



Cambridge O Level

COMBINED SCIENCE

5129/32

Paper 3 Experimental Skills and Investigations

May/June 2023

MARK SCHEME

Maximum Mark: 40

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 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of 7 printed pages.

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)	Iodine ;	1
1(a)(ii)	before blue ; after red / orange / yellow / green ;	2
1(b)	biuret ;	1
	purple / violet ;	1
1(c)(i)	outline single clear lines with no shading ;	1
	size drawing uses at least half of the space available ;	1
	details of drawing 8 main lobes are drawn with similar shape to photograph ;	1
	central vein with side veins attached (no gaps), drawn with central vein showing wider towards the stem, all veins end inside leaf outline ;	1
1(c)(ii)	50 mm $\pm$ 1 mm ;	1
1(c)(iii)	(ans cii / 75 =) 0.67 or 0.667 ;	1

Question	Answer	Marks
2(a)	Thermometer ;	1
2(b)(i)	18, 18, 0 ;	1
2(b)(ii)	31 °C ;	1
2(b)(iii)	All points plotted correctly $\pm$ one small square ;	1
	2 lines of best fit drawn $\pm$ one small square of each point ignoring the anomaly ; NOTE: a minimum of 3 plotted points are needed to judge the line	1
	Both lines extrapolated to an appropriate point of intersection ;	1
	Anomaly – 0.4 g ;	1
2(b)(iv)	magnesium is in excess / too much magnesium for the acid OR all the acid has reacted / all the acid has been used up ;	1
2(b)(v)	value of the point of intersection of the student's lines $\pm$ one small square about 1.16 if they have plotted correctly ;	1
2(c)(i)	energy loss (to environment) ;	1
2(c)(ii)	insulate the beaker / wrap the beaker in cotton or foil / put a lid on the beaker ;	1

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Question	Answer	Marks
3(a)(i)	measuring cylinder ;	1
3(a)(ii)	horizontal arrow aligned with bottom of water level ;	1
3(a)(iii)	idea of two volumes with and without spanner in water ; idea of finding the difference between the volumes ;	2
3(a)(iv)	water level / volume of spanner is too high or the reading is the volume of air + the volume of the spanner ; tap / shake / stir (the apparatus to dislodge the air bubbles) wait for bubbles to disappear or use oil / use boiled water / use distilled water ;	2
3(a)(iv)	remove spanner from water ; determine difference between readings ;	2
3(b)(i)	/ g ; / cm ³ ;	2
3(b)(ii)	7.8 ;	1
3(c)(i)	the density / it is accurate (no mark) less than 10% or within range of experimental error ;	1
3(c)(ii)	use a displacement can / repeat and average / use apparatus with a more precise scale / AVP ;	1

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Question	Answer	Marks
4	1 from each of the 5 categories and then the final 2 marks from any section 1 <u>apparatus</u> stopwatch ; 2 <u>method</u> vary the light intensity ; method of varying light intensity ; idea of range: at least 5 different light intensities ; repeats: at least 3 times ; 3 <u>measurements</u> number of bubbles / volume of oxygen / gas (released) ; for fixed time ; 4 <u>control variables</u> length of pondweed / type of pondweed ; pH of water ; temp of water ; volume of water in boiling tube ; same distance for varying brightness or same lamp for varying distances ; 5 <u>processing and conclusion</u> more bubbles / larger volume of gas (per unit time) at higher light intensity / brightness / shorter distance (between lamp and weed) ;	7