



**Cambridge Assessment International Education**  
Cambridge International General Certificate of Secondary Education

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**CO-ORDINATED SCIENCES**

**0654/62**

Paper 6 Alternative to Practical

**May/June 2019**

MARK SCHEME

Maximum Mark: 60

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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This document consists of **10** printed pages.

**PUBLISHED****Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

**GENERIC MARKING PRINCIPLE 1:**

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

**GENERIC MARKING PRINCIPLE 2:**

Marks awarded are always **whole marks** (not half marks, or other fractions).

**GENERIC MARKING PRINCIPLE 3:**

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

**GENERIC MARKING PRINCIPLE 4:**

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

**GENERIC MARKING PRINCIPLE 5:**

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

**GENERIC MARKING PRINCIPLE 6:**

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer				Marks																
1(a)(i)	<table border="1" data-bbox="342 228 1682 628"> <thead> <tr> <th data-bbox="342 228 678 328">test solutions</th> <th data-bbox="678 228 1014 328">solution <b>A</b></th> <th data-bbox="1014 228 1350 328">solution <b>B</b></th> <th data-bbox="1350 228 1682 328">solution <b>C</b></th> </tr> </thead> <tbody> <tr> <td data-bbox="342 328 678 429">biuret solution</td> <td data-bbox="678 328 1014 429">blue</td> <td data-bbox="1014 328 1350 429">purple / lilac</td> <td data-bbox="1350 328 1682 429">blue</td> </tr> <tr> <td data-bbox="342 429 678 529">ethanol and water</td> <td data-bbox="678 429 1014 529">white cloudy / milky emulsion</td> <td data-bbox="1014 429 1350 529">clear / colourless</td> <td data-bbox="1350 429 1682 529">clear / colourless</td> </tr> <tr> <td data-bbox="342 529 678 628">iodine solution</td> <td data-bbox="678 529 1014 628">orange / brown / yellow</td> <td data-bbox="1014 529 1350 628">orange / brown / yellow</td> <td data-bbox="1350 529 1682 628">blue-black</td> </tr> </tbody> </table> <p data-bbox="342 659 1048 791">purple/lilac for solution <b>B</b> with biuret solution ; white (emulsion) for solution <b>a</b> with ethanol and water ; blue-black for solution <b>C</b> with iodine solution; all correct 'negative' observations ;</p>				test solutions	solution <b>A</b>	solution <b>B</b>	solution <b>C</b>	biuret solution	blue	purple / lilac	blue	ethanol and water	white cloudy / milky emulsion	clear / colourless	clear / colourless	iodine solution	orange / brown / yellow	orange / brown / yellow	blue-black	<b>4</b>
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biuret solution	blue	purple / lilac	blue																		
ethanol and water	white cloudy / milky emulsion	clear / colourless	clear / colourless																		
iodine solution	orange / brown / yellow	orange / brown / yellow	blue-black																		
1(a)(ii)	<p data-bbox="342 826 517 922">A – fat / lipid ; B – protein ; C – starch ;</p>				<b>3</b>																

Question	Answer	Marks
2(a)(i)	14. <u>0</u> ;	1
2(a)(ii)	use of a (dropping) pipette / dropper ;	1
2(b)(i)	11(.0), 11(.0), 8.5, 10.5 ;	1
2(b)(ii)	11(.0) <b>and</b> 11(.0) and 10.5 ; suitable justification in terms of closeness of values ;	2
2(b)(iii)	correct average of selected values of V ;	1
2(b)(iv)	correct answer (0.108) ; 2 significant figures ;	2
2(c)	continuous change with UI ;	1
2(d)	double the value in <b>2(b)(iii)</b> ;	1

Question	Answer	Marks
3(a)(i)	0.16 ;	1
3(a)(ii)	0.9(0) ;	1
3(b)(i)	axes labelled with units ; suitable choice of scales and linear must start from origin ( $\geq$ half the grid used) ; 4 plots correct to half a small square ;	3
3(b)(ii)	good best-fit line judgement ;	1
3(c)	intercept correct from candidate's graph $\pm$ half a small square ;	1
3(d)	calculation of resistance correct ; $R = (5 \pm 1) \Omega$ ;	2
3(e)	difficult to measure to nearest mm / zero error on voltmeter or ammeter / difficult to read (an analogue) scale with precision / cell might run down / circuit heats and resistance changes ;	1

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
4(a)	clear and continuous outline ; surface detail and larger than original ;	<b>2</b>
4(b)(i)	correct measurement ;	<b>1</b>
4(b)(ii)	38 ;	<b>1</b>
4(b)(iii)	correct calculation ;	<b>1</b>
4(c)	not smooth / is not a sphere/ is irregular ;	<b>1</b>

Question	Answer	Marks
5(a)	apparatus connected together ; delivery tube <b>and</b> at least one test-tube labelled ;	<b>2</b>
5(b)(i)	63 ;	<b>1</b>
5(b)(ii)	rate decreases as concentration decreases ;	<b>1</b>
5(c)(i)	need more points if plot a graph / if one is misread two is not enough for a trend / too narrow a range ;	<b>1</b>
5(c)(ii)	(acid) = 2.5 <b>and</b> (water =) 7.5 ;	<b>1</b>
5(c)(iii)	repeat each concentration of acid (and take average) ; use pipette/burette (for measuring volumes) ; weigh marble chips / control temperature ; same volume of water ; measure volume water (with detergent/small test-tube) ; same amount of detergent ;	<b>max 2</b>
5(d)	collect gas above water / collect gas in a gas syringe / reaction vessel on a mass balance / bubble into limewater ; (time for) volume of gas / (time for) drop in mass / (time to) go cloudy ;	<b>2</b>



Question	Answer	Marks
6(a)	85(.0) ;	1
6(b)(i)	S and °C and °C ;	1
6(b)(ii)	30, 60, 90, 120, 150 ;	1
6(c)	read at 90° / perpendicular / at eye level to the scale / stir before reading / keep thermometer at same level / wait until reading stops rising initially / thermometer not touching sides or bottom (of beaker) ;	1
6(d)(i)	$\theta_x = 10.5$ (°C) ;	1
6(d)(ii)	$R_1 = 0.0583$ (°C/s) ;	1
6(e)	$R_2 = 0.0805$ (°C/s) ;	1
6(f)	smaller volume greater temperature change/drop / smaller amount of water cools more quickly ; quoting data from table i.e. temperatures quoted for the same time (or the time quoted as well) ;	2
6(g)	start with the same initial temperatures ;	1

Question	Answer	Marks
7	<p>Minimum of 1 mark from each section and any two other marking points</p> <p><b>method</b> heat ; Benedict's solution ;</p> <p><b>safety</b> waterbath (not naked flame) / goggles ;</p> <p><b>variables</b> same volume of food solution ; same volume / concentration of testing solution ; run test for the same time ;</p> <p><b>observations</b> start/negative is blue ; positive is green / yellow / orange / red ;</p> <p><b>conclusion</b> colours in order : green/yellow – orange – red ;</p>	max 7