

Cambridge IGCSE™

CO-ORDINATED SCIENCES**0654/32**

Paper 3 Theory (Core)

February/March 2025

MARK SCHEME

Maximum Mark: 120

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 February/March 2025 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

This document consists of **15** 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 descriptions 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.

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)	D ; A or B ; D, E, F and G ;	3
1(a)(ii)	any two from: no nucleus / G no chloroplast / C no mitochondria / D no vacuole / B ;;	2
1(a)(iii)	chloroplast ;	1
1(b)(i)	<u>chlorophyll</u> ;	1
1(b)(ii)	LHS carbon dioxide + water ; RHS glucose + oxygen ;	2
1(b)(iii)	light ;	1

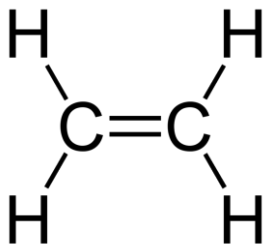
Question	Answer	Marks
1(c)	any two from: movement respiration sensitivity growth reproduction excretion ;;	2

Question	Answer	Marks
2(a)	process egestion ingestion digestion assimilation description the uptake and use of nutrients by cells the taking of substances, e.g. food and drink, into the body the removal of undigested food from the body as faeces the movement of nutrients from the intestine into the blood the breakdown of food ; ; ; ;	4
2(b)(i)	amino acids ; hydrogen (and) nitrogen ; glucose ;	3
2(b)(ii)	add Benedict's (and heat) ; (brick) red / orange /yellow/ green ;	2

Question	Answer	Marks									
3(a)(i)	codes ; ribosomes ; chromosomes ;	3									
3(a)(ii)	<table border="1"> <tr> <td></td><td>D</td><td>d</td></tr> <tr> <td>D</td><td>DD</td><td>Dd</td></tr> <tr> <td>d</td><td>Dd</td><td>dd</td></tr> </table> genotype of parents ; genotype of offspring ; probability = 75(%) / 3 in 4 ;		D	d	D	DD	Dd	d	Dd	dd	3
	D	d									
D	DD	Dd									
d	Dd	dd									
3(b)	any three from: select sheep with desirable traits / thick(er) wool selected sheep breed together select offspring with desirable traits idea of repeating over many generations ; ; ;	3									

Question	Answer	Marks
4(a)(i)	pathogen ;	1
4(a)(ii)	AIDS ;	1
4(a)(iii)	any two from: unprotected sexual intercourse sharing needles blood transfusions AVP ; ;	2
4(b)(i)	B (no mark) thin wall ; large lumen ;	2
4(b)(ii)	Magnification = $\frac{10}{0.008}$ or $\frac{\text{image size}}{\text{actual size}}$; 1250 ;	2
4(c)	any two from: support transport of water transport of mineral ions ; ;	2

Question	Answer	Marks
5(a)(i)	aluminium ;	1
5(a)(ii)	sodium ;	1
5(a)(iii)	iron ;	1
5a(iv)	platinum ;	1
5(b)(i)	magnesium chloride / hydrogen ;	1
5(b)(ii)	(rate of reaction) increases ; increased concentration ;	2
5(b)(iii)	calcium / sodium / potassium ;	1

Question	Answer	Marks
6(a)(i)	contains carbon and hydrogen ; only ;	2
6(a)(ii)	 double bond ; all else correct ;	2
6(b)(i)	(from) orange ; (to) colourless ;	2

Question	Answer	Marks
6(b)(ii)	polyethene ; monomers ; addition ;	3

Question	Answer	Marks
7(a)(i)	gain of oxygen ;	1
7(a)(ii)	(nitrogen) 78% ; (oxygen) 21% ;	2
7(a)(iii)	carbon dioxide ; water ;	2
7(a)(iv)	(anhydrous) copper(II) sulfate ; white to blue ; or (anhydrous) cobalt(II) chloride ; blue to pink ;	2
7(b)(i)	Group VIII – 8 electrons in outer shell ; Period 2 – electrons in 2 shells ;	2
7(b)(ii)	full outer shell ;	1
7(c)	Evaporation ; Condensation ;	2

Question	Answer	Marks
8(a)(i)	covalent ;	1
8(a)(ii)	At ₂ ;	1
8(b)(i)	(thermal) energy released ;	1
8(b)(ii)	$2\text{Na (s)} + \text{Cl}_2 \text{ (g)} \rightarrow 2\text{NaCl (s)}$; ;	2
8(c)	(the electronic configuration shown on the diagram) sodium ion- 2, 8 ; chloride ion- 2, 8, 8 ; (the charge on the ions in diagram) sodium ion +1 and chloride ion -1 ;	3
8(d)(i)	anode cathode ; (in that order)	1
8(d)(ii)	chlorine ; hydrogen ; (in that order)	2

Question	Answer	Marks
9(a)(i)	C anywhere between t = 0 and t = 400 or between t = 440 and t = 800 ;	1
9(a)(ii)	anywhere from t = 400(s) to t = 440(s) ;	1
9(a)(iii)	0.4 (m / s) ;	1
9(b)	electrocution/electric shock;	1

Question	Answer	Marks
9(c)(i)	i indicated correctly on the figure ; r indicated correctly on the figure ;	2
9(c)(ii)	angle of incidence = angle of reflection ;	1
9(d)(i)	negative/minus 1 / – ;	1
9(d)(ii)	in lead container ;	1
9(e)	centre of gravity is not over the base ; moment produced (by weight) ;	2

Question	Answer	Marks
10(a)(i)	hydrogen and helium ;	1
10(a)(ii)	100 000 (light-years) ;	1
10(a)(iii)	conduction and convection require a medium ORA ;	1
10(a)(iv)	refraction ;	1
10(b)(i)	$v = f \times \lambda$ (in any form) or wavelength = $3 \times 10^8 / 2.5 \times 10^{14}$; 1.2×10^{-6} (m) ;	2
10(b)(ii)	'infrared' in box to the right of 'visible light' ;	1

Question	Answer		Marks
10(c)	ray number	colour observed	2
	1	R	
	2	O	
	3	Y	
	4	G	
	5	B	
	6	I	
	7	V	
	7 colours in any order ; 7 colours in correct order ;		
	10(d)(i)	3 000 000 (N) ;	
10(d)(ii)	increase of speed / velocity;		1
10(d)(iii)	any two from gravitational potential / GPE kinetic thermal ;;		2

Question	Answer	Marks
11(a)(i)	work done = force $\times$ distance (in any form) or 1500×20 ; 30 000 ; J ;	3
11(a)(ii)	evidence of $\times 4$; pressure = force / area (in any form) or $36\,000 / 4 \times 0.07$; 130 000 (N / m ²) ;	3
11(b)(i)	elephant ;	1
11(b)(ii)	20 Hz to 20 000Hz ;	1

Question	Answer	Marks
12(a)	arrow going downwards ;	1
12(b)(i)	0 (°C) ;	1
12(b)(ii)	liquid – (at least) 9 particles (all) touching and random arrangement ; solid – (at least) 9 particles all touching and regular arrangement ;	2
12(c)(i)	correct symbols for motor and lamps ; lamps in series with each other ; motor in parallel with lamps ;	3
12(c)(ii)	9000 (Ω) ;	1