

Cambridge IGCSE™

COMBINED SCIENCE**0653/42**

Paper 4 Theory (Extended)

October/November 2022**MARK SCHEME**Maximum Mark: 80

Published

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Question	Answer	Marks								
1(a)(i)	<table><tr><td>letter in Fig. 1.1</td><td>name of part</td></tr><tr><td>(B)</td><td>(left) ventricle ;</td></tr><tr><td>D ;</td><td>(septum)</td></tr><tr><td>(F)</td><td>valve ;</td></tr></table>	letter in Fig. 1.1	name of part	(B)	(left) ventricle ;	D ;	(septum)	(F)	valve ;	3
letter in Fig. 1.1	name of part									
(B)	(left) ventricle ;									
D ;	(septum)									
(F)	valve ;									
1(a)(ii)	arrow(s) showing correct direction ;	1								
1(a)(iii)	separates oxygenated and deoxygenated blood ; allows for different levels of blood pressure / AW ;	2								
1(b)(i)	20–29 / 80+ ;	1								
1(b)(ii)	$18 \times 100 \div 54$ / $18 + 36$ / 54 ; 33(%) ;	2								

Question	Answer	Marks
2(a)(i)	O ₂ ; C; <u>2</u> Fe;	3
2(a)(ii)	hematite;	1
2(a)(iii)	(nitrogen) comes from the air (which enters the furnace);	1
2(a)(iv)	sulfur dioxide;	1
2(b)(i)	<u>mixture</u> of a metal with (an)other element(s);	1
2(b)(ii)	<i>any two from:</i> (stainless steel / ORA) is strong(er); is (more) malleable; does not, corrode / rust (as easily); AVP;	2

Question	Answer	Marks
3(a)(i)	S;	1
3(b)(i)	$341 \times 3600 \div 1000 (= 1228 \text{ km / h})$;	1
3(b)(ii)	evidence of, acceleration = change in speed $\div$ time / $341 \div 20.0$; 17.1; m / s ² ;	3
3(b)(iii)	evidence of, $KE = \frac{1}{2}mv^2$ / $\frac{1}{2} \times 10600 \times 341 \times 341$; 6.16×10^8 (J);	2
3(b)(iv)	evidence of, $P = \Delta E \div t$ / $6.16 \times 10^8 \div 20.0$; 3.08×10^7 (W);	2

Question	Answer	Marks
4(a)(i)	cortex ; (spongy / palisade) mesophyll ;	2
4(a)(ii)	large surface area ; increases rate of absorption (of water) ;	2
4(b)	at higher humidity there is more water vapour in the air ; diffusion / concentration gradient, decreases (as humidity increases) ; less evaporation / less diffusion ;	3
4(c)	<i>any two from:</i> (pollen from) • insect-pollinated flowers is, sticky / covered in spikes ; • insect-pollinated flowers is produced in smaller quantities ; • wind-pollinated flowers is lighter ;	2

Question	Answer				Marks
5(a)		true for ethane only	true for ethene only	true for both ethane and ethene	2
	is a hydrocarbon			✓	
	is a saturated compound	✓			
	changes the colour of aqueous bromine		✓		
	one correct ; all three correct ;				
5(b)	4 ; double bond / two bonds each, containing two electrons ;				2
5(c)(i)	blue (to) pink ; water (vapour) is made ;				2
5(c)(ii)	limewater turns milky ; because carbon dioxide is made ;				2
5(d)	idea that, many (ethene) molecules join ; correct reference to, <u>monomer</u> / (addition) <u>polymerisation</u> ;				2

Question	Answer	Marks
6(a)(i)	evidence of, $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$; $\frac{72 \times 36}{72 + 36} / \frac{2592}{108} / \frac{72}{3} / \frac{1}{72} + \frac{1}{36} (= 24 \Omega)$;	2
6(a)(ii)	evidence of, $R = V \div I / 240 \div 24$; 10 (A) ;	2
6(b)	(total resistance increases so) current decreases ; current decreases so thermal energy output decreases ; evidence of, $P = VI / E = VIt$;	3
6(c)	resistance is inversely proportional to cross-sectional area ; wire in element 2 has greater cross-sectional area ;	2

Question	Answer	Marks
7(a)	Both types of digestion always form soluble molecules. ☐ Both types of digestion take place in the mouth. ☒ ; Both types of digestion use enzymes. ☐ Only chemical digestion takes place in the stomach. ☐ Only mechanical digestion involves no chemical change. ☒ ;	2
7(b)(i)	lipase / amylase ;	1
7(b)(ii)	<i>substrate</i> protein AND <i>product</i> amino acid ;	1
7(c)(i)	(protease) denatures / changes shape ; reference to <u>active site</u> ; will not, fit / bind with substrate (into active site) ;	3
7(c)(ii)	(protease) does not work / denatures, at low pH / in acid conditions ; gastric juice, contains hydrochloric acid / has a low pH ;	2

Question	Answer	Marks
8(a)(i)	<i>any two from:</i> solid does not conduct / only liquid conducts / only conducts in molten state ; energy required to overcome forces (between ions) ; ions in a solid cannot move / ions in a liquid can move ;	2
8(a)(ii)	<i>temperature explanation</i> any temperature greater than 373 °C AND lead bromide must be, molten / a liquid / above the melting point of lead bromide ;	1
8(a)(iii)	<i>lead forms as a explanation</i> liquid AND lead has a lower melting point than lead bromide / idea that if lead bromide is liquid, it is above the melting point of lead / melting point of lead is below the temperature of the electrolysis / AW ;	1
8(b)	cathode gain atoms two correct ; all three correct ;	2
8(c)	orange / brown ;	1

Question	Answer						Marks
9(a)(i)	gamma radiation	X-rays ;		visible light		microwaves ;	2
9(a)(ii)	evidence of, $v = f\lambda$ / $3 \times 10^8 \div 2.48 \times 10^9$; 0.1(21) (m);						2
9(a)(iii)	(X-rays) damage cells / cause cancer ;						1
9(b)(i)	<i>any two from:</i> evaporation (from surface of liquid) ; convection (by heating air above the surface) ; conduction (through cups) ; radiation (from outside of cup) ;						2
9(b)(ii)	(cup B / ORA) has greater surface area ; so increased (rate of) evaporation ;						2