



GCSE

## Science A

General Certificate of Secondary Education

Unit A214/02: Unit 4: Ideas in Context (Higher Tier)

# Mark Scheme for June 2011

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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## Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
<b>not/reject</b>	answers which are not worthy of credit
<b>ignore</b>	statements which are irrelevant - applies to neutral answers
<b>allow/accept</b>	answers that can be accepted
(words)	words which are not essential to gain credit
<u>words</u>	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owt/e	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	no benefit of doubt
	reject

	correct response
	draw attention to particular part of candidate's response
	information omitted

### Subject-specific Marking Instructions

- a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- b. If a candidate alters his/her response, examiners should accept the alteration.
- c. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.
- d. The list principle:  
If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

Question			Answer	Mark	Guidance
1	a	i*	organic food not better (based on nutrient content)	1	"it's no better"
		ii*	diet already contains phosphorus (1)	1	
	b	i*	<b>any two from:</b> used at low level (1); test/approved/assessed before use (1); legal limits applied (1); levels on food monitored after use (1); not considered a risk to health/ is safe(1); break down rapidly (1)	2	'tested to be safe' = (2) (2 <sup>nd</sup> & 5 <sup>th</sup> marking points)
		ii	The risk is not known / you cannot be certain that the chemical residues in non-organic food will not harm you (1); best to avoid these chemicals as much as you can (1)	2	"There's a chance it could harm you" is OK for the 1st mark 'it is better to be safe than sorry' gets the 2nd mark 'reduce pesticide intake' is not enough: 'avoid' must be stated or implied
	c		<b>any two from:</b> many people could no longer afford the higher price of organic produce (1); because of the recession/money market collapse/high unemployment (1); food agencies report no benefit of organic food/ people became aware that pesticides in non-organic food were not harmful (1); bad summers / lower yields (1)	2	This question is about <b>consumers</b> . Watch for answers to (d) appearing here! e.g. 'people had less money in 2008/2009' is 1 <sup>st</sup> marking point 2 <sup>nd</sup> point is a suggested reason for lack of money  e.g. climate change but must be explained
	d		<b>any two from:</b> organic methods produce lower yields/will be eaten by pests (1); not enough manure/compost (1); expensive process (1); organic farming is more labour intensive/time consuming (1)	2	This question is about <b>farmers</b> . Watch for answers to (c) appearing here! Will not be enough food to go around/ need more land

Question			Answer	Mark	Guidance
1	e	i	Best estimate obtained from mean = sum of (appropriate) values divided by number of values (1); Identifies that 19.1 is an outlier/leaves that value out (1)	2	Can get one mark for all 6 data added and divided by 6 even if wrong data set is used; NOT (sum of all values including the best estimate)/7 For both marks, need $(20.2+20.0+19.8+19.9+19.7)/5 = 19.9$ Correct median calculation of <u>all 6</u> = $19.8-19.9 = 19.85 \approx 19.9$ gets both marks No marks for use of mode '19.9 is the commonest value' as it confuses two sample sets.
		ii	mean for organically grown tomatoes lies within range for intensively grown tomatoes or other way round	1	'the ranges overlap' is not enough
Total			[13]		
2	a*		$100 \times 107/280 (1);$ $= 38\% (1)$	2	Bald 38%/38.2% gets both marks $(387-280)$ for 107 is OK no e.c.f. from wrong substitution <b>ignore</b> excessive precision e.g. 38.214%.
	b		Adverse consequence of global warming (1); associated reason for severity (1). Mark both answer spaces together, and award marks if 'consequence' is given in 'reason' space.	2	Climate change alone is insufficient e.g. flooding people displaced/land lost crops don't grow in some places loss of income/famine sea level rise people displaced/land lost ice caps melt Sea levels rise / floods permafrost / ice caps melt More methane released

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Question			Answer	Mark	Guidance
2	c	i*	these gases absorb/trap (infrared) radiation/heat (1) from the Earth (1)	2	<b>ignore</b> references to ozone <b>ignore</b> reference to long/short wavelength radiations unless the answer tackles absorption and re-radiation.
		ii	Any plausible consequence of increase in water vapour (1); Correct explanation of consequence (1)	2	A consequence with a wrong explanation still gets the consequence mark. 'Water vapour is also a greenhouse gas' is 2 <sup>nd</sup> marking point <b>Allow</b> other approaches, e.g 'more rain/storms✓ causing floods✓', 'less rain/drought causing desert spread', gets both marks. 2 independent consequences/explanations may gain two marks if two predictions attempted.
		d	a single result can be questioned/could be wrong/check findings (1) ; replication increases confidence/makes the results more reliable (1); Alaska findings could be unique/due to particular local circumstances/check if it's the same elsewhere (1)	2	'Fair test' without explanation gets no marks
		e	<b>Any two of:</b> <b>advantages:</b> prevents escape of CH <sub>4</sub> , a greenhouse gas (more powerful than CO <sub>2</sub> ) (1); asset for local people for heating/lighting/transport/etc. (1); reduce dependence on fossil fuel (1); <b>disadvantages:</b> CH <sub>4</sub> produces CO <sub>2</sub> /greenhouse gas when burnt (1); need to develop method of collecting over wide area (1); difficulty of collection/storage/distribution to a dispersed population (1); pipes etc. will damage environment (1) <b>QWC:</b> one advantage and one disadvantage given (1)	3	Please annotate this question with ticks.  Not just 'can be used as fuel' without qualification  QWC mark (considering both sides of the argument) is awarded if both sides are given, even if not correct
		f	Top layer gets colder in winter making permafrost colder (1)	1	must refer to 'cold penetrating' owte through top layer into permafrost. 'snow is an insulator' is not enough without the idea that its removal allows the permafrost to become colder in the winter.
			<b>Total</b>	[14]	

Question		Answer	Mark	Guidance
3	a	<b>any two from:</b> pump doesn't provide enough blood (per second) (1); wrong amount of oxygen/glucose supplied by pump (1); $\text{CO}_2$ /urea/waste products not removed effectively by pump (1); potential to cause blood clots/other possible damage caused by invasive system (1)	2	e.g. 'not enough blood to brain'/'insufficient pressure in blood supply' etc.  If HL machine blamed for reduced brain function, need to have a suggested effect e.g. pressure, introducing contaminants
	b	(during the five year period/in this time) brain function of people changes irrespective of age at surgery (1)	1	This question is not about age related brain ability. There is a difference <u>even after you take account of</u> the fact that they are 5 years older so e.g. 'brain function decreases with age' does not get the mark (as age 5-10 years should increase)
	c*	<b>any two from:</b> no control group/ did not include patients having surgery but not on HL machine (1); only included patients on HL machine (during surgery) (1); did not include patients with heart disease but no surgery (1); sample too small/ only 261 in study (1)	2	
	d*	42% of 152/correct alternative method; (1) 63.84 (1)	2	Bald 63/64/63.8 gets both marks Alternative method could be repeated division and then addition, $40\% + 2\%$
	e i	<b>any one from:</b> no coronary heart disease = 69 (1); heart surgery without using the HL machine = 75 (1); no surgical treatment = 99 (1);	1	Need number + description. "Examined 326 with disease and 69 without" scores zero according to list principle, marking instruction d.
	ii	<b>any one from:</b> (if 69) to see if the symptoms were due to CHD; (if 75) to see if the symptoms were due to the HLM; (if 99) to see if the symptoms were due to the surgery;	1	Must follow from answer to (e)(i)
	f	healthy patients could die as a result of surgery (1); patients with heart disease could die without surgery (1)	2	any mention of ethical concern gets (1) 'make sure it's safe' is not enough to tackle the issues

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Question		Answer	Mark	Guidance
3	g	<b>any one from:</b> Limited range/size/number of people to study (1); many ill people available for study in hospital (1); difficulty of finding enough volunteers without CHD (1); must wait to find patients as they present symptoms (1);	1	type of treatment given depended on the needs of patients, not to meet the requirements of the study (1);
	h	Age/other identified factor e.g. Alzheimer's, traumatic injury, disease, genetic predisposition (1)	1	
		<b>Total</b>	[13]	
		<b>Paper Total</b>	[40]	

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