



---

**CO-ORDINATED SCIENCES**

**0654/53**

Paper 5 Practical Test

**October/November 2019**

MARK SCHEME

Maximum Mark: 60

---

**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 October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

---

This document consists of **11** 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)	full set of results for 1 cm <sup>3</sup> ; results recorded to nearest 1.0 cm <sup>3</sup> ;	<b>2</b>
1(a)(ii)	full set of results for 2 cm <sup>3</sup> ; greater volume produced at 150 seconds by 2 cm <sup>3</sup> than 1 cm <sup>3</sup> ;	<b>2</b>
1(b)	scales linear and use at least half the grid ; plots correct $\pm$ half small square line 1 ; plots correct $\pm$ half small square line 2 ; good best fit line 1 ; good best fit line 2 ;	<b>5</b>
1(c)	increases (rate of reaction) ;	<b>1</b>
1(d)	<p><b>Max one source from:</b> foam not level ; foam moving ; timing and reading ; accuracy of scale ; parallax error qualified ;</p> <p><b>Max one matching improvement from:</b> repeat and average ; use 2 people ; use burette ; read at eye level / read perpendicularly ;</p>	<b>2</b>

Question	Answer			Marks
2(a)		final colour observed	conclusion	<b>4</b>
	biuret solution	purple ;	contains protein ;	
	iodine solution	brown / yellow / orange ;	does not contain starch ;	
2(b)(i)	delivery tube under the limewater ;			<b>1</b>
2(b)(ii)	delivery tube and limewater labelled ;			<b>1</b>
2(b)(iii)	milky ;			<b>1</b>
2(c)	To check it does not contain (named) nutrient / protein / starch / control ;			<b>1</b>

Question	Answer	Marks
3(a)	<p><b>MP1 apparatus and safety</b> labelled diagram of apparatus gas collection: flask with delivery tube ; graduated receiving vessel ; air tight / will work ; thermometer ; means to change T ;</p> <p>OR mass decrease: flask and contents ; on balance ; balance at least 1dp ; thermometer ; means to change T ;</p> <p>OR to end: container and acid and Mg ; thermometer ; means to change T ;</p> <p>no naked flame / limit concentration of sulfuric as corrosive / goggles as sulfuric acid corrosive / burns ;</p> <p><b>MP2 variables</b> minimum 2 temperatures stated ; 5 stated values of temperature ;</p> <p><b>MP3 control variables</b> same size / length / surface area of magnesium ; same volume of acid / same amount of magnesium ; same concentration of acid ;</p>	7

Question	Answer	Marks
3(a)	<p><b>MP4 measurements</b> (measure) volume of gas ; OR mass loss ; in a certain time ; OR time ; for certain volume of gas ; OR mass loss ; OR time ; to end / bubbles stop / Mg all gone ;</p> <p><b>MP5 processing</b> graph of volume against time / mass against time ; rate = volume ÷ time ; mass ÷ time ; more gas in set time is fastest / same gas in less time is fastest ;</p>	

Question	Answer	Marks
3(b)	<p>suitable error ; improvement for stated error ;</p> <p>any misreadings / mis-measurements ; repeat ;</p> <p>OR</p> <p>(misread because of) parallax ; eye level ;</p> <p>OR</p> <p>surface area of magnesium ; same size / shape ;</p> <p>OR</p> <p>conc of acid ; use same batch ;</p> <p>OR</p> <p>temperature ; water-bath ;</p> <p>OR</p> <p>mass loss is small ; balance to more dp ;</p> <p>OR</p> <p>loss of gas as assembled ; have tube in flask ;</p>	<b>2</b> <b>1</b>



Question	Answer			Marks												
4(a)	<table border="1"> <thead> <tr> <th>test</th> <th>observations</th> <th>conclusions</th> </tr> </thead> <tbody> <tr> <td>(add dilute hydrochloric acid)</td> <td>no reaction</td> <td>not a carbonate</td> </tr> <tr> <td>(add dilute nitric acid followed by silver nitrate solution)</td> <td>no reaction / slight white ppt.</td> <td>not a chloride</td> </tr> <tr> <td>(add dilute nitric acid followed by barium nitrate solution)</td> <td>white ppt.</td> <td>sulfate</td> </tr> </tbody> </table>	test	observations	conclusions	(add dilute hydrochloric acid)	no reaction	not a carbonate	(add dilute nitric acid followed by silver nitrate solution)	no reaction / slight white ppt.	not a chloride	(add dilute nitric acid followed by barium nitrate solution)	white ppt.	sulfate			3
test	observations	conclusions														
(add dilute hydrochloric acid)	no reaction	not a carbonate														
(add dilute nitric acid followed by silver nitrate solution)	no reaction / slight white ppt.	not a chloride														
(add dilute nitric acid followed by barium nitrate solution)	white ppt.	sulfate														
2 or 3 boxes correct ; 4 or 5 boxes correct ;; 6 boxes correct ;;;																
4(b)	<table border="1"> <thead> <tr> <th>test</th> <th>observations</th> <th>conclusions</th> </tr> </thead> <tbody> <tr> <td>(add sodium hydroxide solution)  AND</td> <td>green ppt. ;  (1)</td> <td>Iron (II) / Fe<sup>2+</sup> ;  (1)</td> </tr> <tr> <td>(add sodium hydroxide solution) and heat ;  (1)</td> <td>red litmus turns blue ;  (1)</td> <td>ammonium / NH<sub>4</sub><sup>+</sup> ;  (1)</td> </tr> </tbody> </table>	test	observations	conclusions	(add sodium hydroxide solution)  AND	green ppt. ;  (1)	Iron (II) / Fe <sup>2+</sup> ;  (1)	(add sodium hydroxide solution) and heat ;  (1)	red litmus turns blue ;  (1)	ammonium / NH <sub>4</sub> <sup>+</sup> ;  (1)			5			
test	observations	conclusions														
(add sodium hydroxide solution)  AND	green ppt. ;  (1)	Iron (II) / Fe <sup>2+</sup> ;  (1)														
(add sodium hydroxide solution) and heat ;  (1)	red litmus turns blue ;  (1)	ammonium / NH <sub>4</sub> <sup>+</sup> ;  (1)														
4(c)	moisture ; smell of ammonia ;			2												

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
5(a)(i)	$D$ recorded (to the nearest 0.1 cm) ;	<b>1</b>
5(a)(ii)	$d$ recorded and smaller than $D$ and to nearest 0.1 cm ;	<b>1</b>
5(b)	$h$ recorded to nearest 0.1 cm ;	<b>1</b>
5(c)(i)	$d_{AV}$ calculated correctly ;	<b>1</b>
5(c)(ii)	$V$ correct ; answer to 3 sf ;	<b>2</b>
5(d)(i)	$V_W$ determined correctly by subtraction ;	<b>1</b>
5(d)(ii)	read scale at right angles / eye level / read scale at bottom of meniscus ;	<b>1</b>
5(e)(i)	$h$ to the inside bottom of the cup / difficult to measure $h$ / thickness of cup / determining the widest part to measure $d$ ;	<b>1</b>
5(e)(ii)	cup not completely full / cup overfilled / water spilled on transfer / poor precision of measuring cylinder ;	<b>1</b>

Question	Answer	Marks
6(a)(i)	$d_A = (60.0 \pm 2.0)$ (cm) ;	1
6(a)(ii)	$f_A$ in the range 14.0 to 16.0 (cm) ;	1
6(b)(i)	$d_B = (64.0 \pm 2.0)$ (cm) ;	1
6(b)(ii)	$f_B$ within 10% of $f_A$ ;	1
6(c)	$f$ correct ; to 2 / 3 / 4 significant figures only ;	2
6(d)	<b>Max one from:</b> move screen slowly to and fro until sharpest focus obtained ; object / lens / screen perpendicular to bench ; object and lens same height above the bench ; carry out experiment away from other bright light sources / darkened room / use brighter lamp ; repeat (and average) ;	1
6(e)	at least 3 values suggested ; all values > 15 (cm) ;	2
6(f)	correct line, labelled $v$ ;	1