



## Cambridge O Level

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COMBINED SCIENCE

5129/21

Paper 2 Theory

May/June 2020

MARK SCHEME

Maximum Mark: 100

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**Published**

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

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This document consists of **12** printed 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 descriptors 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 (see examples below)

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)	two vertical lines at any separation of one wavelength with arrow drawn ;	1
1(b)	$(f =) v / \lambda / 2 \div 100 ;$ 0.02 ;	2
1(c)(i)	1.86 ;	1
1(c)(ii)	speed decreases ;	1

Question	Answer	Marks
2(a)	<b>A</b> = neutron <b>B</b> = proton ;	1
2(b)	gains three electrons ; full outer shell of electrons ;	2
2(c)(i)	78–80% ;	1
2(c)(ii)	cracking ;	1

Question	Answer	Marks
3	<p>diffusion</p> <p>enzyme</p> <p>excretion</p> <p>hormone</p> <p>osmosis</p> <p>xylem</p> <p>movement of gas molecules down a concentration gradient</p> <p>chemical that alters the activity of a target organ</p> <p>removal of toxic materials and waste products of metabolism</p> <p>biological catalyst</p> <p>tissue transporting carbohydrates in plants</p> <p>tissue transporting water and mineral ions in plants</p> <p>movement of water molecules through a partially permeable membrane</p>	6

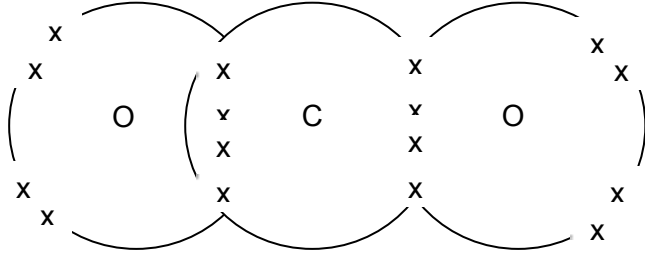
Question	Answer	Marks
4(a)	magnetic field ; materials are magnetized (by core) / induced magnetism ; opposite poles ;	3
4(b)	steel ; stays magnetised ;	2
4(c)	direct current ;	1

Question	Answer	Marks
5(a)	136 24 ;; 6.8 ;	3
5(b)	lighted splint ; burns with a 'pop'	2
5(c)	any <b>two</b> from zinc oxide zinc carbonate zinc hydrogencarbonate zinc hydroxide ;;	2

Question	Answer	Marks
6(a)	<b>A</b> = lens ; <b>B</b> = suspensory ligaments ; <b>C</b> = ciliary muscle ;	3

Question	Answer	Marks
6(b)	any <b>three</b> from ciliary muscles contract ; diameter of ciliary body decreases ; tension in suspensory ligaments decreases ; lens becomes fatter ; to focus image on retina ;	<b>3</b>

Question	Answer	Marks
7(a)	39.0(°C) ;	<b>1</b>
7(b)	34.1(°C) to 42(°C) ;	<b>1</b>
7(c)	reading remains steady for more time ;	<b>1</b>
7(d)	distance between particles increases ;	<b>1</b>

Question	Answer	Marks
8(a)	orange ;	<b>1</b>
8(b)		<b>2</b>
8(c)	decreases ;	<b>1</b>
8(d)	H <sub>2</sub> O ; 2      2 ;	<b>2</b>



Question	Answer	Marks
9(a)	glucose + oxygen (on left hand side) ; carbon dioxide + water (on right hand side) ;	2
9(b)(i)	5 (dm <sup>3</sup> / minute) ;	1
9(b)(ii)	30 × 4.2 = 126 ; (126 – 5) = 121 dm <sup>3</sup> ;	2
9(b)(iii)	any <b>three</b> from more oxygen needed ; more carbon dioxide produced ; more respiration ; more energy needed ; because muscles contracting more strongly ;	3

Question	Answer	Marks
10(a)	any <b>one</b> from magnet ; slip ring ; carbon brushes ; iron core ;	1
10(b)	coil moves / rotates ;  the sides of the coil cut the <u>magnetic</u> field in opposite directions ;  directions of cutting reverse for each side (as coil rotates) ;	3

Question	Answer	Marks
11(a)	Live ; to disconnect motor (from live) ;	2
11(b)	Earth ; prevents case becoming live ;	2
11(c)	(risk of) electrocution / shock ;	1

Question	Answer	Marks
12(a)	alkali metals ;	1
12(b)	hydroxide ;	1
12(c)	ammonia ;	1
12(d)	<i>melting point</i> : decreases ; <i>reactivity</i> : increases ;	2
12(e)	it is <u>more reactive than carbon</u> ;	1

Question	Answer	Marks
13	plasma ; arteries ; capillaries ; antibodies ; phagocytosis ; plasma ;	6

Question	Answer	Marks
14	1.26 ;	1
	Fd = Fd or $F \times 24 = 8 \times 6$ or 48 ;	2
	2(.0) ;	

Question	Answer	Marks
15(a)	X = ethane ; Y = steam ; Z = polymerisation ;	3
15(b)	$\left[ \text{CH}_2 - \text{CH}_2 \right]_n$	2

Question	Answer	Marks
16	<i>correct labelling of:</i> penis ; prostate gland ; sperm duct ;	3

Question	Answer	Marks
17(a)	changes shape / size ;	1
17(b)	F x d or $12 \times 0.15$ ; 1.8 ;	2

Question	Answer	Marks
17(c)	measure original length <b>or</b> measure the extension ; hang a weight on the balloon ; balloon returns to the same length / size when force is removed ;	<b>3</b>

Question	Answer	Marks
18(a)	T ;	<b>1</b>
18(b)	P ;	<b>1</b>
18(c)	S ;	<b>1</b>
18(d)	U ;	<b>1</b>

Question	Answer	Marks
19(a)	penicillin (injection) ;	<b>1</b>
19(b)(i)	any <b>two</b> from ulcer ; body rash ; swollen lymph glands ; fever ; weight loss ; hair loss ;	<b>2</b>
19(b)(ii)	any <b>two</b> from use of condom / femidom during intercourse ; avoid contact with blood of other people ; use sterile needles for injections ; sexual abstinence / one sexual partner ;	<b>2</b>