OCR
Oxford Cambridge and RSA

Cambridge National

Science

Unit **R072/01:** How Scientific Ideas Have Developed

Level 1

Mark Scheme for January 2014

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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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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For answers marked by levels of response:

a. **Read through the whole answer from start to finish**

b. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor

c. **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

d. 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.

Annotations

Annotation	Meaning
	correct response
	incorrect response
BOD	benefit of the doubt
NBOD	benefit of the doubt **not** given
ECF	error carried forward
^	information omitted
I	ignore
R	reject
CON	contradiction
L1	Level 1
L2	Level 2
L3	Level 3

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
allow	=	answers that can be accepted
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
( )	=	words which are not essential to gain credit
__	=	underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>1</td><td>a</td><td></td><td>18</td><td>1</td><td>{value from final graph ± ½ square}</td></tr>
<tr><td></td><td>b</td><td></td><td><table><tr><th></th><th>True</th><th>False</th></tr><tr><td></td><td>✓</td><td></td></tr><tr><td></td><td></td><td>✓</td></tr><tr><td></td><td></td><td>✓</td></tr><tr><td></td><td></td><td>✓</td></tr><tr><td></td><td>✓</td><td></td></tr></table></td><td>2</td><td>All 5 correct = 2
3 or 4 correct = 1</td></tr>
<tr><td></td><td>c</td><td></td><td>Any two from:
(mean gives) reliable results;
Shows more data;
eliminates outliers /individual variations;</td><td>2</td><td></td></tr>
<tr><td></td><td>d</td><td></td><td>Any two from:
blood glucose (concentration) drops;
less thirsty;
urinates less;
becomes stronger/gets better/free from symptoms/control diabetes</td><td>2</td><td>Ignore cure diabetes</td></tr>
<tr><td></td><td>e</td><td>i</td><td>They needed more evidence to confident ✓</td><td>1</td><td></td></tr>
<tr><td></td><td>e</td><td>ii</td><td>So other scientists could confirm their results ✓</td><td>1</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
	f		Ayo; Roshanee	2	Any order
	g		A-T C-G	2	mark independently
	h		**Any two from:** Bovine insulin is almost identical/ similar effect as human insulin; human pancreas / bodies/bodies not available; bovine insulin readily available; no genetic modification / knowledge of DNA;	2	**accept** moral arguments
			Total	**15**	

Question			Answer	Mark	Guidance
2	a	i	South America; Africa	2	
		ii	**Any three from:** continents "fit together"/jigsaw; bands show fossils; same fossils across continents; suggests continents have moved away from each other/apart; clear and well expressed answer (1)	4	
		iii	Wegener was not a geologist/ he was a meteorologist/ He did not know what caused it/ continents had not been seen to move/; no forces was known to be strong enough	1	
	b		as a result of a convection current in the mantle ✓	1	
			Total	**8**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>3</td><td>a</td><td></td><td>Grasshopper</td><td>1</td><td></td></tr>
<tr><td></td><td>b</td><td></td><td>[Level 3]
Gives examples of how ants and beetles are similar and identifies how to tell the difference between them OR identifies similarities between ants and beetles and discusses differences between two types of beetle.
Quality of written communication does not impede communication of the science at this level.
(5 – 6 marks)

[Level 2]
Identifies physical features of ants and beetles from the key.
Quality of written communication partly impedes communication of the science at this level.
(3 – 4 marks)

[Level 1]
Identifies a physical feature of ants and beetles.
Quality of written communication impedes communication of the science at this level.
(1 – 2 marks)

[Level 0]
Insufficient or irrelevant science. Answer not worthy of credit.
(0 marks)</td><td>6</td><td>This question is targeted at grades up to Level 1 Merit

Indicative scientific points may include:
• most of the features are the same
• for beetles and ants
• beetles and ants both have small or no wings
• beetles and ants have short back legs
• black beetles and ants do not have any horns
• ants have small eyes
• black beetles have large eyes
• rhino beetles are another type of beetle
• rhino beetles have horned heads</td></tr>
<tr><td></td><td>c</td><td></td><td><table><tr><td></td><td>✓</td></tr><tr><td></td><td></td></tr><tr><td></td><td>✓</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></td><td>2</td><td>Box 1;
Box 3</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>9</td><td></td></tr>
</table>

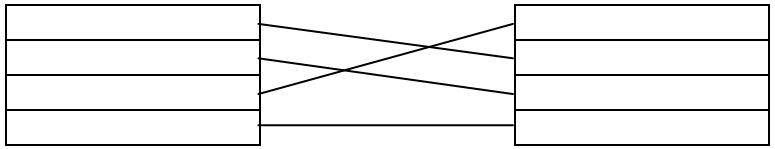
<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>4</td><td>a</td><td></td><td>21</td><td>1</td><td></td></tr>
<tr><td></td><td>b</td><td></td><td>[Level 3]
Identifies best advice and links it to evidence.
Quality of written communication does not impede communication of the science at this level.
(5 – 6 marks)

[Level 2]
Identifies best advice or links any advice to evidence.
Quality of written communication partly impedes communication of the science at this level.
(3 – 4 marks)

[Level 1]
Answer includes any advice or identifies a trend or pattern in the data.
Quality of written communication impedes communication of the science at this level.
(1 – 2 marks)

[Level 0]
Insufficient or irrelevant science. Answer not worthy of credit.
(0 marks)</td><td>6</td><td>This question is targeted at grades up to Level 1 Distinction

Indicative scientific points may include:
Evidence
• breaks shorten reaction times / speed up reaction times
• biggest improvement is if cup of coffee is drunk
• peppermint sweet also shortens reaction time / speeds up reactions
• drinking coffee keeps reaction time shorter for longer idea
• quotes actual values from the table.
• allow reference to caffeine in coffee/ reference to action as a stimulant
Advice
• drivers should take a break during long drives.
• drivers should drink a cup of coffee during a break
• if they cannot take a break, they should suck a peppermint sweet
• Best advice is break and coffee</td></tr>
<tr><td></td><td>c</td><td></td><td><table><tr><td></td><td>✓</td></tr><tr><td></td><td>✓</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></td><td>2</td><td>Box 1;
Box 2</td></tr>
<tr><td></td><td>d</td><td></td><td>Any two from:
idea that can’t design tests / methods;
because can’t go back to a previous life/ back in time;
so no data/evidence is available;</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>11</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
5	a	i	A	1	
		ii	Radio waves ✓	1	
	b			2	4 lines correct = 2 marks 2 or 3 lines correct = 1 mark
	c	i	Equipment not invented yet (owtte)/too fast	1	**Ignore** cannot be seen
		ii	300,000 km/s	1	
	d		The radio waves were refracted by the ionosphere ✓	1	
			Total	**7**	

Question			Answer	Mark	Guidance
6	a		<table><tr><td></td><td></td></tr><tr><td></td><td>✓</td></tr><tr><td></td><td>✓</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>	2	box 2; box 3
	b	i	lets many people know / idea of the public knowing	1	**Ignore** other scientists would read
		ii	scientists can check / discuss / decide if they agree/ replicate	1	
	c		<table><tr><td>Most galaxies are moving away from each other</td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td>✓</td></tr></table>	1	box 4
			Total	**5**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>7</td><td>a</td><td>i</td><td>Similarity: characteristics (longer neck) passed on idea / slow change over many generations;
Difference: (Lamarck) changes happen during life/ (Darwin) giraffes are born with characteristic (longer neck) / shorter necked animals die / idea of survival of fittest</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>ii</td><td>natural selection ✓</td><td>1</td><td>box 4</td></tr>
<tr><td></td><td>b</td><td></td><td><table><tr><th></th><th>True</th><th>False</th></tr><tr><td>The fastest dogs are used for breeding</td><td>✓</td><td></td></tr><tr><td>Offspring bred from fast dogs are always faster than their parents</td><td></td><td>✓</td></tr><tr><td>Breeders make slower dogs run a lot of races so they are more likely to have fast offspring</td><td></td><td>✓</td></tr><tr><td>A fast dog can be born from slow parents.</td><td>✓</td><td></td></tr></table></td><td>2</td><td>All correct (2)
2/3 correct (1)
1 correct (0)</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
</table>

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