OCR
RECOGNISING ACHIEVEMENT

GCSE

Science A

General Certificate of Secondary Education

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

Mark Scheme for June 2012

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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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Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant - applies to neutral answers
allow/accept	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/owtte	alternative wording
ORA	or reverse argument

Available in scoris to annotate scripts

?	indicate uncertainty or ambiguity
BOD	benefit of doubt
CON	contradiction
✖	incorrect response
ECF	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
NBOD	no benefit of doubt
R	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.   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.

   e.g. for a one-mark question where ticks in the third and fourth boxes are required for the mark:

   This would be worth   This would be worth   This would be worth
   1 mark.   0 marks.   1 mark.

c.   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.

d. Marking method for tick-box questions:

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.
If there is at least one tick, ignore crosses and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

e.g. if a question requires candidates to identify cities in England:

Edinburgh

Manchester

Paris

Southampton

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (or have indication of choice crossed out).

Edinburgh			✔			✔	✔	✔	✔	
Manchester	✔	✘	✔	✔	✔				✔	
Paris				✔	✔		✔	✔	✔	
Southampton	✔	✘		✔		✔	✔		✔	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

e.   For answers marked by levels of response:
      i.   **Read through the whole answer from start to finish**
      ii.   **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
      iii.   **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

      iv.   Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

    Quality of Written Communication skills assessed in 6-mark extended writing questions include:
- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question			Answer	Marks	Guidance
1	(a)		*any two from:* burn in limited air supply/incomplete combustion ; (1) all carbon does not form carbon dioxide ; (1) produces soot / carbon ; (1)	2	**accep**t smoke
	(b)		idea that particulates coat/settle/land on glaciers/ice (1) particulates absorb heat /solar radiation/light(from sun) (1) (ice) melts (1)	3	
	(c)	(i)	as particulate concentration increases number of deaths rises *ora* (1)	1	**allow** alternative wording must relate particle concentration to number of deaths direction of changes **accept** causal link if correlation clear, e.g. 'increase in particle concentration causes rise in deaths' 'positive correlation' is not enough, but 'positive correlation between particle concentration and numbers of death' is OK
		(ii)	*any pair of answers:* do a controlled investigation i.e. get more data e.g. in other places/ seasons(1) comparing data to confirm correlation (1) OR study what happens to particulates in the lungs/ use autopsy results (1) find particulates/find a linking mechanism (1) OR make a prediction about future deaths (1) test prediction by collecting data on future deaths (1)	2	e.g. look at what people died of

Question			Answer	Marks	Guidance
(d)	(i)		clear comparison between 1st /2nd and 4th /5th days(1)	3	may be implied from answer in 'these days were higher than the rest', 'these' must refer to the dates referred to in the last line of the stem, i.e. 4th and 5th
			idea of evening out/averaging/smoothing out graph over the whole day (for the days concerned) (1)		this must refer to duration over the limit, not maximum height of peak e.g. 'it only just nips over the line on 1st and 2nd' or 'it's well over 50 $\mu g/m^3$ most of the time on 4th and 5th' NOT "it well over 200" as that doesn't tackle the question
			compare with (European) limit / 50 ($\mu g/m^3$) (1)		
	(ii)		*any two from:* use cars with more efficient engines ; (1) encourage public rather than private transport ; (1) reduce car use ; (1) set and enforce legal limits for particulate emissions ; (1) encourage use of electric/hybrid cars ; (1) make city centre traffic free / charge cars to enter city ; (1)	2	e.g. 'better engines' **ignore** catalytic converters e.g. encourage cycling/walking/car sharing can include factories & power stations e.g. congestion charge or scheme to limit access to certain days
			Total	13	

Question			Answer	Marks	Guidance
2	(a)	(i)	**insurance companies** they might want to charge more or refuse insurance / need pay out more if they're ill (1) **employers** may not want to employ / need to plan for absences / implications for health & safety (1)	2	
		(ii)	*any two from:* **family trees** idea of family trees only show phenotypes ; (1) family tree can only give probability of having any particular allele ; (1) **genetic testing** idea that genetic mapping provides more information ; (1) genetic testing can say for certain ; (1)	2	e.g. 'shows who has the disease' or 'what is in the family' e.g. risk of having a disorder
	(b)		**technical feasibility** there may be too much data to deal with / implications of cost, time and implementation (1) **values** may not be able to use data to help patients / difficulty of deciding who to treat and who not to treat / may have information that would be difficult to tell the patient (1)	2	**ignore** unqualified references to technical feasibility and values **ignore** references to item (a)(i) e.g. insurance issues **ignore** references to religious arguments (as gene mapping has already been done in this case)
	(c)		whether or not it's a good/right idea to know a person's genes(1)	1	'whether or not' must be <u>stated</u>, not e.g. 'the ethical arguments of gene mapping' or 'if it is right to gene map'
	(d)	(i)	any correct response e.g. is a person more at risk of having heart disease? (1)	1	'what diseases might I get' would be the minimum acceptable can be based on individuals or on larger groups e.g. countries, socio-economic groups
		(ii)	environmental factors are also very important / can only suggest tendency to do well at tennis (1)	1	'tennis is a skill' gets the mark as skills are learned

Question			Answer	Marks	Guidance
	(e)		one statement for and one against (1) *then any two from:* idea of not being ethical / God ; (1) not natural / against nature ; (1) idea of helping people ; (1) planning for the future ; (1) reliability of tests (false positives false negatives) ; (1) whether or not to have children ; (1) idea of freedom of information ; (1) getting insurance ; (1) getting a job ; (1) idea of storing all the extra information generated ; (1) cost of procedure ; (1)	3	QWC mark is for presenting conflicting points of view **ignore** stress arguments **ignore** not want to know
	(f)		*any two from:* idea that the risk is only a possibility ; (1) genes not switched on/off ; (1) they have different genes ; (1) effect of environmental factors / different lifestyles ; (1)	2	**ignore** any reference to dominant/recessive genes **allow** idea that genes interact **allow** epigenetics
			Total	**14**	

Question			Answer	Marks	Guidance
3	(a)		Moon moves around Earth (1) planets move around Sun (as does the Earth) (1)	2	not 'moons orbit planets' – it must be clear it is our Moon **allow** 'planets orbit a star'
	(b)		*any two from:* different methods used/data obtained ; (1) different locations/telescopes ; (1) difficult to measure distances ; (1) interpretations based on individual creativity ; (1) data has more than one interpretation ; (1) hard to abandon own treasured theory ; (1)	2	e.g. 'each had his own ideas' e.g. 'because they believed in different things'
	(c)		galaxies started at the same point /big bang **and** microwave data/more distance &speed data (1) OR Hershel's comet/planet (Uranus) **and** observations of its motion (1)	1	either pair both prediction and observation needed for the mark
	(d)	(i)	plots must be within half a square on each side (2)	2	all correct = (2); 2 correct = (1)
		(ii)	best fit line must be **straight** and **single** and not have all points on one side	1	need not pass through (0,0) judge by eye does not need to extend beyond plotted points
		(iii)	(1) method (1) evaluation	2	a sensible line would give 22 km/s per Mly which can gain two marks if no working shown ecf own line, even if silly if no working shown but value not too far from 22, check gradient of line drawn method mark can be given for triangle on graph or for v/d from graph
		(iv)	galaxy at distance 0 must be our own (Milky Way) and it is not moving (relative to us)	1	stating that we/ Earth/Milky Way are (0,0) gets the mark **accept** the Universe started at one point, e.g. 'that's where the Universe started/Big Bang occurred' or 'all the galaxies are moving away from that point'

Question			Answer	Marks	Guidance
	(e)		*any two from:* conflicting data reduce confidence in a theory ; (1) theory has worked well, so should not be abandoned ; (1) improvements to the theory need to be sought ; (1) needs better data/improved measurements ; (1)	2	e.g. questions reliability, it may be wrong/incomplete do not credit 'there's a lot we do not understand about the early Universe' [quote from article] without development
			Total	13	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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