

Cambridge IGCSE™

COMBINED SCIENCE**0653/43**

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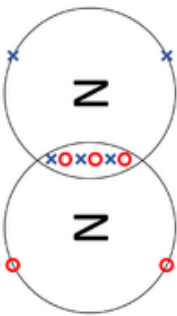
Cambridge International is publishing the mark schemes for the October/November 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

Question	Answer	Marks
1(a)(i)	A rib ; B diaphragm ;	2
1(a)(ii)	produce mucus ; (mucus) traps, pathogens / particulates ;	2
1(b)(i)	(student) 2 ;	1
1(b)(ii)	$73 \div 4 / 18.25$; 18 ;	2
1(b)(iii)	(increased) respiration ; (idea that respiration) produces carbon dioxide ; increase in carbon dioxide (concentration) in the <u>blood</u> (causes increase in breathing rate) ;	3

Question	Answer	Marks
2(a)(i)	<i>hydrogen</i> H^+ AND decreases ; <i>hydroxide</i> water ; <i>sodium</i> Na^+ AND stays the same ;	3
2(a)(ii)	(each) chloride ion loses (one) electron ; chlorine atoms (form) ; two atoms join together to form a molecule (of chlorine gas) ;	3
2(b)(i)	conducts electricity / inert / unreactive ;	1
2(b)(ii)	<i>any two from:</i> high melting point ; high density ; forms coloured compounds ; acts as a catalyst ; AVP ;	2

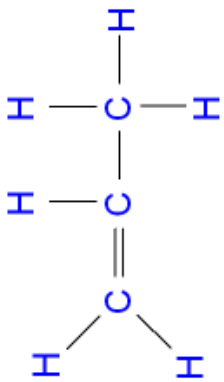
Question	Answer	Marks
3(a)(i)	radiation ;	1
3(a)(ii)	turns to steam / vaporises / boils ;	1
3(a)(iii)	unit conversion, $1800 \text{ dm}^3 = 1.8 \text{ m}^3$; evidence of, $\rho = \frac{m}{V} / 1000 \times 1.8$; 1800 (kg) ;	3
3(b)(i)	evidence of, $W = mg / 140\,000 \div 10$; 14 000 (kg) ;	2
3(b)(ii)	evidence of, $p = \frac{F}{A} / 140\,000 \div 0.56$; 250 000 ; Pa OR N / m ² ;	3

Question	Answer	Marks
4(a)(i)	gall bladder labelled ;	1
4(a)(ii)	amylase ; (simpler) sugars ;	2
4(a)(iii)	<i>any two from:</i> diffuses ; through, cell membrane / capillary wall ; (dissolves) into the plasma ;	2
4(b)(i)	10 (°C) ;	1
4(b)(ii)	enzyme is <u>denatured</u> ; <u>active site</u> changes shape ; substrate no longer fits (into active site) ;	3

Question	Answer	Marks
5(a)(i)	1.2 (%) ;	1
5(a)(ii)	oxygen ;	1
5(b)	in Group VIII AND period 3 ; in VIII because 8 electrons in outer shell ; period 3 because 3 shells ;	3
5(c)	4 ; it has a double bond / 2 electrons in each bond / 2 pairs of electrons are shared / oxygen shares 2 electrons and carbon shares 2 electrons ;	2
5(d)	 bonding electrons correct ; non-bonding electrons correct ;	2

Question	Answer	Marks
6(a)(i)	2.0 (cm) ;	1
6(a)(ii)	evidence of, $F = kx / 1.5 \div 2.0$; 0.75 (N/cm) ;	2
6(a)(iii)	elastic (potential) / strain ;	1
6(b)(i)	period correctly shown AND labelled ; amplitude correctly shown AND labelled ;	2
6(b)(ii)	evidence of, $KE = \frac{1}{2}mv^2 / \frac{1}{2} \times 0.15 \times 0.012^2$; 1.1×10^{-5} (J) ;	2
6(b)(iii)	correct and idea that, all the stored (elastic) energy is transferred to kinetic energy (assuming no, friction / air resistance) / energy is conserved ; OR incorrect and idea that, some energy is transferred to surroundings / work is done against, friction / air resistance ;	1

Question	Answer	Marks
7(a)(i)	support ; transport (of, water / minerals) ;	2
7(a)(ii)	large surface (area) ;	1
7(b)(i)	chemical ; photosynthesis ;	2
7(b)(ii)	<i>any three from:</i> due to eutrophication ; increase in growth of producers / plants on surface (of pond B) ; (increased) decomposition of producers (after death) ; (increased aerobic) respiration by decomposers ; (aerobic respiration/decomposers) uses up the oxygen (in pond B) ; AVP ;	3

Question	Answer	Marks
8(a)(i)	C_nH_{2n+2} ;	1
8(a)(ii)	C_2H_4 ; butane ; C_8H_{18} ;	3
8(b)(i)	hydrocarbon because it contains hydrogen and carbon only ; saturated because, it contains only single bonds / no double (carbon-carbon) bond ;	2
8(b)(ii)	 structure contains 3 carbon atoms AND one double bond between 2 carbons ; structure fully correct ;	2

Question	Answer						Marks							
9(a)(i)	<table><tr><td></td><td>(X-rays)</td><td>ultraviolet ;</td><td>visible light ;</td><td></td><td></td><td>(radio waves)</td></tr></table>							(X-rays)	ultraviolet ;	visible light ;			(radio waves)	2
	(X-rays)	ultraviolet ;	visible light ;			(radio waves)								
9(a)(ii)	burn (to skin) / damage to eyes / blindness ;						1							
9(a)(iii)	evidence of, $P = IV$ / $3.0 \div 3.7$; 0.81 (A) ;						2							
9(b)	evidence of, $R = R_1 \times R_2 \div (R_1 + R_2)$ / $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$, for R1 and R2 ; use of series addition of resistors for R3 to result for R1 and R2 ; values for R1 and R2 of 10 and 15 AND R3 = 22 ;						3							