

Science A

General Certificate of Secondary Education **A214/102**

Unit 4: Ideas in Context

Mark Scheme for June 2010

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

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Question		Expected Answers	Marks	Additional Guidance
1	a	badgers (carry TB/act as reservoir of infection) / cattle infected as they are moved around (1)	[1]	
	b	any two from: (vaccine) not 100% (successful) / idea that TB becomes resistant / mutates; may not provide life time immunity; all cattle may not be vaccinated;	[2]	must relate to the vaccine not badgers/cattle/antibiotics references to viruses are neutral
	c	any two from: vaccinated cow does not catch TB; this stops the disease from spreading in cattle; further detail on the second point, eg because less chance of infected animal coming into contact with a non-infected one; less chance of infecting badgers;	[2]	second mark is about other cows catching it
	d	any two from: hard to catch/vaccinate badgers / not all badgers will be vaccinated / badgers spend all day underground; vaccine likely to be less than 100% effective / TB may become resistant; cannot tell if a badger has been vaccinated; badgers produce non-vaccinated young;	[2]	answer must be about the badger population, not cattle accept 'cannot vaccinate all badgers' idea 'roaming around' not enough by itself, needs to link to inability to vaccinate
	e	any named variable eg numbers of badgers / different movement of badgers / susceptibility of different cattle (varieties) / amount of cattle movement / whether the countryside is good badger habitat or not / cattle enclosed or free to roam (1)	[1]	not numbers of cattle
	f	when there are fewer badgers there is a lower incidence of TB in cattle (1)	[1]	reject 'killing badgers stops cows getting TB' must have comparative aspect, eg more badgers killed then fewer cattle will contract TB allow reverse arguments give the mark for the description of the link ignore reference to 'negative/positive correlation'

Question		Expected Answers	Marks	Additional Guidance
1	g	<p>any two from: the results will vary / there will be a range of results (1) the average will be a more reliable/accurate/best estimate (1) idea of outliers/idea of combining results (1)</p>	[2]	<p>'More likely to be right'</p> <p>Procedural point</p>
	h	<p>No (1); any one from: May be other factors involved (1); not enough data/more experimental evidence needed/not reliable/can be interpreted in more than one way (1); "Badgers roaming further" is only a suggested explanation, not proven (1);</p>	[2]	<p>Second mark is independent of the first.</p> <p>eg other animals may spread TB Candidates who do not answer 'No' or 'Yes' can get both marks for two correct explanations.</p> <p>The insert says that badgers roaming is only one POSSIBLE explanation, so NOT a proof as required by the question.</p>
		Total	[13]	

Question		Expected Answers	Marks	Additional Guidance
2	a	<p>any two from: killed; become cancerous; mutate/damage/harmed;</p>	[2]	<p>answers must be about effect on cells allow more detail if clear, eg create ions in cell (1) which take place in chemical reactions (1) not cells ionised ignore 'burned'</p>
	b i	<p>any two from: most of island not inhabited; difficult to excavate/transport; difficult to dispose of so much contaminated soil; not all of soil is significantly contaminated; significant risk only from contaminated soil in populated areas; plants would not grow if all soil was removed; covering radioactive soil with coral is enough to reduce dose;</p>	[2]	<p>not just coral soaks up radiation, or just putting coral down, this mark needs 'cover the soil instead of removing it' idea</p>

Question			Expected Answers	Marks	Additional Guidance
2	b	ii	<p>any two from: islanders held in low esteem (prejudice/xenophobia); Islanders disenfranchised (no votes); Islanders not aware of real risk; greater population in UK; England has closer neighbouring countries than Rongelap (1); could not evacuate (everyone in that area) in UK; more influence of pressure groups in UK; more money available in UK; more difficult to prevent publicity in UK; equipment on site in UK;</p>	[2]	any two points related to ethical or practical issues
	c		<p>evidence of halving every 6 cm (1) 3 lots of 6 cm therefore $100/2/2/2 = 12.5\%$ (1)</p>	[2]	'12.5' by itself gets both marks
	d	i	<p>washed out of ground/into ocean / plants absorb it from the ground (1)</p>	[1]	'soluble' by itself is worth the mark
		ii	<p>any two from: soluble; absorbed by plants; (plants absorb) caesium instead of potassium; enters food chain / eaten by people;</p>	[2]	so 'plants absorb caesium instead of potassium' is 2 marks
	e		<p>describe benefit: eg unspoiled sea / tropical climate / not crowded (1)</p> <p>idea of risk being small: eg close to background radiation / only a little will have leached from rocks into sea / radiation diluted / only spend a little time in sea (1)</p> <p>QWC is given for mention of benefit and risk qualified or unqualified (1)</p>	[3]	any mention of benefit and risk will gain QWC 'benefit outweighs risk' by itself = QWC mark only
Total				[14]	

Question		Expected Answers	Marks	Additional Guidance
3	a	drink (C) with no additive was a control/to allow comparison (1) to find out whether different combinations of colourings (drinks A & B) have different effects (1)	[2]	the word 'placebo' is neutral and worth no marks without further explanation allow 'additive' for 'colouring' in this question, and also allow sodium benzoate as constituent part of mixture need to recognise that drink A and drink B are mixtures containing more than one different colouring
	b	any two from: it is a small study / not many children were in the study; the study only included children/only 3-year olds and 8-year olds; idea that study carried out in only one area;	[2]	accept additives were not tested separately ignore 'needs more research' or 'not enough information'
	c	any two from: appeal: to make the drinks look more attractive; money: sell/buy more drinks / make more profit; safety: manufacturers consider them to be safe / approved by FSA; longer shelf life: these colourings are more stable than others; alternatives: alternative colours are more expensive;	[2]	ignore references to taste

Question		Expected Answers	Marks	Additional Guidance
3	d	<p>any three points from:</p> <p>list 1: idea of producing drinks without added colours; but they would be less attractive / sell less; use natural/alternative colourings; but they are more expensive;</p> <p>list 2: more research should be carried out to find the effect of colourings; colourings may/may not cause ill effects; people should have the right to choose what they drink; clearly label drinks with their contents;</p>	[3]	<p>no more than two marks from either list</p> <p>allow 'remove (some) colours' for 'not adding colours' allow 'less colours' idea</p> <p>watch out for rephrasing the command line, eg 'this is/is not a sensible idea' which is neutral and needs more to earn a mark</p>
	e i	<p>they do not know whether there is a risk / they do not know how big the risk is / they do not know if their children will be affected / they do not know how bad the consequences would be (1) it is better to err on the side of caution / do not allow drinks with these food colourings (until we know more about them) (1)</p>	2	<p>first marking point is for acknowledging that the risk is unknown.</p> <p>second marking point is for 'better to be safe than sorry' idea</p>

Question			Expected Answers	Marks	Additional Guidance
3	e	ii	<p>any two from: allergy ideas / some children may have bad reaction / effect;</p> <p>contamination ideas eg pesticides, plasticizers; example of effect of named ingredient;</p> <p>unknown long-term effects (of named ingredient); could choke;</p>	[2]	<p>eg drink may be OK for nearly all people but may cause harm to a few answer must state or imply that only some children are affected and the effect is bad.</p> <p>problems caused eg sugar rots teeth / sugar affects diabetes / sugar causes obesity / acids dissolve teeth ignore answers about hyperactivity or impulsive behaviour. accept any plausible example</p>
			Total	13	

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