is lost as heat / spreads out/ <i>sound</i>	<i>ignore it gets wasted</i> <i>ignore it is lost</i>	1
Total			11

question	answers	extra information	marks
7(a) E	Any sensible named features/ characteristics for example: disease resistance / higher yield	Ignore shelf life/ healthy Accept grows faster	1
7(b) E	Natural, no foreign genes If the converse is the answer candidate must specify GM foods e.g. not natural / foreign genes may spread into environment/ 'belief' that they are harmful	Ignore cost/ taste/ pure/ chemicals	1
7(c)(i) E	carbon dioxide oxygen	Allow CO_2 / O_2 correct formulae	1 1
7(c)(ii) E	need to put in energy / light/ heat		1
7(d)(i) E	any two from: <ul style="list-style-type: none"> cell wall chloroplast/ <i>chlorophyll</i> (large) vacuole 		2
7(d)(ii) E	large surface area/ long	Ignore thin/ hair	1
7(d)(iii) G	osmosis		1
Total			9

question	answers	extra information	marks
8(a) E	high melting point/ <i>unreactive insulator/ heat resistant</i>		1
8(b) G	calcium oxide/ <i>CaO / OCa</i>	any order	1
	carbon dioxide/ <i>CO₂ / O₂C</i>	<i>Ignore quick lime</i>	1
8(c) E	<p>any two from:</p> <ul style="list-style-type: none"> <i>Idea of (the reducing agent) removes oxygen (from iron oxide)</i> <i>Idea of by chemically combining it</i> <i>Idea of oxide of carbon forms</i> <p>or</p> <p>2 marks for correct symbol equation</p> <p>i.e. $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$</p> <p>or</p> <p>word equation:</p> <p>iron oxide + carbon monoxide \rightarrow iron + carbon dioxide</p> <p>or</p> <p>iron oxide + carbon \rightarrow iron + carbon oxide</p>		2
8(d) E	<p>any two from:</p> <ul style="list-style-type: none"> steel is an alloy iron is an element steel contains carbon 	<p><i>Not compound</i></p> <p><i>ignore mixture/ uses/ other properties</i></p> <p><i>Allow steel is harder/ stronger</i></p>	2

question	answers	extra information	marks
8(e)(i) E	$C + O_2 \rightarrow CO_2$ accept alternatives e.g. $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$ or $CaCO_3 \rightarrow CaO + CO_2$	<i>Credit correct word equation</i>	1
8(e)(ii) E	air pollution / sulfur dioxide / dust / mining / quarrying/ <i>acid</i> <i>rain/ noise/ poisonous gases/ toxic</i> <i>gases</i>	<i>Any sensible environmental</i> <i>pollution not linked with CO_2 /</i> <i>global warming</i> <i>Ignore carbon monoxide</i>	1
Total			9

question	answers	extra information	marks
9(a) E	More miles per gallon/ uses less petrol / fuel / finite resource	Answer must be comparative	1
	produce less carbon dioxide/ emissions		1
9(b) E	$221 \times \frac{1}{60}$ (0.016 or 0.017)	Answer range 3.5 – 3.8 to allow for rounding	1
	= 3.7		1
9(c)(i) E	number of seconds in one hour = $60 \times 60 = 3600$		1
	100000 / 3600 (= 27.78) Or $27.78 \times 3600 = (100,000)$ Or $100000 / 27.78 = 3600$		1
9(c)(ii) E	acceleration = change in velocity / time taken	Allow correct rounding	1
	= 27.78 / 8.8		1
	= 3.16 (m/s ²)		1
	= 3.1568182 (m/s ²)		
Total			9
Overall mark = 90			