

Cambridge IGCSE™

COMBINED SCIENCE**0653/42**

Paper 4 Theory (Extended)

October/November 2024**MARK SCHEME**Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)(i)	anther labelled A on flower X ;	1
1(a)(ii)	insect / bird / animal ; anthers inside flower / stigma inside flower ;	2
1(b)	palisade ; chloroplasts ; phloem ;	3
1(c)(i)	organic AND energy ;	1
1(c)(ii)	primary ;	1
1(d)	increased aerobic respiration by decomposers in the water ; increased decomposition of dead producers in the water ;	2

Question	Answer	Marks
2(a)(i)	hydrogen; rubidium hydroxide ;	2
2(a)(ii)	idea that rubidium is more reactive / faster / more vigorous ORA ;	1
2(a)(iii)	red ;	1
2(b)	11 ; 12 ; 10 ;	3
2(c)	Sodium is a liquid at room temperature. Rubidium is more dense than potassium. The density of sodium is less than 0.50 g/cm^3. The melting point of rubidium is 70°C. any two correct ; all correct ;	2
2(d)	positive and negative <u>ions</u> ; alternating / regular (arrangement) ;	2

Question	Answer	Marks
3(a)	chemical (potential) ;	1
3(b)(i)	acceleration = gradient of graph / $20 \div 10$ / change in speed $\div$ time ; 2 (m/s^2) ;	2
3(b)(ii)	(any relevant area) $100 / 800 / 200$; (all three relevant areas) $100 + 800 + 200 / 1100$; (unit conversion) 1.1 km ;	3
3(b)(iii)	recognition that maximum speed is 20 m/s ; evidence of, $\text{KE} = \frac{1}{2} m v^2$ / $\frac{1}{2} \times 1200 \times 20^2$; 240 000 (J) ;	3

Question	Answer	Marks
4(a)	blood vessel W X Y adaptation thick elastic walls permeable walls large lumen function for diffusion of materials to withstand high blood pressure for less resistance to blood flow two lines correct ; four lines correct ; six lines correct ;	3
4(b)(i)	idea of blockage of, a blood vessel / blood flow ; <u>coronary artery</u> ;	2
4(b)(ii)	329 000 000 / 0.659 million / 0.002 / ratio of N:P $\times$ 100 ; 0.200 (%) ;	2
4(b)(iii)	<i>any two from:</i> chronic obstructive pulmonary disease / COPD ; lung cancer ; AVP ;	2

Question	Answer	Marks
5(a)	carbon ; platinum ;	2
5(b)(i)	hydrogen ;	1
5(b)(ii)	Cl_2 ; $2e^-$;	2
5(c)	sodium ; chlorine ;	2

Question	Answer	Marks
6(a)(i)	(total resistance =) $18 + 15 / 33 (\Omega)$; $V = IR$ (in any form) / 0.20×33 ; $6.6 (V)$;	3
6(a)(ii)	evidence of, $E = VIt / \frac{330}{6.6 \times 0.20} / 1.32 (W)$; $250 (s)$;	2
6(b)(i)	$(1.05 - 0.41 =) 0.64 (A)$;	1
6(b)(ii)	evidence of, $R_T = \frac{R_F \times R_G}{R_F + R_G}$ OR $\frac{1}{R_T} = \frac{1}{R_F} + \frac{1}{R_G}$ OR $\frac{51 \times 33}{51 + 33}$; $20 (\Omega)$;	2

Question	Answer	Marks
7(a)	C ; is <u>complementary</u> (in shape, to the active site of the enzyme) ;	2
7(b)(i)	biuret (solution) ;	1
7(b)(ii)	protein intake needs to increase ; for the growth / development of the fetus ;	2
7(b)(iii)	gastric juice / stomach, is a lower pH / acidic pH OR protease works (best) in, a lower pH / (more) acidic pH/conditions ; protease is denatured (in small intestine) ; active site changes shape / enzyme substrate complex cannot form / substrate/protein no longer fits (active site of) protease;	3

Question	Answer	Marks
8(a)	calcium chloride ; water ;	2
8(b)	calcium carbonate is heated (to a high temperature) ; (and) breaks down / breaks bonds / separates atoms ;	2
8(c)	$\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + (3\text{CO}_2)$ correct formulae ; balanced ;	2
8(d)(i)	methane / AVP ;	1
8(d)(ii)	increase in global temperature / climate change / named effect of climate change, e.g. ice caps melting, flooding, etc. ;	1

Question	Answer	Marks
9(a)(i)	continuation of the three straight rays to converge at X ;	1
9(a)(ii)	focal point / (principal) focus ;	1
9(b)	evidence of, $\rho = m \div V / 0.23 \div 920$; $0.00025 / 2.5 \times 10^{-4} \text{ (m}^3\text{)}$;	2
9(c)	(intermolecular) forces are strong(er) in solid / weak(er) in liquid ; molecules / they (only) vibrate, in solid ; molecules / they move around / move freely / flow / slide over each other, in liquid ;	3
9(d)	<i>any three from:</i> heated wax, expands / increases in volume / particles move further apart / OR A ; hot wax has lower density / cool wax has higher density ; hot wax rises ; cool wax sinks ;	3