



**General Certificate of Secondary Education**

**Applied Science (Double Award)  
4861**

**4860/2F      Science for the Needs of Society**

**Mark Scheme**

*2007 examination - June 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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*Dr Michael Cresswell*, Director General.

## Foundation / 2F

question	answers	extra information	marks
1(a)(i)	N <sub>2</sub> / N		1
(ii)	argon	spelling must be correct	1
(iii)	78.1 + 0.9 + 0.1 = 79.1	answer alone scores <b>2</b> marks	1
	(100 – 79.1) = 20.9	do not allow rounded up mark to 21	1
(b)(i)	volcanoes		1
(ii)	photosynthesis		1
(iii)	photosynthesis		1
(c)(i)	coal / oil / (natural) gas	allow petrol, etc	1
(ii)	carbon dioxide / carbon monoxide		1
(iii)	climate change / rising ocean levels / floods / droughts / polar ice caps melting	do not allow ‘change in weather’	1
(iv)	wind / tidal / HEP / solar / wave / geothermal / biomass	operate list principle – eg coal and wind = 0  do not allow ‘water’	1
<b>Total</b>			<b>11</b>

question	answers	extra information	marks
2(a)(i)	measles / mumps / rubella / flu / malaria / polio / food poisoning / smallpox / pneumonia / meningitis / chicken pox / impetigo	not cancer	1
(ii)	breathing / swallow with food or drink / cut / mouth / sex / injections	not touching / through eye / air / blood	1
(iii)	cells reproduce / cause cell damage / produce toxins / attack / eat / kill / engulf cells		1
(iv)	(produce) antibodies / remove, fight, engulf, destroy or kill the microorganism	not 'antibacterial' (allow 'cell' as long as it is clear that talking about microorganism)	1
(b)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• wash hands / use antiseptic</li> <li>• sterilise equipment</li> <li>• disinfect surfaces</li> <li>• get vaccinated</li> <li>• wear a mask / gloves / protective clothing (<b>not</b> hairnet)</li> <li>• isolation of patient</li> <li>• cover up cuts</li> </ul>		2
(c)(i)	antibiotic		1

question	answers	extra information	marks
2(c)(ii)	eg penicillin / erythromycin / amoxicillin / amoxil		1
(iii)	bacteria develop resistance to antibiotics / immunity / bacteria getting used to it / mutation	not bacteria getting stronger / drug getting weaker	1
<b>Total</b>			<b>9</b>
3(a)(i)	high melting point		1
(ii)	metal		1
(b)(i)	carbon / C	not charcoal	1
	carbon dioxide / CO <sub>2</sub> / carbon monoxide / CO / carbon oxide		1
(ii)	iron / copper / tin / zinc	allow symbols  not ion, not alloys	1
(c)	malleable		1
	unreactive		1
(d)(i)	solder		1
(ii)	connections between components in the circuit	allow idea of joining components / making connections  not welding	1
(iii)	4(g)		1
<b>Total</b>			<b>10</b>

question	answers	extra information	marks
4(a)	2700 / 230	allow if written next to formula	1
	= 11.74 (amps)	allow 11.739, 11.73, 11.7, 12 or full calculator display	1
(b)(i)	13A		1
(ii)	high	allow alternative words if meaning the same (eg large)	1
	break		1
(c)(i)	$2.7 \times 2$	allow if written next to formula	1
	= 5.4	allow $2700 \times 2 = 5400$ for 1 mark	1
(ii)	$5.4 \times 9$	allow ecf from 4(c)(i)	1
	= 48.6		1
(d)	any <b>three</b> from: <ul style="list-style-type: none"> <li>• hot water</li> <li>• equal amounts of water</li> <li>• temperature measured / take reading on the thermometer</li> <li>• fixed time / time for fixed temperature change</li> <li>• comparison</li> </ul>	maximum <b>2</b> marks if reference made to temperature rising	3
<b>Total</b>			<b>12</b>

question	answers	extra information	marks
5(a)	brain liver		2
(b)(i)	nicotine	allow phonetic spelling	1
(ii)	carbon monoxide	not carbon dioxide	1
	less oxygen carried (in the blood) / poisonous		1
	<b>or</b>	second mark cannot be obtained independently	
	tar / benzene / harmful named chemical		1
	blocks airways / kills cilia in trachea / (lung) cancer / lung disease / bronchitis		1
	<b>or</b>		
	ash		1
	emphysema / lung damage / lung disease / bronchitis		1
(c)(i)	sleeping tablets		1
(ii)	psychological dependence / physical dependence / addicted	allow answers that imply dependence  do not allow tolerance	1
(iii)	amphetamine / cocaine / heroin / cannabis / weed / marijuana / hash / morphine	allow any drug sold on the street	1

question	answers	extra information	marks
<b>5(d)</b>	(eg alcohol / amphetamine)	no mark for name of drug but must be linked	
	drink / tablet / by mouth		1
	(absorbed) from digestive system / stomach		1
	<b>or</b>		
	(eg nicotine / heroin / cocaine)		
	smoke / breathing in		1
	(absorbed) through lungs		1
	<b>or</b>		
(eg heroin)			
injected		credit any correct science	1
into a vein			1
<b>Total</b>		<b>10</b>	



question	answers	extra information	marks
6(a)	infrared – remote control for TV microwaves – mobile phones light waves – fibreoptic cables radio waves – television signals	all four for <b>3</b> marks  <b>2</b> marks for either two or three correct  one correct for <b>1</b> mark	3
(b)(i)	waves vibrations / waves / cycles second	allow light waves	1 1 1
(ii)	ultraviolet light infrared microwave radio		1
(c)(i)	gamma alpha, beta		1 1
(ii)	ions		1
(iii)	treatment of cancer / radiotherapy / X-rays / diagnosis / sterilising surgical instruments		1
<b>Total</b>			<b>11</b>

question	answers	extra information	marks
7(a)	ear		1
(b)(i)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• nucleus</li> <li>• cytoplasm</li> <li>• cell membrane</li> </ul>	allow neucleus / nuclus not cell wall	2
(ii)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• long</li> <li>• many connections / branches</li> <li>• insulated</li> </ul>		2
(c)	glucose / sugar / food <u>reacts with</u> oxygen	accept respiration alone for <b>2</b> marks	1 1
(d)(i)	in the blood		1
(ii)	insulin / thyroxine / testosterone / oestrogen / glucagon / ADH  pancreas / thyroid / testes / ovary / pancreas / pituitary	independent marks, but must be correctly linked for <b>2</b> marks	1 1
<b>Total</b>			<b>10</b>

question	answers	extra information	marks
8(a)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• need to paint</li> <li>• not waterproof</li> <li>• wood will rot / biological damage</li> <li>• damaged by time / weather / warping</li> </ul>	ignore strength  not corrode	2
(b)(i)	flexible material  needs to be rigid (to support glass)	makes it less flexible / to stop it bending = <b>2</b> marks no marks for 'makes it strong'	1  1
(ii)	idea of two materials combined together	allow polymer has steel plate in it	1
(c)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• sand</li> <li>• limestone / <math>\text{CaCO}_3</math> / calcium carbonate</li> <li>• sodium carbonate / <math>\text{Na}_2\text{CO}_3</math> / soda ash</li> </ul>		2
(d)	reduced heat loss / better insulator		1
	less fuel needed / heating on for less time		1
<b>Total</b>			<b>2</b>

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question	answers	extra information	marks
9(a)	speed = distance / time  <b>or</b>  description in words		1
(b)	any <b>two</b> from: <ul style="list-style-type: none"><li>• type of road surface</li><li>• driver's reaction time / thinking distance / tiredness / drugs / alcohol / concentration</li><li>• braking distance</li><li>• weather conditions</li><li>• condition of vehicle / brakes / tyres</li><li>• mass / load</li></ul>		2

question	answers	extra information	marks
9(c)	any <b>two</b> from <ul style="list-style-type: none"> <li>• driving test / lessons</li> <li>• punishment for breaking the law</li> <li>• breathalyser</li> <li>• advertising campaign / education programme</li> <li>• take a taxi home (drunken drivers)</li> <li>• warning other drivers (eg L-plates)</li> <li>• making them be accompanied</li> </ul>	(2 separate marks)	2
(d)	50/3.3	answer alone = 2 marks	1
	= 15.2 (m/s)	allow 15.15 or 15	1
(e)	decreases / get lower/ lower pitch		1
<b>Total</b>			<b>8</b>