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**COMBINED SCIENCE**

**0653/33**

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.

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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This document consists of **10** 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 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)	<b>A</b> trachea ; <b>B</b> rib ; <b>C</b> bronchiole ;	<b>3</b>
1(b)	4 (%) ;	<b>1</b>
1(c)(i)	carried by haemoglobin ; in red blood cells ;	<b>2</b>
1(c)(ii)	needed for respiration ; reacts with glucose / releases energy ;	<b>2</b>
1(d)	breathing rate increases ; depth of breathing increases ;	<b>2</b>

Question	Answer	Marks
2(a)(i)	(contains) atoms (chemically) joined / bonded / combined (together) ;	<b>1</b>
2(a)(ii)	boiling / evaporation ;	<b>1</b>
2(a)(iii)	(change) physical <b>AND</b> (explanation) no new substance(s) made ;	<b>1</b>
2(b)(i)	releases (heat / thermal) energy ;	<b>1</b>
2(b)(ii)	(sodium ion) drawn 2, 8 electrons (outer shell blank) ; (chloride ion) drawn 2, 8, 8 electrons ;	<b>2</b>

Question	Answer	Marks
2(b)(iii)	(solid) zero / poor / non-conductor <b>AND</b> (liquid) good / conducts ;	1
2(b)(iv)	(type) covalent <b>AND</b> (explanation) carbon and chlorine / both are non-metals ;	1

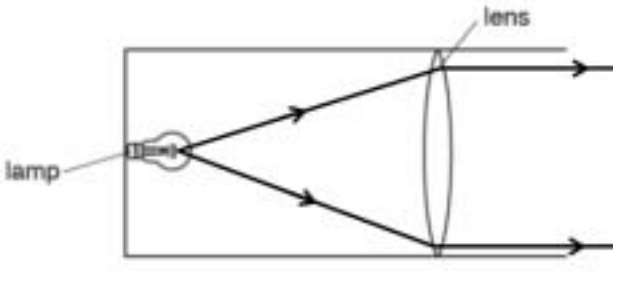
Question	Answer	Marks							
3(a)(i)	arrow pointing left to right, touching swimmer ;	1							
3(a)(ii)	40 N because are equal and opposite / forces balance ;	1							
3(b)	speed = distance / time <b>or</b> time = distance / speed <b>or</b> time = 25 / 0.8 ; = 31 (s)	2							
3(c)	10–20 s / for 10 s, constant speed (of 0.8 m / s) ; 20–40 s / next 20 s, changing speed / slowing down / decelerating (to a stop at 40 s) ;	2							
3(d)(i)	X-rays are harmful ;	1							
3(d)(ii)	<table><tr><td></td><td>X-rays</td><td></td><td>visible light</td><td>infra-red</td><td></td><td>radio waves</td></tr></table>		X-rays		visible light	infra-red		radio waves	1
	X-rays		visible light	infra-red		radio waves			

Question	Answer	Marks
4(a)(i)	sensitivity ;  movement ;	2
4(a)(ii)	rate stops / reduces <b>and</b> less leaf area / less light (energy) absorbed ;	1

Question	Answer	Marks
4(b)(i)	wheat → mouse → snake → badger  correct order of organisms ; arrows going in correct direction ;	2
4(b)(ii)	snake / badger ;  mouse ;	2
4(c)	Sun ;	1

Question	Answer	Marks
5(a)(i)	increases ;	1
5(a)(ii)	<div style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">             calcium hydroxide           </div> + <div style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">             sulfuric acid           </div> → <div style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">             calcium sulfate           </div> + <div style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">             (water)           </div> LHS (1) RHS (1)	2
5(a)(iii)	(test) (aqueous) sodium hydroxide ;  (result) white precipitate ;	2
5(b)(i)	react with <b>all</b> the acid / (make sure) all acid is used up ;	1
5(b)(ii)	filter ;	1

Question	Answer	Marks
5(b)(iii)	<p><i>any two from</i> heat / boil / evaporate ;</p> <p>leave to crystallise / leave to cool ;</p> <p>filter (crystals) ;</p>	2

Question	Answer	Marks
6(a)	<p>...evaporates... molecules ... faster... ; ;</p> <p>any 2 correct for 1 mark</p> <p>all three correct for 2 marks</p>	2
6(b)	<p>(molecules in the cylinder are) close together / less far apart ORA / random in both / arrangement irregular ;</p> <p>same speed (at same temperature) / both free to move around ;</p>	2
6(c)(i)	<p>20 ;</p> <p>Hz / hertz ;</p>	2
6(c)(ii)	any sensible value above 20 000 (Hz) ;	1
6(d)(i)	<p>(3 cm) <i>no mark</i></p> <p>(to produce a parallel beam) must come from (principal) focus ;</p>	1
6(d)(ii)		1

Question	Answer	Marks
7(a)	<p> <b>A</b>      absorption      faeces leave the body  <b>B</b>      digestion      food is taken into the body  <b>C</b>      egestion      insoluble food molecules are broken down  <b>D</b>      ingestion      soluble food molecules enter the blood </p> <p style="text-align: right;">; ; ;</p>	<b>3</b>
7(b)	stores bile ;	<b>1</b>
7(c)(i)	contains all the nutrients ; in the (correct / appropriate) proportions / amounts / quantities / to meet a person's needs / for health ;	<b>2</b>
7(c)(ii)	growth / repair of tissues ;	<b>1</b>
7(c)(iii)	biuret solution ; (biuret solution) goes purple ;	<b>2</b>



Question	Answer	Marks
8(a)(i)	reduction ;	1
8(a)(ii)	slower (reaction) ;	1
8(a)(iii)	argon / noble gases / Group VIII gases have full outer electron shell ;	1
8(b)	aluminium is more reactive (than carbon) ;	1
8(c)(i)	bauxite ;	1
8(c)(ii)	electrolysis ;	1
8(d)	(difference) density / melting point / hardness / strength ; (similarity) (electrical / heat) conductivity ;	2
8(e)	metals/ores are running out/finite / no need to mine / does not go into landfill ;	1

Question	Answer	Marks
9(a)(i)	24 V ;	1
9(a)(ii)	must not touch the electricity line ; 11 000 V / the electricity line (can produce a current which) is fatal ;	2
9(b)(i)	$R = V/I$ or $R = 240 / 0.005$ ; $= 48\,000\ (\Omega)$ ;	2
9(b)(ii)	(rubber is a) good insulator ;	1

Question	Answer	Marks
9(c)	<div data-bbox="360 215 757 512"></div> <p data-bbox="786 316 1630 448">battery symbol ; motor symbol and additional switch symbol (anywhere) in circuit ; switch to lamps in correct place ; motor and switch connected in parallel with lamps ;</p>	<b>4</b>