Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

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COMBINED SCIENCE **0653/43**

Paper 4 Extended Theory **October/November 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 October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **10** 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)	**X** fossilisation ; **Y** feeding / eating / ingestion ;	**2**
1(a)(ii)	green plants ;	**1**
1(b)(iii)	starch ;	**1**
1(b)	(oxygen concentration decreases because) O_2 used up during combustion ; fewer trees so less photosynthesis ; so less oxygen produced ;	**3**

Question	Answer	Marks
2(a)(i)	(methanol contains oxygen and) hydrocarbons contain only carbon atoms and hydrogen atoms ;	**1**
2(a)(ii)	all hydrogen atoms correctly located ; correct electron distribution around carbon atom ; correct electron distribution around the oxygen atom ;	**3**
2(b)(i)	<u>enhanced</u> greenhouse effect / global warming / climate change ;	**1**
2(b)(ii)	$2CH_3OH + 3O_2 \rightarrow 2CO_2 + 4H_2O$ correct formulae on LHS ; correct formulae on RHS ; correctly balanced ;	**3**

Question	Answer	Marks
3(a)(i)	(child A because) child **A** holding close(r) to eye / child **B** eye is too far from the lens ;	**1**
3(a)(ii)	image that cannot be projected onto a screen ;	**1**
3(b)	**compressions** **longitudinal** **amplitude** any 2 correct = 1 mark all 3 correct = 2 marks	**2**
3(c)(i)	use of area under graph **or** $d = s \cdot t$; correct use of data from graph ; = 116 ;	**3**
3(c)(ii)	constant acceleration (0–10 s) ; non-constant deceleration (150–180 s) ;	**2**
3(d)	use of gravitational PE gained = mgh ; (= 40 $\cdot$ 10 $\cdot$ 50) = 20 000 (J) ;	**2**

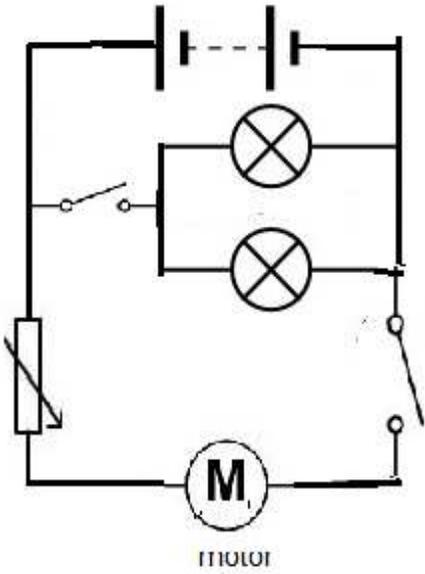| Question	Answer	Marks
4(a)	a protein ; (that functions as) a biological catalyst ;	**2**
4(b)(i)	enzyme substrate product amylase fats amino acids lipase protein fatty acids and glycerol protease starch simple sugars 2 or 3 connections correct ; 4 or 5 connections correct ; 6 connections correct ;	**3**
4(b)(ii)	stomach / pancreas / small intestine ;	**1**
4(c)	(no enzyme activity / enzyme activity greatly reduced because) enzyme is <u>denatured</u> ; enzyme (molecule) has changed shape **or** active site has changed shape ; substrate no longer fits the active site substrate cannot bind to enzyme molecule ;	**3**
4(d)	killing bacteria ; optimum pH for enzymes ;	**2**

Question	Answer	Marks
5(a)(i)	8 ;	1
5(a)(ii)	the greater the number of outer shell electrons, the less metallic the elements become ;	1
5(b)(i)	damp litmus paper ; bleaches ;	2
5(b)(ii)	sterilises water / kills harmful microorganisms ;	1
5(c)	yellow / orange colouration ; chlorine displaces bromine / chlorine is more reactive than bromine / chlorine oxidises bromide ions ;	2
5(d)(i)	anode ;	
5(d)(ii)	chloride ion loses electrons ; one electron (per ion) ;	2
5(d)(iii)	potassium ;	1

Question	Answer	Marks
6(a)(i)	*any two from*: blood passes through the heart twice (for each complete circulation) ; circulation (from heart) to lungs / pulmonary circulation ; circulation (from heart) to body / systemic circulation ;	2
6(a)(ii)	more carbon dioxide in **P** / less carbon dioxide in **Q** ; less oxygen in **P** / more oxygen in **Q** ;	2
6(b)(i)	phloem ;	1
6(b)(ii)	food is made in the leaves (so has to be transported to the roots) ;	1
6(b)(iii)	(less transpiration because) increased concentration of water vapour in the air / reduced difference in water potential ; (so) less <u>diffusion</u> of water vapour through the stomata ;	2

Question	Answer	Marks
6(b)(iv)	support ;	**1**

Question	Answer	Marks
7(a)(i)	faster / more energetic molecules escape ; (average) speed / KE of remaining molecules is lower (results in lower temperature) ;	**2**
7(a)(ii)	molecules in air moving faster / more KE ; transfer more energy to water molecules by collision (so more escape) ;	**2**
7(a)(iii)	collisions of faster milk molecules with slower glass molecules causes glass molecules to gain energy and vibrate faster ; energy then passed from molecule to molecule through glass ;	**2**
7(b)	use of $P = V \cdot I$; 12 V circuit current = 90 / 12 = 7.5 A ; 240 V circuit current = 80 / 240 = 0.33 A ; 10 A fuse appropriate for 12 V circuit, 1 A fuse for 240 V circuit ;	**4**

Question	Answer	Marks
8(a)(i)	(at higher concentrations) more hydrogen ions / acid particles / reactant particles present ; increased rate of collisions ; so higher frequency of successful collisions ;	3
8(a)(ii)	increase temperature / use a catalyst / increase surface area of magnesium ;	1
8(a)(iii)	(thermal) energy is absorbed for bond breaking and released during bond formation ; more thermal energy is released than taken in ;	2
8(b)	magnesium is too reactive / magnesium is above carbon in reactivity series ;	1

Question	Answer	Marks
9(a)	use of correct symbols ; lamps in parallel with motor and variable resistor ; lamps in parallel with each other and in series with switch ;	3
9(b)	use of $R = V / I$; identification of emf of battery as 12 V **and** total current as 3 A ; (R = 12 / 3) = 4 (Ω) ;	3