CAMBRIDGE
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CO-ORDINATED SCIENCES **0654/61**

Paper 6 Alternative to Practical **May/June 2026**

MARK SCHEME

Maximum Mark: 60

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

This document consists of **19** printed pages.

[Turn over

General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: • the specific **content** defined in the mark scheme • the specific **skills** defined in the mark scheme or in the level descriptions • the **standard of response** required as exemplified by the standardisation scripts.
2	Examiners must award **whole marks** (not half marks, or other fractions).
3	Examiners must award marks **positively**. This means that: • marks are not deducted for errors or omissions • marks are awarded for correct/valid answers as defined in the mark scheme and also for **other valid answers** which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate • the quality of spelling, punctuation and grammar are judged **only** when the mark scheme indicates that these features are **specifically assessed** in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must **consistently** apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the **full range of marks** defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and **must not** award marks with grade thresholds or grade descriptions 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.

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	correct point or mark awarded
	incorrect point or mark not awarded
BOD	benefit of the doubt given
FT	follow through
NBOD	benefit of doubt was considered, but the response was decided to not be sufficiently close for benefit of doubt to be applied.
TV	response is too vague or there is insufficient detail in response
ECF	error carried forward applied
^	information missing or insufficient for credit
	unclear response
I	incorrect or insufficient point ignored while marking the rest of the response

Annotation	Meaning
R	incorrect point or mark not awarded
CON	contradiction in response, mark not awarded
LNK	two statements are linked
SEEN	point has been noted, but no credit has been given or blank page seen
	key point attempted / working towards marking point / incomplete answer / response seen but not credited / blank page seen
BP	blank page

Mark Scheme Abbreviations

;	separates marking points
/	separates alternative responses for the same marking point
Allow	accept (a less-than-ideal answer which should be marked correct)
Ignore	ignore (mark as if this material was not present)
AND	indicates that two or more parts of a response are required for the mark
AVP	alternative valid point
AW	alternative wording (where responses vary more than usual)
NOT	indicates an incorrect response that would contradict another otherwise correct alternative
OR	alternative responses for the same marking point
owtte	or words to that effect
underline	actual word given must be used by candidate (grammatical variants excepted)
ecf	error carried forward
ORA	or reverse argument
( )	the word / phrase in brackets is not required but sets the context
max	indicates the maximum number of marks

Question	Answer	Marks	Guidance
1(a)(i)	quality: clear and continuous outline ; size: at least half the box and all must fit inside the box ; detail: expect 3 / 4 petals, at least 3 stamen with anthers ;	3	**DO NOT ALLOW** shading on the petals / ruled lines **DO NOT ALLOW** for a drawing that is not an attempt of the flower in the figure should be similar to figure, **DO NOT ALLOW** for a different flower **DO NOT ALLOW** single lines for the stamen **NOTE** a drawing which is a flower but not an attempt at Figure 1.1 can score M2 only
1(a)(ii)	label line **touching** anther and with the label A ;	1	top part of stamen **ALLOW** label as anther 
1(b)(i)	47 ;	1	± 1 mm **Ignore** line drawn **DO NOT ALLOW** 47.0
1(b)(ii)	line drawn to show width of flower **AND** correct measurement ;	1	± 1 mm **DO NOT ALLOW** if no line drawn **ecf** unit from **1(b)(i)**

Question	Answer	Marks	Guidance
1(b)(iii)	correct calculation ; 2SF **AND** correctly rounded ;	**2**	**ALLOW** any sf, truncated or rounded **IGNORE** units

Question	Answer	Marks	Guidance
2(a)(i)	syringe / measuring cylinder ;	**1**	**ALLOW** graduated pipette / burette / volumetric pipette **IGNORE** pipette unqualified **DO NOT ALLOW** dropping pipette / teat pipette / eye dropper
2(a)(ii)	to ensure enzyme evenly distributed / maximum contact of enzyme and apple ;	**1**	**ALLOW** even distribution (of apple) / even spread of apple **ALLOW** even (enzyme) distribution **ALLOW** enzyme in contact with **all** apple / **all** apple in contact with enzyme **ALLOW** the concentration (of apple / enzyme) is even **IGNORE** ensure apple cells have not settled (at the bottom of the tube) I**GNORE** evenly mix – mix is in the Question / evenly combined **IGNORE** to react / to get complete reaction / speed up the reaction / increase collision of particles **IGNORE** dissolving the enzyme / apple

Question	Answer	Marks	Guidance
2(a)(iii)	to increase surface area (for enzyme action) ;	1	**ALLOW** (to form a) large surface area **ALLOW** to break open the cells **IGNORE** mixing / increase rate of reaction / increase the surface area of a molecule
2(a)(iv)	to allow enzyme time to work ;	1	**ALLOW** for enzymes to (start) react(ing) / for reaction to begin **IGNORE** mixing **DO NOT ALLOW** for complete reaction / for reaction to finish
2(b)(i)	separation of rows **and** columns in one table with lines ; with headers for time and volume ;	2	 **IGNORE** units / amount
2(b)(ii)	5.0, 8.5 and 10.5 ;	1	
2(b)(iii)	9.0 ; 10.5 ;	2	

Question	Answer	Marks	Guidance
2(b)(iv)	more juice collected at start / less juice collected each minute (as time increases) ; stops/ plateaus at 10.5cm^3 / 4 minutes / same total volume of 10.5 cm^3 / at 4 and 5 minutes ;	**2**	**ecf** their values table in **2(a)(i)** **IGNORE** restatement of table needs to be interpreted **ALLOW** it decreases must include data If no marks scored **ALLOW 1 max** for as time increases the amount of juice increases / more juice is collected as time passes
2(b)(v)	(repeat with) water instead of <u>enzyme</u> / repeat with no <u>enzyme</u> ;	**1**	**ALLOW** different volumes / concentrations / amounts of <u>enzyme</u> tested **ALLOW** repeat with boiled <u>enzyme</u> **ALLOW** use the apple on its own

Question	Answer	Marks	Guidance
3(a)(i)	50 cm^3 **and** any 1 from: (idea of) the only one which measures 30 cm^3 in **one** measurement (which is more accurate) / (idea of) if smaller than 30 cm^3 **more than one** measurement is required (which may increase error) ;	**1**	 idea of used once idea of used more than once / needs a refill **IGNORE** more accurate unqualified **IGNORE** precision **IGNORE** need a larger volume than 30 / 50 is the only one larger than 30
3(a)(ii)	aqueous copper sulfate **and** no grey solid/Zn left in the beaker / (aqueous) copper sulfate in the beaker / blue solution in the beaker ;	**1**	 **ALLOW** copper sulfate / solution is still blue / copper sulfate has not lost its colour **IGNORE** copper sulfate and produces a blue colour **DO NOT ALLOW** (copper sulfate) is insoluble (in excess) **IGNORE** pink solid discussions
3(a)(iii)	Remember to mark the page above seen 37.0 ; 35.5 ;	**2**	 **DO NOT ALLOW** 37

Question	Answer	Marks	Guidance
3(b)(i)	axes correct orientation and labelled with quantity and unit ; sensible linear scales so plotted points cover ⩾ ½ grid and all points must be able to be plotted ; points plotted correctly ± ½ small square ;	**3**	y axis temperature **and** °C x axis time **and** s 6 vertically and 7 horizontally contain points **ALLOW** 2 errors
3(b)(ii)	best-fit curve with a peak higher than 43 °C ;	**1**	Should be a single non-feathery line which takes account of all of the points but is not dot-to-dot should peak higher than 43 °C **ALLOW** lines need to be within 1 small square of 8 of the points
3(b)(iii)	max temperature marked on the graph with a horizontal line to the y-axis ; value at peak of curve ;	**2**	**ecf** **ALLOW** value ± ½ small square **ALLOW** the plateau temperature **DO NOT ALLOW** from a non-linear scale
3(b)(iv)	take temperature at times between 90 s and 120 s / take temperature at times between the two values either side of peak on the graph ;	**1**	**ALLOW** continuous monitoring of temperature **ALLOW** times given within the range 90 s and 120 s **IGNORE** smaller gap between temperature readings **unless** they specify between 43 and 43 °C / past 40 **IGNORE** repeat

Question	Answer	Marks	Guidance
3(b)(v)	correct calculated temperature increase **AND** correct calculation of 126 × maximum temp increase ;	**1**	**ecf** from **3(b)(iii)** **ALLOW** minimum 2 sf and truncated or rounded values 23 and 2898 23.5 and 2961 24 and 3024
3(c)(i)	thermal energy loss / heat loss ;	**1**	**IGNORE** temperature reading / mass reading / time reading / volume reading / parallax **IGNORE** rounding / stirring / time **IGNORE** precision of experiment
3(c)(ii)	insulate the beaker / add a lid ;	**1**	
3(c)(iii)	reading the temperature **and** read perpendicular ;	**1**	**ALLOW** reading the temperature and use datalogging equipment / digital scale **ALLOW** reading temperature and at eye level **IGNORE** look directly / look parallel

Question	Answer	Marks	Guidance
4(a)(i)	iron(II) **and** bromide **and** sulfate / correct symbols ;	**1**	**ALLOW** Fe^{2+} / Fe(II) and Br^- and SO_4^{2-} or a mix of name and formula **DO NOT ALLOW** bromine / iron(III) **NOTE** If both names and formulae are given they must match
4(a)(ii)	to breakdown any carbonate ;	**1**	**ALLOW** remove carbonate / so carbonate cannot give a precipitate

Question	Answer	Marks	Guidance
4(a)(iii)	wire / splint into solution and into a flame ; blue / roaring (Bunsen) flame ;	2	**ALLOW** cotton bud / stick / rod / loop **IGNORE** spraying into flame **IGNORE** spoon / spatula **IGNORE** into Bunsen burner **ALLOW** non-luminous flame **IGNORE** into Bunsen burner
4(b)	sample / wire / splint / solution / it has (been contaminated with) sodium (ions on it) ;	1	**IGNORE** impurities unqualified **IGNORE** used a yellow flame **NOTE** it is sodium is insufficient

Question	Answer	Marks	Guidance
5(a)(i)	68.2 ; 75.7 ;	**2**	
5(a)(ii)	as number of strips increases, mass increases ; size of increase in mass is lower for larger numbers of strips ;	**2**	ORA **DO NOT ALLOW** proportional **IGNORE** positive correlation / positive relationship **ALLOW** the larger the number of spaghetti strips the less grams per strip to break **ALLOW** difference in mass decreases the more strips added
5(a)(iii)	marbles have smaller mass ; more accurate value for **mass** needed to **break** spaghetti strips ;	**2**	**ALLOW** less increase in mass for each marble **ALLOW** can add smaller increments of mass **IGNORE** marbles are lighter **ALLOW mass** needed to **break** the strips is nearer to the true **mass** **NOTE** it is more precise / wider range are insufficient **NOTE** it is more accurate is insufficient **IGNORE** can fit more in the bag
5(a)(iv)	measure **height** of both clamps **and** check they are the same / **height** of each end of spaghetti **and** check they are the same ;	**1**	**ALLOW** clamps are at the same height (above the bench) **ALLOW** the ends of the spaghetti are at the same height (above the bench) **ALLOW** use a spirit level (and the bubble should be in the centre)

Question	Answer	Marks	Guidance
5(b)(i)	(*d* =) 10 cm / 1.91 ; did not divide by 3 / did not divide by the number of trials ;	**2**	 **ALLOW** the value should be 0.64 value given to a minimum of 2 sf and can be rounded or truncated I**GNOR**E just adds the values unqualified
5(b)(ii)	2.56 ;	**1**	
5(b)(iii)	0.17 to 0.23 inclusive ;	**1**	**ALLOW** 0.2
5(b)(iv)	No AND 1 / *F* does not increase by the same amount for each increase in *d* ; difference between two pairs of 1 / *F* values calculated ; **OR** **ALLOW** no and ratio of 1 / F to d is not constant ; 2 values calculated ;	**2**	**ALLOW** No and doubling the distance does not double the 1 / F ; **ALLOW** values calculated to show doubling ; **ALLOW** doubling of 1 / *F* for *d* = 5 cm and compared to 1 / *F* for *d* = 10 cm / doubling of 1 / *F* for *d* = 10 cm and compared to 1 / *F* for *d* = 20 cm

Question	Answer	Marks	Guidance
6	**one** mark from each section and any **two** others: **1 apparatus** voltmeter and its use in the method ; ruler and its use in the method ; **2 method** connect solar cell to voltmeter / make circuit with solar cell and voltmeter **and** measure voltage for a minimum of two distances from the lamp ; **3 measurements** distance of lamp from solar cell ; voltage / number of volts ; repeat each distance to exclude/identify anomalies ; minimum 5 different distances ; **4 control variables** brightness / power of lamp ; **angle** of solar cell ; background lighting ; **5 conclusion** plot graph of voltage against distance (of lamp from solar cell) ; describe relationship from shape of graph e.g. if straight line through origin is proportional etc. ; if distance increases, does voltage increase or decrease (or stay the same)	**7**	**ALLOW** multimeter **ALLOW** rule / tape measure may be from a circuit diagram measurements may be awarded from a results table but distance is insufficient **NOTE** voltmeter reading is insufficient **ALLOW** same (light) intensity <u>from lamp</u> / luminosity of the <u>lamp</u> I**GNORE** same type of lamp **IGNORE** position of lamp **IGNORE** type of solar cell **ALLOW** in a darkened room **IGNORE** a stated conclusion