

Cambridge IGCSE™

COMBINED SCIENCE**0653/41**

Paper 4 Theory (Extended)

October/November 2023**MARK SCHEME**Maximum Mark: 80

Published

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

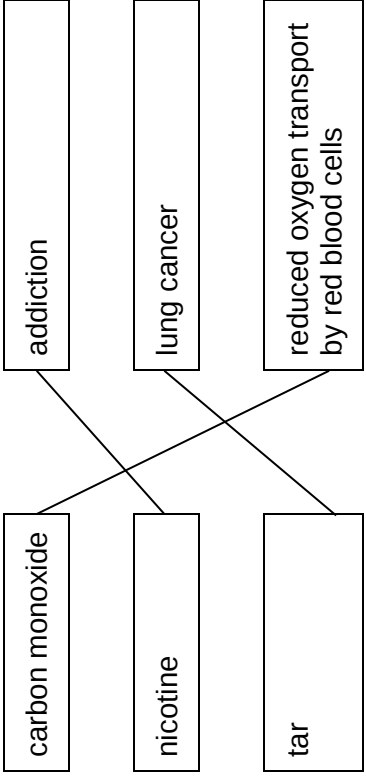
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Cambridge International is publishing the mark schemes for the October/November 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

Question	Answer	Marks												
1(a)(i)	one mark for each correct row <table border="1"> <thead> <tr> <th>letter in Fig. 1.1.</th><th>name</th><th>function</th></tr> </thead> <tbody> <tr> <td>A</td><td>(salivary gland)</td><td>(secretes amylase)</td></tr> <tr> <td>(B)</td><td>pancreas</td><td>(secretes amylase, protease and lipase)</td></tr> <tr> <td>(D)</td><td>anus</td><td>egestion</td></tr> </tbody> </table> ; ; ;	letter in Fig. 1.1.	name	function	A	(salivary gland)	(secretes amylase)	(B)	pancreas	(secretes amylase, protease and lipase)	(D)	anus	egestion	3
letter in Fig. 1.1.	name	function												
A	(salivary gland)	(secretes amylase)												
(B)	pancreas	(secretes amylase, protease and lipase)												
(D)	anus	egestion												
1(a)(ii)	(mechanical) breakdown of food into smaller pieces / AW ; then any one from: to increase surface area ; without chemical change (to molecules) ;	2												
1(b)(i)	pH 4–5 ;	1												
1(b)(ii)	any three from: reference to, strongly acidic / low pH conditions (in stomach) ; R is denatured ; active site changes shape ; substrate no longer fits into <u>active site</u> ;	3												

Question	Answer	Marks
2(a)	does not react / is unreactive ;	1
2(b)(i)	lead(II) bromide, is still solid / has not reached melting point / AW ;	1
2(b)(ii)	idea that charge can flow (in molten lead(II) bromide) ; idea that the orange vapour is <u>bromine</u> (gas forming) ; idea that the grey shiny liquid is <u>lead</u> (forming) ;	3
2(c)(i)	lead AND chlorine ; Pb AND Cl_2 ;	2
2(c)(ii)	different coloured, gas / vapour (formed) ;	1

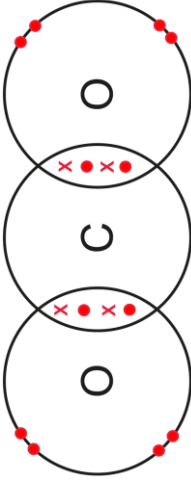
Question	Answer	Marks
3(a)(i)	air resistance ;	1
3(a)(ii)	air resistance, lift, weight (<i>all required</i>) ;	1
3(b)	evidence of, speed = distance $\div$ time / 2170 $\div$ 620 ; 3.5 (h) ;	2
3(c)	unit conversion, 720 000 $\div$ 3600 / 200 (m / s) ; evidence of, $KE = \frac{1}{2} m v^2$ / $\frac{1}{2} \times 190\,000 \times 200 \times 200$; 3.8×10^9 / 3 800 000 000 (J) ;	3

Question	Answer	Marks
4(a)	intercostal muscle ;	1
4(b)	<i>any one from:</i> large (surface) area ; thin (surface) ; good blood supply ; good ventilation (with air) ; AVP ;	1
4(c)	(aerobic) respiration ; water (vapour) ;	2
4(d)	ciliated / has cilia ; to move mucus (away from lungs) ;	2
4(e)	 only three lines and all correct ;	1

Question	Answer	Marks
5(a)	> 0 to < 20 ($^{\circ}\text{C}$) ; > 0 to < 1.0 (mol / dm^3) ;	2
5(b)	more (acid) particles (per unit volume) in experiment 2 / concentration (of acid) in experiment 2 is higher, ORA ; so more frequent collisions (between particles) ;	2
5(c)	experiment 3 ; it is the highest temperature / the most gas is produced (in 10 s) ;	2
5(d)(i)	idea that the metals have different reactivities / correct order of reactivity implied, $\text{Mg} > \text{Zn} > \text{Fe}$; higher reactivity causes higher rate of gas production / reaction ;	2
5(d)(ii)	no gas collected / no reaction AND copper, is unreactive / does not react with acids ;	1

Question	Answer	Marks
6(a)(i)	one correct switch symbol ; one switch labelled S2 in heater branch / switch labelled S1 between battery and lamps AND not in heater branch ; correct circuit with no extra components or short circuit ;	3
6(a)(ii)	total resistance of rear lamps = 7.0 (Ω) / total resistance of headlamps = 14.0 (Ω) ; evidence of, $R = R_1 \times R_2 \div (R_1 + R_2)$ / $7.0 \times 14.0 \div (7.0 + 14.0)$; 4.7 (Ω) ;	3
6(b)(i)	evidence of, $Q = It$ / 150×30 ; 4500 (C) ;	2
6(b)(ii)	large (cross-sectional) area means low resistance ORA ; reference to the need to, carry a (very) high current / avoid overheating ;	2

Question	Answer	Marks
7(a)(i)	carpel labelled ;	1
7(a)(ii)	<i>any two from:</i> (large) petals ; stigma inside flower ; anther inside flower ;	2
7(b)	light (energy) AND chemical ; synthesis ;	2
7(c)(i)	phloem ;	1
7(c)(ii)	starch ;	1
7(d)	concentrated sugar solution has a lower water potential / cells have a higher water potential ; water moves out of, the cells / plant ; by osmosis ; through partially permeable membranes ;	4

Question	Answer	Marks
8(a)(i)	the values, only add to 98.8% / do not add up to 100% ;	1
8(a)(ii)	<i>any three from:</i> Earth has (a significant amount of), oxygen / water vapour ; Earth has less carbon dioxide ; Earth has more nitrogen ; Earth has less argon ;	3
8(b)(i)	6 ;	1
8(b)(ii)	 bonding electrons correct ; non-bonding electrons correct ;	2
8(b)(iii)	(causes) <u>enhanced</u> greenhouse effect ; leading to, climate change / stated outcome of climate change, e.g. sea level rise, melting of ice caps, extreme weather events, flooding, crop failure ;	2

Question	Answer	Marks
9(a)(i)	compression correctly labelled with label line and letter C AND rarefaction correctly labelled with label line and letter R ;	1
9(a)(ii)	evidence of, $v = f \lambda / 330 \div 1.5$; 220 ; Hz / hertz ;	3
9(b)(i)	radio waves ;	1
9(b)(ii)	3.0×10^8 m / s ;	1
9(b)(iii)	for longitudinal/sound waves, the direction of oscillation/vibration (of particles) is parallel to the (direction of) energy transfer / AW ; for transverse/electromagnetic waves, the direction of oscillation/vibration (of particles) is perpendicular to the (direction of) energy transfer / AW ;	2
9(c)	<i>any two from:</i> incident rays now, parallel to axis / form a beam; idea that refracted rays now pass through, F / (principal) focus; lens must be moved so, (principal) focus / F , is, on / closer to, the screen (for focused image) ;	2