

Cambridge IGCSE™

COMBINED SCIENCE**0653/41**

Paper 4 Theory (Extended)

October/November 2025**MARK SCHEME**Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)	E ; C ; A ;	3
1(b)(i)	20 ÷ 4000 seen OR actual L = measured L ÷ magnification ; 20 (mm) × 1000; seen OR 0.005 (mm) × 1000 ; 5 (µm) ;	3
1(b)(ii)	respiration occurs within mitochondria; Idea that the mitochondria provide energy (for movement of the flagellum) ;	2

Question	Answer	Marks
2(a)(i)	plasmolysis ;	1
2(a)(ii)	<i>any three from:</i> M1 water enters the cell ; (<i>Direction of water movement</i>) M2 by osmosis ; M3 pure water has a high(er) water potential / low(er) water potential inside cell ; (<i>Reason why water moves as it does</i>) M4 increase in turgor pressure / cell becomes turgid ;	3
2(b)(i)	cellulose ; starch ;	2

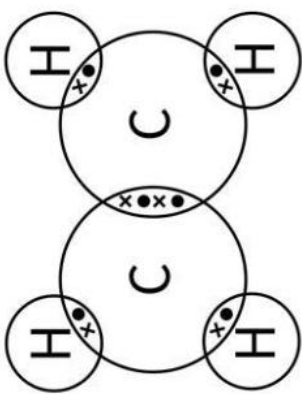
Question	Answer	Marks
2(b)(ii)	carbon dioxide AND water ; energy ; chlorophyll ;	3
2(c)(i)	algae → limpets → starfish → crabs → sharks ; ; <i>organisms in correct order</i> <i>arrows in correct direction</i>	2
2(c)(ii)	limpets ;	1

Question	Answer	Marks
3(a)(i)	either coronary artery labelled ;	1
3(a)(ii)	blocked / AW ;	1
3(a)(iii)	any two from: lack of exercise / AW ; stress ; smoking ; genetic predisposition ; age ; sex ; high blood pressure ; AVP::	2

Question	Answer	Marks
3(b)	Any two from (wall) is muscular (wall) is elastic; narrow <u>lumen</u> ; and then to withstand high (blood) pressure / maintain high (blood) pressure ;	3

Question	Answer	Marks
4(a)	$2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$ correct formulae ; correct balancing ;	2
4(b)	79 (cm ³) ; oxygen is 21% of air ;	2
4(c)(i)	M1 endothermic ; M2 EITHER products have higher <u>energy</u> than reactants / (thermal) <u>energy</u> is taken in OR Energy required for bond breaking greater than energy released when bonds form;	2
4(c)(ii)	any label showing activation energy from level of reactants to top of peak ;	1
4(c)(iii)	M1 energy needed for a reaction ; <i>but</i> M2 minimum energy needed to for a reaction ; ;	2
4(c)(iv)	increases rate of reaction ; is unchanged at the end of the reaction / idea that catalyst is not used up ;	2

Question	Answer	Marks
5(a)(i)	bubbles / chlorine / gas produced ;	1
5(a)(ii)	$\text{Zn}^{2+}(\text{l}) + 2\text{e}^{-} \rightarrow \text{Zn}(\text{s})$ correct equation ; correct state symbols ;	2
5(b)(i)	two types of atom shown, most touching at least one other atom and mixed ; more metal A atoms than metal B atoms ;	2
5(b)(ii)	atoms are different sizes ; (layers / atoms) can no longer slide ;	2

Question	Answer	Marks
6(a)	<i>ticks for:</i> is formed by cracking large alkanes (box 2); reacts with hydrogen to form ethane (box 3); decolourises aqueous bromine (box 5) ;	3
6(b)	bonding pair between each hydrogen and carbon and no extra electrons anywhere ; two bonding pairs between the carbons ; 	2

Question	Answer	Marks
6(c)	steam ; addition ; acid ;	3

Question	Answer	Marks
7(a)(i)	change in speed per unit time;	1
7(a)(ii)	(acceleration =) $\frac{\Delta v}{\Delta t}$; OR ($a =$) $\frac{7.8 - 2.2}{40}$; OR ($a =$) $\frac{5.6}{40}$; 0.14 ; m / s ² ;	3
7(b)(i)	(KE =) $\frac{1}{2} m v^2$ OR $0.15 = \frac{1}{2} \times 0.060 \times v^2$ OR $v = \sqrt{\frac{2 \times 0.15}{0.060}}$; 2.2 (m / s) ;	2

Question	Answer	Marks
7(b)(ii)	M1 KE = GPE OR GPE = 0.15 (J) ; M2 (ΔGPE =) $mg\Delta h$ <i>But if M1 and M2 combined is seen give two marks</i> $0.15 = 0.060 \times 9.8 \times \Delta h$ OR $\Delta h = \frac{0.15}{0.060 \times 9.8}$; 0.26 (m) ;	3

Question	Answer	Marks
8(a)(i)	any named insulator, e.g. (named) wood, (named) plastic ; insulator ;	2
8(a)(ii)	M1 vibrations of particles ; M2 ref to movement / delocalised / free electrons ; M3 (energy transfer) by collisions between particles / contact between particles OR collisions between electrons and particles ;	3
8(b)	unit conversion GHz to Hz / 4.10×10^{11} Hz ; $v = f\lambda$ OR $3.0 \times 10^8 \div 4.10 \times 10^{11}$; 7.3×10^{-4} (m) ;	3

Question	Answer	Marks
9(a)	charge ;	1
9(b)	variable resistor ; heater ;	2
9(c)	LED connected the wrong way round / AW ;	1
9(d)	<i>length</i> idea that $R \propto L$ or B is 3× resistance of A seen or 0.48 / 0.16 × 3 ; seen <i>area</i> idea that $R \propto A^{-1} / R \propto d^{-2}$ or B is $\frac{1}{4} / \frac{1}{2}^2$ × resistance of A or 0.04 / 0.16 × 0.25 ; seen 0.12 (Ω) ;	3
9(e)	M1 $v = 2\pi r \div T$ or $r = 7800 \times 5400 \div 2\pi$; M2 (radius of orbit of satellite =) 6.7×10^6 m ; M3 (distance above Earth = $6.7 \times 10^6 - 6.380 \times 10^6$ =) 3.2×10^5 (m) ;	3