OCR
Oxford Cambridge and RSA

Cambridge National

Science

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

Level 1

Mark Scheme for January 2017

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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.

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
words	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	alternative wording
ORA	or reverse argument

Annotation	Meaning of annotation
	Blank page
	indicate uncertainty or ambiguity
	Benefit of doubt
	Contradiction
	Cross
	error carried forward
	Extendable ellipse
	Extendable horizontal line

	Development
	Benefit of doubt not given
	Reject
	Tick
	Extendable vertical wavy line
	Omission mark

1. Here are the subject specific instructions for this question paper

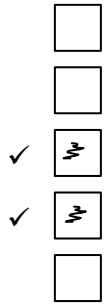
a. If a candidate alters his/her response, examiners should accept the alteration.

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.

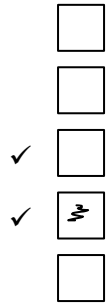
For a one mark question, where ticks in boxes 3 and 4 are required for the mark:

Put ticks (✓) in the correct boxes.



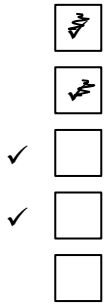
This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.



This would be worth 0 marks.

Put ticks (✓) in the two two correct boxes.



This would be worth 1 mark.

2. Here is the Mark scheme for this question paper.

Question			Answer	Marks	Guidance
1	(a)	(i)	sulfur	1	
		(ii)	phosphorus	1	
		(iii)	Any **two** from: Carbon, hydrogen, oxygen & nitrogen	1	Any two (or more) correct elements
	(b)		<table><tr><th></th><th>T</th><th>C</th></tr><tr><td>Carbon</td><td></td><td></td></tr><tr><td>Hydrogen</td><td></td><td>5</td></tr><tr><td>Oxygen</td><td></td><td>1</td></tr><tr><td>Nitrogen</td><td></td><td>3</td></tr></table>	1	
	(c)	(i)	Chicken	1	
		(ii)	A and T; C and G	2	either order
		(iii)	paper chromatography had not been discovered OWTTE	1	**Ignore:** references to equipment / technology
		(iv)	compare different species; find out if DNA was the same;	2	**Accept:** to increase confidence in results / gather more data / see if results were similar (1)
	(d)	(i)	using X-rays; to take photographs/ look at patterns;	2	
		(ii)	Any **two** from: further/extended work; checking / making sure; taking more photographs / gather more evidence;	2	**Accept:** in case she was wrong
	(e)		bases ✓ backbone helix sugar phosphate	1	
			Total	**15**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>2</td><td>(a)</td><td>(i)</td><td><table><tr><td>[E]</td><td>B</td><td>A</td><td>D</td><td>[C]</td></tr></table></td><td>2</td><td>B before A;
A before D;</td></tr>
<tr><td></td><td></td><td>(ii)</td><td><table><tr><td>…back to normal</td><td>✓</td></tr><tr><td>…negative</td><td></td></tr><tr><td>…higher</td><td></td></tr><tr><td>… faster</td><td></td></tr></table></td><td>1</td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Idea of being convenient for player (1)
Eg no need to stop playing (for a reading) / Will not get in the way/ restrict movement

Idea of being convenient for trainer (1)
Eg continuous / frequent readings / automatically recorded / Accurate reading / no human interpretation</td><td>2</td><td>Ignore other measurements (eg pulse)</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Sweating / perspiration;
evaporation removes (excess) heat</td><td>2</td><td>Accept: description and explanation of vasodilation (only required for Level two)</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>7</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
3	(a)		Layer D (is oldest); More recent layers formed on top of it	2	Idea D has simplest fossils / more complex (mammals) came later.
3	(b)		**[Level 3]** A clear description of the formation of fossils AND a clear description of why there are many different fossils AND a link to the theory of evolution. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** A clear description of the formation of fossils AND a clear description of why there are many different fossils OR a link to the theory of evolution. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** A clear description of the formation of fossils OR a clear description of why there are many different fossils OR a basic attempt at both OR a link to the theory of evolution. 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)	**6**	**This question is targeted at grades up to D** **Indicative scientific points may include:** **How fossils form:** • Plants/Animals die / compressed • Partially decompose • Leaving residue in (sedimentary) rocks **Why fossils are different:** • Each species leaves a distinctive fossil • Lots of species present • Extinction / new species at different times **Link to evolution:** • Link to age of rocks • Different/related species at different times • Showing how organisms have changed **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
			Total	**8**	

Question			Answer	Marks	Guidance
4	(a)		Visible light *infra-red* microwaves radio waves	2	All three correct for 2 marks If wrong **allow** 1 for light shortest OR radio wave longest
	(b)		eye……visible light (1); aerial……....microwaves (1); receiver……radio waves (1)	3	
			Total	5	

Question			Answer	Marks	Guidance
5			**[Level 3]** Describes at least two differences comparing both **AND** gives at least one explanation. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Describes at least one difference comparing both models. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Describes at least one feature for one model. 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)	6	**This question is targeted at grades up to D** **Indicative scientific points may include:** **Differences** • Centre - Earth / Sun • Sun – orbits Earth / centre • Earth – centre / orbits Sun • Moon – orbits Earth / orbits Earth and Sun • Planets – small orbits as well as orbiting Earth / orbit Sun • Fixed stars – on outer circle / all around **Explanation** • Copernicus's model is simpler • Based on maths • Fitted movement of planets better **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
			Total	6	

Question			Answer	Marks	Guidance
6	(a)		The Earth's climate changes. ☐ The continents fit together like a jig-saw. √ Birds migrate from continent to continent. ☐ The same fossils are found on different continents. √ The Universe is expanding. ☐	2	
	(b)	(i)	Movement too slow / movements very small / over too long a time frame / cannot be seen in a short time;	1	accept: equipment not available / did not have technology
		(ii)	he was not a geologist / he was a meteorologist	1	
	(c)	(i)	at the centre of the Earth ☐ between the centre of the Earth and cust √ on the outside of the Earth. ☐ along the edges of the tectonic plates ☐	1	
		(ii)	convection currents under ocean bed / in magma / mantle (1); parts of ocean bed moving opposite ways (1); convection currents cause force to move ocean bed (1);	3	look for marking points on diagram
			Total	8	

Question			Answer	Marks	Guidance
7	(a)	(i)	correct plot	1	
		(ii)	speed increases as distance increases (OWTTE) / both increase / positive slope	1	**Accept:** all points in a straight line (going up)
		(iii)	700	1	**allow** 500-900
	(b)	(i)	better equipment/techniques/technology	1	**allow** see further
		(ii)	all galaxies moving away from each other / furthest galaxies moving away fastest	1	Allow galaxies moving away from Earth
		(iii)	binomial ☐ big bang √ evolution ☐ particulate ☐	1	
			Total	6	

Question			Answer	Marks	Guidance
8	(a)		Any **THREE** from: pulse stays within fibre; pulse emerges from end; pulse stays as straight line; first reflection off walls of fibre; subsequent reflections about correct angles	3	
	(b)		0.5 x 3 (1); 1.5 (1)	2	correct answer without working gets 2 marks
			Total	5	

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