Cambridge IGCSE™

COMBINED SCIENCE	**0653/62**
Paper 6 Alternative to Practical	**May/June 2024**
MARK SCHEME	
Maximum Mark: 40	

<div style="border:1px solid black; text-align:center">

Published

</div>

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 2024 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 **8** printed pages.

[Turn over

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 descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

<table>
<tr><td>

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.

</td></tr>
<tr><td>

GENERIC MARKING PRINCIPLE 2:

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

</td></tr>
<tr><td>

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.

</td></tr>
<tr><td>

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.

</td></tr>
</table>

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.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	‘List rule’ guidance For questions that require n responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards n. • Incorrect responses should not be awarded credit but will still count towards n. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first n responses may be ignored even if they include incorrect science.

6	Calculation specific guidance
	Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.
	For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.
	For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.
	Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.
7	Guidance for chemical equations
	Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.
	State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Question	Answer	Marks
1(a)(i)	all results recorded in mm ; all results correct (expect 0, 5, 12, 20, 44) $\pm$ 1 mm ;	**2**
1(a)(ii)	*any* **one** *from:* height of liquid varies ; peas displace hydrogen peroxide ; only want to measure bubbles ;	**1**
1(a)(iii)	vertical axis labelled height or *h* in mm **AND** horizontal axis labelled number of peas ; linear scales so that plotted points occupy at least half the grid ; plots correct to $\pm$ ½ small square ;	**3**
1(a)(iv)	line of best fit ;	**1**
1(a)(v)	correct estimate from graph ; horizontal and vertical lines shown on graph ;	**2**
1(a)(vi)	as the (number of) <u>peas</u> increases, the <u>height</u> (of bubbles) increases ;	**1**
1(a)(vii)	the higher the <u>concentration</u> of catalase, the higher the rate of breakdown of hydrogen peroxide ;	**1**
1(b)	difficult to determine exact height / bubbles not level ;	**1**
1(c)	can identify / check for / exclude, anomalous results ;	**1**

Question	Answer	Marks
2(a)(i)	mixture of colours seen (blue-green and yellow) / (green-blue) colour only appears for a short time ;	1
2(a)(ii)	yellow colour will mask the flame colour / yellow flame is not as hot as the blue flame ;	1
2(b)	allows the precipitate to sink to the bottom of the test-tube / filters the mixture (to see colour of residue) ;	1
2(c)	chloride ; test **3** / (dilute) nitric acid and (aqueous) silver nitrate ;	2
2(d)	(light) blue precipitate ; (with excess) dark blue solution ;	2

Question	Answer	Marks
3	*One mark from each section and any* **two** *other marking points:* *(If one section is missing max 6 etc.)* **1 Apparatus** balance **AND** measuring cylinder ; stop-clock ; **2 Method** description of making different concentrations of salt solution ; leave different concentrations of salt solution to evaporate for a fixed time (**not** to dryness / crystallisation) ; at least five different concentrations of salt solution ; **3 Measurements** states values of mass of salt added to make solutions (if they use increments, must include the starting mass) / states volumes used in serial dilution ; measure mass / volume of salt solution at start and at end ; measure time (for fixed change in, mass / volume) ; **4 Control variables** temperature of liquid or room ; (initial) volume of salt solution ; **5 Processing results** calculate rate / divide mass by time ; plot a graph of change of mass against concentration of salt solution / graph of time for fixed change in mass against concentration of salt solution / graph of rate against concentration ; idea of repeat measurements at each concentration **and** averaging results / repeat measurements at each concentration to, identify / check for / exclude anomalous results ;	**7**

Question	Answer	Marks
4(a)(i)	78.5 ; 76.0 ;	**2**
4(a)(ii)	77.0 (indicated) ;	**1**
4(b)(i)	$(\Delta\theta_A)$ 15.0 **and** $(\Delta\theta_B)$ 9.0 ;	**1**
4(b)(ii)	R_A = 0.08(333 …) **and** R_B = 0.05(0) ; both recorded to 2 sf (0.083 and 0.050) ; unit = °C / s ;	**3**
4(b)(iii)	*statement must be consistent with candidate results* **expect** rates are different (no mark) evidence of 10% calculation ; because they differ by more than 10% / are not within experimental accuracy ; **OR** rates are the same (no mark) evidence of 10% calculation ; because they are within 10% of each other / are within experimental accuracy ;	**2**
4(c)(i)	read (with eye) perpendicular (to the reading) ;	**1**
4(c)(ii)	measuring cylinder ;	**1**
4(c)(iii)	*any **two** from:* same starting temperature of water (in both beakers) ; stir the water before each temperature reading ;	**2**