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Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

0653/43

Paper 4 Extended Theory

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MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **10** printed pages.

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)	$2\text{CH}_3\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 4\text{H}_2\text{O}$ 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 $d = s \times t$; 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 ; (= $40 \times 10 \times 50$) = 20 000 (J) ;	2

Question	Answer	Marks
4(a)	a protein ; (that functions as) a biological catalyst ;	2
4(b)(i)	enzyme amylase lipase protease substrate fats protein starch product amino acids fatty acids and glycerol 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

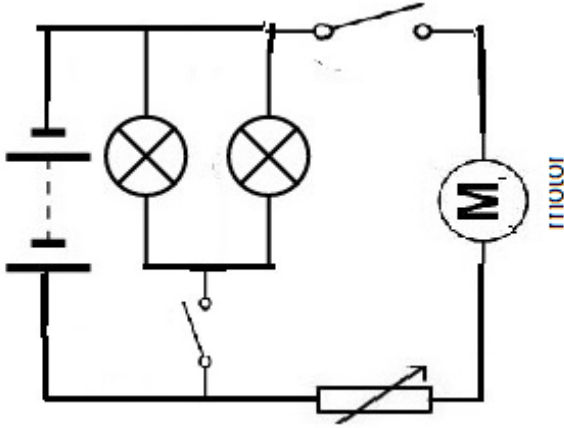
Question	Answer	Marks
5(a)(i)	8 ;	1
5(a)(ii)	the greater the number of outer shell electrons, the less metallic the elements become ;	1
5(b)(i)	damp litmus paper ; bleaches ;	2
5(b)(ii)	sterilises water / kills harmful microorganisms ;	1
5(c)	yellow / orange colouration ; chlorine displaces bromine / 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)	<i>any two from:</i> 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 $P = V \times I$; 12 V circuit current = $90 / 12 = 7.5 \text{ A}$; 240 V circuit current = $80 / 240 = 0.33 \text{ A}$; 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 ; ($R = 12 / 3 = 4 \text{ } (\Omega)$) ;	3