

Cambridge IGCSE™

COMBINED SCIENCE**0653/42**

Paper 4 Theory (Extended)

February/March 2023**MARK SCHEME**Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)(i)	ovary labelled ;	1
1(a)(ii)	anther inside flower / stigma / reproductive organs inside flower ; large / long, petals ;	2
1(b)	spikes (to stick to insect) ;	1
1(c)	shoot tip ; distribution / spread ; <u>elongation</u> ;	3
1(d)(i)	<i>any two from:</i> producers ; make their own food ; reference to photosynthesis ; do not consume other life forms ;	2
1(d)(ii)	<i>any two from:</i> lost as heat / respiration ; not all (parts of) plant are eaten ; not all is digested / energy remnants in faeces ;	2

Question	Answer	Marks
2(a)	(positive) anode AND (negative) cathode ;	1
2(b)	needs to be, molten / in liquid form ; so that ions move / ions do not move in solid ;	2
2(c)(i)	Pb and Cl_2 ; (l) (l) (g) ;	2
2(c)(ii)	lead (ions) gain electrons (from negative electrode) ; (lead ions) form (lead / metal) atoms / are discharged / gains two electrons ;	2

Question	Answer	Marks
3(a)(i)	S on any point on curved section of graph ;	1
3(a)(ii)	X reasonable accurately marked at $t = 20 \text{ s}$ and $s = 3 \text{ m/s}$;	1
3(a)(iii)	10 (s) ;	1
3(b)	energy lost / wasted as, thermal energy / heat ;	1
3(c)	mass of bicycle = $\text{weight} \div g / m = 150 \div 10 = 15 \text{ (kg)}$; total mass of rider + bicycle = $60 + 15 = 75 \text{ (kg)}$; (KE =) $\frac{1}{2} mv^2$; $\frac{1}{2} \times 75 \times 9 = 338 \text{ (337.5) (J)}$;	4

Question	Answer	Marks								
4(a)	<u>catalysts</u> ;	1								
4(b)(i)	A ;	1								
4(b)(ii)	enzyme denatured ; <u>active site</u> changes shape ; <u>substrate</u> no longer fits (into active site) ;	3								
4(c)	one mark for each correct row:<table><tr><td>enzyme</td><td>function</td></tr><tr><td>amylase ;</td><td>(breaks down starch into simple sugars)</td></tr><tr><td>(protease)</td><td>(breaks down) protein (into) amino acids ;</td></tr><tr><td>lipase ;</td><td>(breaks down fats into fatty acids and glycerol)</td></tr></table>	enzyme	function	amylase ;	(breaks down starch into simple sugars)	(protease)	(breaks down) protein (into) amino acids ;	lipase ;	(breaks down fats into fatty acids and glycerol)	3
enzyme	function									
amylase ;	(breaks down starch into simple sugars)									
(protease)	(breaks down) protein (into) amino acids ;									
lipase ;	(breaks down fats into fatty acids and glycerol)									
4(d)	storage ;	1								

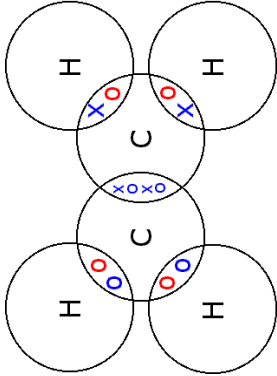
Question	Answer	Marks
5(a)	solute: (solid) magnesium sulfate ; solvent: water ;	2
5(b)(i)	exothermic / energy is given out ; products are lower than reactants / products have less energy than reactants ;	2
5(b)(ii)	<u>activation</u> energy ;	1
5(b)(iii)	bonds are being broken ;	1

Question	Answer	Marks
5(c)	sulfuric acid in all three rows ; hydrogen ; water ; magnesium carbonate ;	4

Question	Answer	Marks					
6(a)(i)	solid to liquid / it melts ;	1					
6(a)(ii)	0 (°C) ;	1					
6(b)	ultraviolet / UV in correct position ; e.g., <table><tr><td>gamma radiation</td><td>x-ray</td><td>ultraviolet</td><td>visible light</td><td>infrared</td></tr></table>	gamma radiation	x-ray	ultraviolet	visible light	infrared	1
gamma radiation	x-ray	ultraviolet	visible light	infrared			
6(c)	speed of light, changes / decreases ; ray moves into a, different / denser medium ;	2					
6(d)	frequency = number of waves ÷ time / 40 ÷ 25 ; 1.6 (Hz) ; $v = f \lambda$ / 1.6×2 ; 3.2 (m / s) ;	4					

Question	Answer	Marks
7(a)(i)	A ;	1
7(a)(ii)	B / D because it is a vein ;	1
7(a)(iii)	idea of blood flows from atrium to ventricle ; idea of flow of blood caused by (muscular) contraction (of chambers) ;	2
7(b)	idea that less oxygen is transported (to heart muscle / wall) ; therefore reduced (aerobic) respiration ; so less energy available (for muscle contraction) ;	3

Question	Answer	Marks
8(a)	alkane ;	1
8(b)	propane contains <u>only</u> single bonds / propane has single bonds between C atoms ; ethene has a double bond (between C atoms) ;	2
8(c)(i)	H ₂ O ;	1
8(c)(ii)	contains oxygen ;	1

Question	Answer	Marks
8(d)	carbon-carbon double bond correct ; carbon – hydrogen bonds correct ; e.g., 	2
8(e)	(aqueous) bromine (water) ; propane – remains orange AND observations with ethene – goes (from orange to) colourless ;	2

Question	Answer	Marks
9(a)	<u>series</u> ;	1
9(b)(i)	resistance = voltage ÷ current ; $R = 6.4 \div 1.28 = 5.0 \text{ } (\Omega)$; Ω ;	3

Question	Answer	Marks
9(b)(ii)	single lamp branch (P) has half the resistance of two lamps branch (Q + R) ; current in P is $2 \times$ current (in Q + R) ; current (in Q + R) / ammeter 2 = $1 / 3 \times 1.28$; (= 0.43 A to 2 sf) OR algebraic use of resistors in parallel formula to get the resistance of one lamp (n) e.g., $1 / n + 1 / 2n = 1 / 5$; so $n = 7.5 \Omega$ so resistance in branch = 15Ω ; then $V / R = 6.4 \div 15 = 0.43 \text{ A}$;	3
9(c)	correct symbols for variable resistor and voltmeter ; variable resistor in series with lamp R (allow ecf for incorrect symbol) ; voltmeter connected in parallel with R only and all else correct, i.e. no open circuit and no short circuit ;	3