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**COMBINED SCIENCE**

**0653/32**

Paper 3 Core Theory

**May/June 2019**

MARK SCHEME

Maximum Mark: 80

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**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 **9** 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).

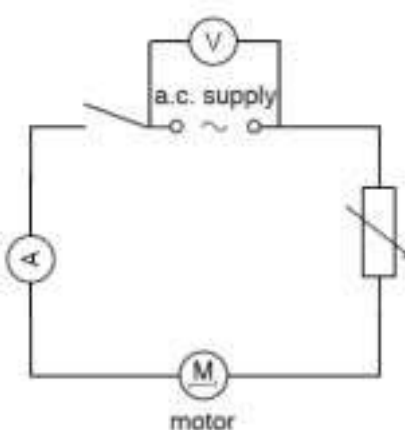
**GENERIC MARKING PRINCIPLE 6:**

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.

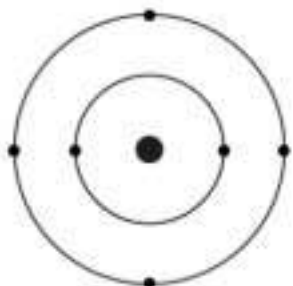
Question	Answer	Marks
1(a)(i)	<i>either order</i> growth ; respiration ;	2
1(a)(ii)	(plants obtain their nutrition by) photosynthesis ; (animals obtain their nutrition by) eating ;	2
1(b)(i)	sensitivity ;	1
1(b)(ii)	downwards ; gravitropism ; phototropism ;	3
1(c)	<i>any two of</i> increased breathing rate ; increased pulse rate ; widened pupils ;	2

Question	Answer	Marks
2(a)(i)	NaCl ;	1
2(a)(ii)	(ionic)        electrons lost <b>and</b> gained ; (covalent)    electrons shared ;	2
2(a)(iii)	(sodium chloride)    solute (water)                solvent (aq NaCl)             solution ;; all three correct (2) one or two correct (1)	2
2(b)(i)	(change)        chemical <b>and</b> (explanation)    new substance(s) made ;	1
2(b)(ii)	carbon / C ;	1

Question	Answer	Marks
2(b)(iii)	(positive) anode <b>and</b> (negative) cathode ;	1
2(b)(iv)	(positive) chlorine / $Cl_2$ ; (negative) hydrogen / $H_2$ ;	2

Question	Answer	Marks
3(a)(i)	sound ;	1
3(a)(ii)	microwave ;	1
3(a)(iii)	ultraviolet ;	1
3(b)	 <p>ammeter symbol ; variable resistor symbol ; voltmeter symbol ; voltmeter in parallel across a.c. supply <b>only</b> ;</p>	4
3(c)	increase frequency / decrease wavelength ;	1

Question	Answer	Marks
4(a)(i)	banana stay white / colour remains unchanged ; <u>oil</u> prevents / blocks / stops / provides a barrier to oxygen / air (from reaching the banana) ;	2
4(a)(ii)	boiling / heat / high temperature affects the enzyme ; makes the enzyme inactive / destroys the enzyme / can't speed up the reaction ;	2
4(a)(iii)	acidic / acid ;	1
4(b)	add Benedict's solution (and heat); (Benedict's solution) goes red ;	2

Question	Answer	Marks
5(a)(i)	gasoline ;	1
5(a)(ii)	refinery gas ;	1
5(b)(i)	alkane(s) / saturated ;	1
5(b)(ii)	carbon dioxide / CO <sub>2</sub> <b>and</b> water / H <sub>2</sub> O ;	1
5(c)(i)	ethene / C <sub>2</sub> H <sub>4</sub> / any named alkene / any correct alkene formula / alkene ;	1
5(c)(ii)	addition (polymerisation) ;	1
5(d)(i)	 <p>2,4 arrangement ;</p>	1

Question	Answer	Marks
5(d)(ii)	$H^x H$	1
5(d)(iii)	they / carbon and hydrogen are (both) non-metals / it is a simple molecule ;	1

Question	Answer	Marks
6(a)	<p>melting point of ice — B</p> <p>room temperature — C</p> <p>boiling point of liquid air — A</p> <p>boiling point of water — E</p> <p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p> <p>F</p> <p>1 mark for each correct link ;;;</p>	3
6(b)(i)	thermal expansion (as temperature rises) ;	1
6(b)(ii)	resistance ;	1
6(c)(i)	radiation ;	1
6(c)(ii)	convection ; hot gases rise / move out from the centre (to the surface) ;	2

Question	Answer	Marks
7(a)(i)	<i>any two of</i> high in / a lot of fat ; high in / a lot of carbohydrate ; not enough vitamins / named vitamin / not enough mineral salts / named mineral salt ;	<b>max 2</b>
7(a)(ii)	add fruit / vegetable / named fruit or vegetable ; adds vitamins / minerals ;	<b>2</b>
7(b)(i)	glycogen ; starch ;	<b>2</b>
7(b)(ii)	makes small / soluble molecules ; that can be absorbed / pass through walls (of alimentary canal) / pass into the blood ;	<b>2</b>
7(b)(iii)	any two of mouth (cavity) ; stomach ; small intestine ;	<b>max 2</b>

Question	Answer	Marks
8(a)(i)	(most reactive)      calcium / Ca aluminium / Al (least reactive)      iron / Fe	<b>1</b>
8(a)(ii)	LHS ; RHS ; <div style="text-align: center; margin-top: 10px;"> <span style="border: 1px solid black; padding: 2px 10px;">aluminium</span> + <span style="border: 1px solid black; padding: 2px 10px;">iron oxide</span> → <span style="border: 1px solid black; padding: 2px 10px;">(aluminium oxide)</span> + <span style="border: 1px solid black; padding: 2px 10px;">iron</span> </div>	<b>2</b>
8(a)(iii)	(aluminium is) (explanation)      oxidised <b>and</b> it gains oxygen / reacts with oxygen	<b>1</b>
8(b)(i)	heat / increase temperature ;	<b>1</b>



Question	Answer	Marks
8(b)(ii)	(test) (aqueous) sodium hydroxide / (aqueous) ammonia ; (result from correct reagent) blue ppt ;	2

Question	Answer	Marks
9(a)(i)	R ;	1
9(a)(ii)	R, P ;	1
9(b)(i)	5000 (N) ;	1
9(b)(ii)	greater ;	1
9(b)(iii)	more work ; (same force / box lifted through) greater distance (from the ground) / box lifted through 3 m rather than 1 m ;	2
9(c)(i)	average speed = total distance / total time <b>or</b> speed = $\frac{d}{t} = \frac{225}{60}$ ; = 3.75 m/s ;	2
9(c)(ii)	accelerating / speeding up ;	1
9(c)(iii)	chemical / potential) ; (to) electrical ;	2