Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE **0653/31**

Paper 3 Core Theory **May/June 2019**

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.

Cambridge International is publishing the mark schemes for the May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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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.

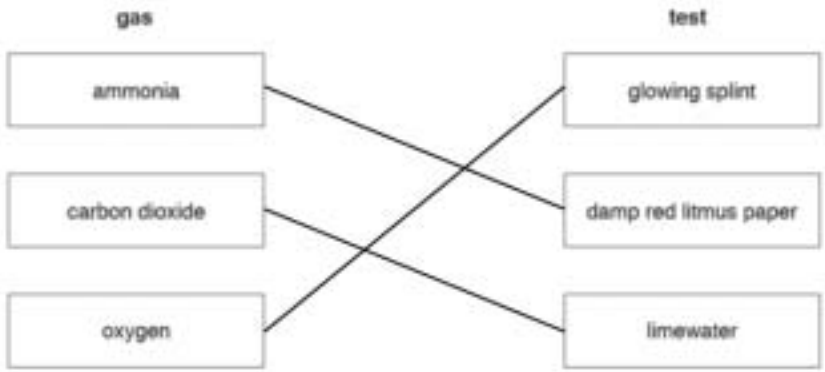
Question	Answer	Marks
1(a)	**A** nucleus ; **B** chloroplast ; **C** vacuole ;	**3**
1(b)(i)	label **X** to any part of xylem area ;	**1**
1(b)(ii)	label **P** to any part of phloem area ;	**1**
1(b)(iii)	transport food substances (from leaves) ;	**1**
1(c)	carbon dioxide **and** water ; (either order)	**1**
1(d)	any two of muscle contraction ; protein synthesis ; growth ; maintenance of (a constant body) temperature ;	**2**

Question	Answer	Marks
2(a)	(gas **X**) oxygen / O^2 ; (gas **Y**) nitrogen / N^2 ;	**2**
2(b)(i)	natural gas ;	**1**
2(b)(ii)	CH^4 ;	**1**
2(b)(iii)	alkane ;	**1**
2(b)(iv)	carbon dioxide / CO^2 **and** water / H^2O ;	**1**

Question	Answer	Marks
2(c)	calcium carbonate / $CaCO^3$;	**1**
2(d)	(test) (anhydrous) copper ((II)) sulfate ; (result) turns (from white to) blue ; **or** (test) (anhydrous) cobalt ((II)) chloride ; (result) turns (from blue to) pink / red ;	**2**

Question	Answer	Marks
3(a)(i)	weight / gravitational force / (force of) gravity	**1**
3(a)(ii)	horizontal arrow pointing to right, with one end touching whale	**1**
3(a)(iii)	500 (N)	**1**
3(a)(iv)	slows down ; moves upwards ;	**2**
3(b)(i)	force (exerted by the whale) ; distance (travelled) ;	**2**
3(b)(ii)	chemical potential ; (to) kinetic ;	**2**
3(c)	speed = distance/time **or** 9000 / 6.0 ; = 1500 (m / s) ;	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(a)</td><td>One mark each for lines A, B, C, D
<table>
<tr><td>letter of structure</td><td>name of structure</td><td>definition</td></tr>
<tr><td>A</td><td>sperm duct</td><td>carries sperm (to the urethra/from the testes)</td></tr>
<tr><td>B</td><td>urethra</td><td>carries urine and semen out of the body</td></tr>
<tr><td>C</td><td>testis/testes</td><td>production of male gametes (sperm)</td></tr>
<tr><td>D</td><td>scrotum</td><td>(sac that) holds the testes (outside the body)</td></tr>
</table></td><td>4</td></tr>
<tr><td>4(b)(i)</td><td>uterus lining becomes thinner / breaks down ;</td><td>1</td></tr>
<tr><td>4(b)(ii)</td><td>30 days ;</td><td>1</td></tr>
<tr><td>4(b)(iii)</td><td>preparing for a fertilised egg / implantation ;</td><td>1</td></tr>
<tr><td>4(c)</td><td>fusion / joining ;
of the nuclei ;</td><td>2</td></tr>
</table>

Question	Answer	Marks
5(a)(i)	(most) calcium magnesium zinc (least) tin Ca most reactive & Sn least reactive ; Mg & Zn in the middle in the correct order ;	**2**
5(a)(ii)	*any two from* increase temperature ; increase concentration (of acid) ; reduce particle size / use a powder / increase the surface area (of the metal) ;	**2**
5(b)(i)	hydrogen / H^2 ;	**1**
5(b)(ii)	 three correct ;; two or one correct ;	**2**
5(c)	*any two from:* malleable ; (good) heat conductor ; (good) electrical conductor ;	**2**

Question	Answer	Marks
6(a)(i)	<table><tr><td></td><td>X-rays</td><td>Ultraviolet/ UV</td><td>visible</td><td></td><td>micro-waves</td><td>radio waves</td></tr></table> ultraviolet/UV in correct box ; visible in correct box ;	**2**
6(a)(ii)	ultraviolet can be hazardous / dangerous / harmful / cause damage ; to the retina / eyes / eyesight / cells/skin / may cause cancer ;	**2**
6(b)(i)	flow of (electric) charge	**1**
6(b)(ii)	$R = V/I$ **or** $R = 2000 / 0.5$; $= 4000$; ohms / Ω ;	**3**
6(c)	idea of water getting into / heat causing damage to devices ;	**1**

Question	Answer	Marks
7(a)	oxygen ;	**1**
7(b)(i)	brown ; (brick) red ;	**2**
7(b)(ii)	inside the bag ;	**1**
7(b)(iii)	some / they have moved out of the bag / into the water ; by diffusion / through the membrane ;	**2**
7(b)(iv)	glucose molecules are small(er) / starch molecules are bigg(er) ; glucose molecules can pass through (the bag) / starch molecules cannot pass through (the bag) ;	**2**
7(c)	carbon dioxide / hormones / ions ;	**1**

Question	Answer	Marks
8(a)	(protons) 13 ; (neutrons) 14 ;	**2**
8(b)(i)	electrolysis ;	**1**
8(b)(ii)	ionic ;	**1**
8(b)(iii)	It is a finite resource / (they're) running out / will run out / more energy used for extraction / less energy to recycle (than extract) / no need to mine / does not go into landfill ;	**1**
8(c)	copper / Cu is a transition metal / aluminium is not a transition metal ;	**1**
8(d)(i)	carbon ;	**1**
8(d)(ii)	(copper oxide is) reduced **and** (explanation) (CuO) loses oxygen ;	**1**

Question	Answer	Marks
9(a)(i)	(good) insulator / poor conductor ;	**1**
9(a)(ii)	to heat up the tube / element / water ;	**1**
9(a)(iii)	*any 2 from* convection ; hot water rises ; cools then falls ;	**2**
9(b)(i)	switch symbol ; fuse symbol + completed circuit ;	**2**
9(b)(ii)	(fuse would) blow / melt in normal use (with a 3 A current) ;	**1**