



Cambridge IGCSE™

COMBINED SCIENCE**0653/42**

Paper 4 Theory (Extended)

October/November 2021**MARK SCHEME**Maximum Mark: 80

Published

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This document consists of **12** printed pages.

Question	Answer	Marks								
1(a)	 cervix labelled anywhere in shaded area ;	1								
1(b)(i)	respiration ;	1								
1(b)(ii)	amino acids come from mother's blood ; <i>plus any one from:</i> cross the placenta ; brought to fetus by umbilical cord ; via diffusion ;	2								
1(c)	idea that fetus needs some of the iron ; reference to any named iron deficiency symptom (in mother) / iron is needed for haemoglobin production ;	2								
1(d)	<table border="1"><tr><td>organ</td><td>function</td></tr><tr><td>mouth ;</td><td>(uses teeth to breakdown food into smaller pieces)</td></tr><tr><td>(large intestine)</td><td>absorbs water ;</td></tr><tr><td>anus ;</td><td>(egestion)</td></tr></table>	organ	function	mouth ;	(uses teeth to breakdown food into smaller pieces)	(large intestine)	absorbs water ;	anus ;	(egestion)	3
organ	function									
mouth ;	(uses teeth to breakdown food into smaller pieces)									
(large intestine)	absorbs water ;									
anus ;	(egestion)									

Question	Answer			Marks									
2(a)(i)	does not react (with the solution) ;			1									
2(a)(ii)	<table><tr><td>(solution)</td><td>(name of gas formed at positive electrode)</td><td>(name of gas formed at negative electrode)</td></tr><tr><td>(dilute aqueous sodium chloride)</td><td>oxygen</td><td>hydrogen</td></tr><tr><td>(concentrated aqueous sodium chloride)</td><td>chlorine</td><td>hydrogen</td></tr></table> oxygen ; chlorine ; hydrogen AND hydrogen ;			(solution)	(name of gas formed at positive electrode)	(name of gas formed at negative electrode)	(dilute aqueous sodium chloride)	oxygen	hydrogen	(concentrated aqueous sodium chloride)	chlorine	hydrogen	3
(solution)	(name of gas formed at positive electrode)	(name of gas formed at negative electrode)											
(dilute aqueous sodium chloride)	oxygen	hydrogen											
(concentrated aqueous sodium chloride)	chlorine	hydrogen											
2(a)(iii)	positive: anode AND negative: cathode ;			1									
2(b)	sodium ions are positive ; attracted to the, negative electrode / cathode ; where they gain, electrons / one electron each (to form sodium) ;			3									
2(c)	only sodium cations are present in molten sodium chloride / molten sodium chloride does not contain any hydrogen (ions) / hydrogen (ions) also present in aqueous sodium chloride ; sodium is more reactive than hydrogen / hydrogen ions (in aqueous solution) more easily discharged / AW :			2									

Question	Answer	Marks
3(a)(i)	3 ;	1
3(a)(ii)	double-headed arrow between equilibrium position (mid-point) and any peak or trough ;	1
3(b)(i)	frequency = number of waves per second / $6 \div 40$; 0.15 ; Hz ;	3
3(b)(ii)	$v = f\lambda$ in any form / 0.15×18 ; 2.7 (m / s) ;	2
3(c)	0.055 s AND sound travels faster through, water / liquids (than in, air / gases) ORA ;	1

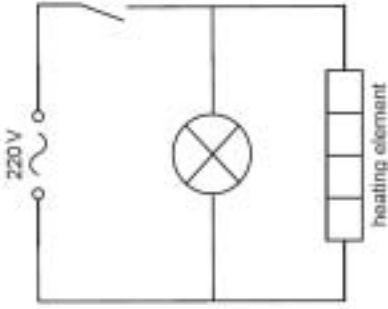
Question	Answer	Marks
4(a)(i)	diaphragm ;	1
4(a)(ii)	larynx labelled ;	1
4(b)	<i>difference</i> : more carbon dioxide in expired air ; <i>explanation</i> : because produced in respiration ;	2
4(c)	<i>any three from</i> : cilia are, damaged / shorter ; (goblet cells make) more mucus ; pathogens / particles, trapped in the mucus ; idea that it is harder (for cilia) to move the mucus ; idea that, pathogens / particles, are not removed (easily) from the airways ;	3

Question	Answer	Marks
5(a)	use universal indicator ; observe the colour ;	2
5(b)(i)	iron(III) chloride AND has the lowest pH ;	1
5(b)(ii)	copper(II) sulfate AND iron(III) chloride ;	1
5(c)	experiment 4 ; more particles, have / collide with, the (minimum) activation energy ; <i>plus any two from:</i> higher temperature means higher, kinetic energy / speed ; small pieces have larger surface area ; reference to more frequent collisions ;	4

Question	Answer	Marks
6(a)(i)	force due to Earth's gravitational field accelerates meteorite / energy is transferred from GPE store to KE store ;	1
6(a)(ii)	$KE = \frac{1}{2}mv^2$ in any form / $\frac{1}{2} \times 45\,000 \times (1.7 \times 10^4)^2$; 6.5×10^{12} (J) ;	2
6(b)(i)	(resultant opposing force of) air resistance / friction ;	1
6(b)(ii)	(opposing) force increases / atmosphere becomes denser ;	1
6(c)(i)	(volume = $3480 - 2500 =$) 980 (cm ³) ;	1
6(c)(ii)	unit conversion / 980×10^{-6} (m ³) ; density = $m \div V$ in any form / $4.52 \div 980 \times 10^{-6}$; 4610 (kg / m ³) ; so must be stony-iron meteorite / identification of type of meteorite matched with density calculation ;	4

Question	Answer	Marks
7(a)(i)	0.2 ÷ 180 ; 0.001 (cm / s) ;	2
7(a)(ii)	as light intensity increases, the rate of photosynthesis increases ; idea that rate levels off (below 20 cm) ;	2
7(b)	<i>any three from:</i> 0 to 30 °C rate increases as enzymes gain more kinetic energy ; 0 to 30 °C rate increases as there are more (effective) collisions ; above 30 °C enzymes denature / shape of active site changes ; above 30 °C substrate no longer fits into active site ;	3
7(c)	phloem ; starch ;	2
7(d)(i)	phototropism ;	1
7(d)(ii)	auxin ;	1

Question	Answer	Marks
8(a)(i)	respiration / AVP ;	1
8(a)(ii)	combustion of fossil fuels / AVP ;	1
8(b)	causes <u>enhanced</u> greenhouse effect / global warming ; leads to, climate change / named harmful effect of climate change e.g. sea level rise ;	2
8(c)(i)	<i>solvent</i> : water ; <i>solute</i> : salts / gases ; <i>solution</i> : carbonic acid / sea (water) ;	3
8(c)(ii)	seas are becoming more acidic / acidification / named harmful effect ;	1

Question	Answer	Marks
9(a)	100 °C ;	1
9(b)	reference to (thermal) expansion (of metal) ; brass expands more (than steel causing the switch to bend / open) ;	2
9(c)(i)	conversion of kW to W / 2400 ; $P = IV$ in any form / $2400 \div 220$; 11 (A) ;	3
9(c)(ii)	 correct symbols for lamp AND switch ; lamp in parallel with heating element ; switch controls both lamp and heater AND no short circuits or additional components ;	3