

Cambridge O Level

COMBINED SCIENCE**5129/22**

Paper 2 Theory

May/June 2024**MARK SCHEME**Maximum Mark: 80

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.

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This document consists of **12** 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)	friction ; contact ;	2
1(b)(i)	(rate of) constant increase in speed / constant rate of change of velocity ;	1
1(b)(ii)	change in speed ÷ time or $1.25 \div 1.5$; 0.83 ;	2

Question	Answer	Marks
2(a)(i)	line into the vacuole, labelled V ;	1
2(a)(ii)	line ending on cell membrane, labelled M ;	1
2(a)(iii)	controls the (activity / reactions of the) cell or stores/contains, chromosomes / genes / alleles / genetic information / DNA or controls how cells, develop / divide / reproduce / grow ;	1
2(b)	flaccid ;	1
2(c)	description: • volume of vacuole reduced / cell is smaller / AW • plasmolysis / cell contents or cytoplasm or membrane, moved away from cell wall AW • cytoplasm is more concentrated explanation: • water moves out (of cell) or water moves from higher to lower water potential or water moves down water potential gradient ; • loss of turgor pressure • (by) osmosis ... 111	3

Question	Answer	Marks
3(a)(i)	119 ;	1
3(a)(ii)	103 ;	1
3(b)	red-brown ;	1
3(c)	(acidified) silver nitrate / AgNO_3 ; cream precipitate ;	2

Question	Answer	Marks
4(a)	(perpendicular) distance ;	1
4(b)	line labelled P at axle of wheel ;	1
4(c)	F is further from the pivot (than W) ;	1
4(d)	0.11 (m) ;	1

Question	Answer	Marks
5	The liver ... - stores protein - damaged by alcohol ; - produces lipase - produces urea ; - blood to heart via HPV - stores glycogen ;	3

Question	Answer	Marks
6(a)	CH ₄ ;	1
6(b)	CaCO ₃ ;	1
6(c)	CH ₄ ;	1
6(d)	HNO ₃ ;	1
6(e)	Cu ;	1

Question	Answer	Marks
7(a)(i)	increases ;	1
7(a)(ii)	vibrating / fixed (to) moving freely / moving around ;	1
7(a)(iii)	decreases ;	1
7(b)	increase in the (kinetic) energy ; to break / overcome forces between molecules ;	2

Question	Answer				Marks
8(a)(i)	blood vessel	lumen	wall	valves	3
	artery	small	thick	no	
	vein	large	thin	yes	
	...				
8(a)(ii)	to withstand pressure ;				1
8(b)	any two from: thin walls / one cell thick (wall) cells of walls are flattened (capillary / it) has a small / narrow, diameter / lumen ;;				2

Question	Answer	Marks
9(a)	protons / atomic number ; right ; row ; protons and neutrons ;	4

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Question	Answer	Marks
10(a)	any two: cold air is (more) dense / warm air is less dense cold air sinks to the bottom / warm air rises to the top less dense air rises / more dense air sinks ;;	2
10(b)	15×133 or 1995 or $15 \times (133 \div 365)$ or $133 \div 365$ or 0.36(438) ; 5.5 or 5.47 (cents) ;	2
10(c)	less thermal energy enters the fridge or idea that the temperature inside fridge stays constant	1

Question	Answer	Marks
11(a)	<i>any two from:</i> fats minerals or correct named mineral fibre / roughage water ;;	2
11(b)(i)	8.1 (%) (correct answer only) ;	1
11(b)(ii)	14–24 (years) ;	1

Question	Answer	Marks
11(c)	energy is lost ; and any two named example of energy loss: • respiration • muscle contraction / movement • egestion / excretion • digestion • growth • maintain body temperature / thermal energy • nerve impulse transmission • not all the animal is eaten	3

Question	Answer	Marks
12(a)(i)	condenser ;	1
12(a)(ii)	liquid to gas ;	1
12(b)	kill microbes ;	1
12(c)	1 bonding pair of electrons ; 6 unbonded electrons on each chlorine ;	2
12(d)(i)	increases ;	1
12(d)(ii)	decreases ;	1

Question	Answer	Marks
13(a)	horizontal line intersects curve and vertical line from same point on curve intersects x-axis ; 1 (minutes) (c.a.o);	2
13(b)	idea that background count-rate / it adds (to the count-rate from the source) or so that the half-life is correct or because background count-rate is from background radiation / the surroundings / not from the source ;	1
13(c)	to increase distance between source and hands / reduce exposure to radiation ;	1

Question	Answer	Marks
14	movement of particles higher to lower concs and BOX 6 diffusion ; movement of sucrose and amino acids in phloem and BOX 4 translocation ; nuclear division to give same number of chromosomes and BOX 5 mitosis ; release of large amount of energy from glucose and BOX 1 aerobic respiration ;	4

Question	Answer	Marks
15(a)(i)	sodium bromide ; ammonia ;	2
15(a)(ii)	from 8 to 14 ;	1
15(b)	3 ;	1
15(c)	20 ;	1

Question	Answer	Marks
16(a)	reflects ;	1
16(b)(i)	coulomb ;	1
16(b)(ii)	$Q = It$ or $(t =) 1.2 \times 10^{-3} \div 0.8$ or $1.2 \times 10^{-3} = 0.8 \times t$; 0.0015 (s) / 1.5×10^{-3} ;	2