



Cambridge IGCSE™

COMBINED SCIENCE

0653/03

Paper 3 Theory (Core)

For examination from 2025

MARK SCHEME

Maximum Mark: 80

Specimen

This document has **10** 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 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 descriptions for the question
- the specific skills defined in the mark scheme or in the generic level descriptions 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 descriptions.

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 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	<p><u>'List rule' guidance</u></p> <p>For questions that require n responses (e.g. State two reasons ...):</p> <ul style="list-style-type: none"> • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked <i>ignore</i> 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.

mark scheme abbreviations

;	separates marking points
/	alternative responses for the same marking point
A	accept (a less than ideal answer which should be marked correct)
I	ignore (mark as if this material was not present)
ecf	error carried forward
AVP	alternative valid point
ORA	or reverse argument
owtte	or words to that effect
AW	alternative wording (where responses vary more than usual)
AND	both responses required for the mark
OR	alternative responses for the same marking point
<u>underline</u>	actual word given must be used by candidate (grammatical variants excepted)
()	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)	letter in Fig. 1.1	name of structure	function	4	
	(A)	(cell) membrane ;	(controls the movement of substances into and out of cells)		
	(D)	(mitochondria)	(site of aerobic) respiration ;		
	G ;	(vacuole)	support ;		
1(b)	(cell)	↓	tissue	2	
	↓	organ	↓		
	organ system	↓	(organism)		
	one sequential pair ; all three in correct order ;				
	(right / left) atrium ;				
	vein(s) ;				
1(c)(i)	(right / left) atrium ;			1	A atria
1(c)(ii)	vein(s) ;			1	
1(c)(iii)	transport of oxygen ;			1	
1(d)	skin / hairs in the nose / mucus / stomach acid ;			1	

Question	Answer	Marks	Guidance
2(a)(i)	starch ; carbon dioxide ;	2	
2(a)(ii)	chlorophyll ;	1	
2(b)(i)	30 (°C) ;	1	A value in range 28–30 °C
2(b)(ii)	idea that, enzymes works best at lower temperatures / enzyme stops working above 25 (°C) ; idea that, photosynthesis stops so no, glucose / sugar / carbohydrates, produced ;	2	A enzymes are not active at 40 °C I food
2(c)(i)	stigma ;	1	
2(c)(ii)	a pollen <u>nucleus</u> fuses with the <u>nucleus</u> in the ovule ;	1	
Question	Answer	Marks	Guidance
3(a)(i)	phytoplankton ;	1	
3(a)(ii)	carnivore <input type="checkbox"/> ✓ ; herbivore <input type="checkbox"/> primary consumer <input type="checkbox"/> secondary consumer <input type="checkbox"/> tertiary consumer <input type="checkbox"/> ✓ ;	2	
3(a)(iii)	idea that, less squid for puffins to eat ; puffin numbers reduce so less food for the foxes to eat ;	2	

Question	Answer	Marks	Guidance
3(a)(iv)	any two from: climate change ; habitat destruction ; hunting ; overharvesting ; introduced species ; AVP ;	2	
3(b)	energy ; organic ;	2	

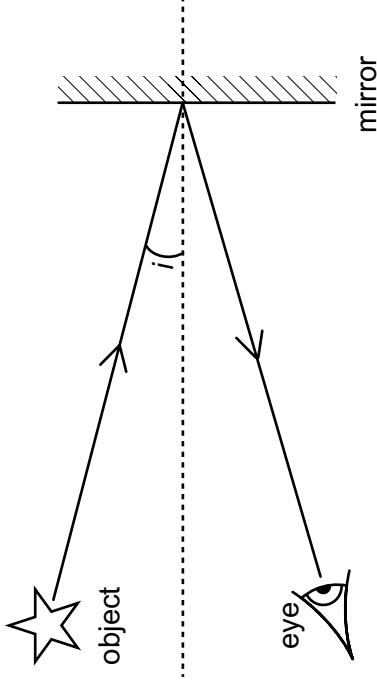
Question	Answer	Marks	Guidance
4(a)	anode ;	1	
4(b)	(positive electrode) chlorine / Cl_2 ; (negative electrode) hydrogen / H_2 ;	2	1 chloride
4(c)(i)	a soluble, base / metal oxide / hydroxide ;	1	
4(c)(ii)	yellow ;	1	
4(d)(i)	(sodium hydroxide) + (sulfuric acid) → sodium sulfate + water ;	1	
4(d)(ii)	(an exothermic reaction) transfers thermal energy to the surroundings ; leading to an increase in temperature (of the surroundings) ;	2	idea of the surroundings may be seen in either marking point

Question	Answer	Marks	Guidance
5(a)	(refinery gas) heating / cooking ; (gasoline) cars / vans / lorries ;	2	
5(b)(i)	C ₃ H ₈ ;	1	
5(b)(ii)	(hydrocarbon) A AND (reason) all carbon–carbon bonds are single (bonds) ;	1	
5(b)(iii)	(test) aqueous, bromine / Br ₂ ; (hydrocarbon A) mixture stays orange AND (hydrocarbon B) mixture decolourises / turns colourless ;	2	
5(c)	CH ₄ (g) + 2O ₂ (g) → CO ₂ (g) + 2H ₂ O(l) correct state symbols ; correct balancing ;	2	
5(d)	any one from: low melting point ; low boiling point ; low electrical conductivity ;	1	

Question	Answer	Marks	Guidance
6(a)	(electrons) 26 ; (neutrons) 30 ;	2	
6(b)(i)	(the atom) loses two electrons ;	1	
6(b)(ii)	green ; precipitate / ppt (is formed) ;	2	1 any reference to turning brown
6(c)(i)	a new substance is made ;	1	
6(c)(ii)	(test) lighted splint AND (result) (burns with a squeaky) 'pop' ;	1	
6(d)	(a substance that) increases the rate (of a reaction) ; is unchanged (at the end of the reaction) ;	2	

Question	Answer	Marks	Guidance
7(a)(i)	(electric) motor ;	1	
7(a)(ii)	8.8 A ;	1	more than one answer circled = 0 marks
7(a)(iii)	total cost = cost per kW h × power in kW × time (in hours) / \$0.15 × 2.0 × 5.5 ; \$1.65 ;	2	A formula in any form A 1.70
7(b)	power = energy ÷ time / $E = P \times t / 2200 \times 15$; 33 000 (J) ;	2	A formula in any form
7(c)(i)	red ;	1	
7(c)(ii)	infrared OR ultraviolet ;	1	

Question	Answer	Marks	Guidance
8(a)(i)	weight = mass × gravitational field strength / $W = mg / 3.1 \times 10^3 \times 9.8$; $30 \times 10^3 / 30\,000$; N / newton(s) ;	3	A formula in any form A 30.38 / 30.4 1 31
8(a)(ii)	increases in speed ;	1	
8(a)(iii)	(3.2 days = $3.2 \times 24 =$) 76.8 (h) ;	1	A 76 h 48 min
8(a)(iv)	(average) speed = distance ÷ time / $v = s \div t / 384\,000 \div 76.8$; 5000 (km / h) ;	2	A formula in any form ecf from (a)(iii)
8(a)(v)	(speed) same AND (reason) both electromagnetic waves which all travel at the same speed ;	1	
8(b)	Mercury ;	1	
8(c)	Milky Way ;	1	

Question	Answer	Marks	Guidance
9(a)	(electrical property) insulator AND (reason) plastic / polymer / not a metal or carbon ;	1	
9(b)	(water) floats AND (ethanol) sinks ; density (of poly(ethene) is) between water (greater density) and ethanol (lower density) ;	2	
9(c)	(ethanol) Y AND (sulfur) X AND (at 25 °C) sulfur is solid AND ethanol is liquid ; (explanation) solid has regular particle arrangement / liquid has irregular particle arrangement / solid more closely packed particles / liquid less closely packed particles ;	2	
9(d)(i)	density = mass ÷ volume / $V = m \div \rho / 9.0 \div 2.7$; 3.3 (cm ³) ;	2	A formula in any form A 3 significant figures but no more
9(d)(ii)	 <p>normal drawn correctly AND angle of incidence correctly shown ; reflected ray to eye AND angle of reflection approximately equal to angle of incidence ;</p>	2	