

Cambridge IGCSE™

COMBINED SCIENCE**0653/42**

Paper 4 Theory (Extended)

February/March 2025**MARK SCHEME**Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)(i)	hawk / snake ;	1
1(a)(ii)	any two from: rabbits would have no food / rabbits would decrease in number ; mice would have more food / mice would increase in number ; grasshoppers would eat more corn (rather than grass) ; hawks would eat more mice ; mice would decrease in number because more eaten by hawks ; AVP ;	2
1(b)	any two from: monitoring species ; protecting habitat ; education (qualified) ; (captive) breeding programs ; AVP ;	2
1(c)(i)	amylase ; reducing ;	2
1(c)(ii)	any one from: molecules are too large to pass through ileum wall or capillary wall / molecules are too large to pass into blood ; (starch)molecules are too, large / complex to be absorbed / only small / simple, molecules can be absorbed ; (starch) molecules cannot be absorbed because they are insoluble / only soluble molecules can be absorbed ;	1

Question	Answer	Marks
2(a)(i)	(left) atrium ; valve ;	2
2(a)(ii)	thick (muscular) wall / elastic wall ; the idea of allowing or withstanding the transport of blood at high pressure ; OR narrow lumen ; to maintain high blood pressure ;	2
2(b)(i)	heart rate increases (from 3 min) ;	1
2(b)(ii)	133 – 64 / 69 ; $\frac{133 - 64}{64} \times 100 / 107.8(125) / 108 ;$	2
2(b)(iii)	any three from: the person has stopped running / owtte ; muscle contraction decreases ; less energy / oxygen required ; reduction in respiration rate ;	3
2(c)	white blood cells ;	1

Question	Answer	Marks
3(a)(i)	guard (cell) ;	1
3(a)(ii)	photosynthesis ;	1

Question	Answer	Marks
3(b)	any three from: uptake of mineral ions is by <u>active transport</u> ; energy required for, active transport / uptake of mineral ions ; respiration releases energy ; (mitochondria are) site of (aerobic) respiration ;	3
3(c)	potential ; turgor ; plasmolysed ;	3

Question	Answer	Marks
4(a)(i)	sodium: reacts violently / produces effervescence / bubbles / melts / moves around surface / becomes smaller / yellow flame ; copper: does not react with water / no reaction / no change ;	2
4(a)(ii)	(most) copper compounds are coloured (and (most) sodium compounds are colourless / white) ;	1
4 (a) (iii)	CuO ; NaCl ;	2
4(b)	any two from: malleable ; ductile ; (good) conductors of heat ; (good) conductors of electricity ;	2
4(c)(i)	shows different atoms / atoms of different sizes / arrangement of atoms is not regular ;	1
4(c)(ii)	alloy is, harder / stronger / more hardwearing / more durable / ora ;	1

Question	Answer	Marks
5(a)(i)	(l) shows it is a liquid / the state symbol shows it is a liquid ;	1
5(a)(ii)	oxidation and reduction happen (simultaneously) / iron is reduced and aluminium is oxidised ; iron (oxide) loses oxygen and aluminium gains oxygen ;	2
5(a)(iii)	Fe ; Al^{3+} ;	2
5(b)	shows oxidation number / state (of iron) (which is +3) ;	1
5(c)	shape of diagram: hump with products lower than reactants ; activation energy labelled ; energy change of reaction correctly labelled ;	3

Question	Answer	Marks
6(a)(i)	addition ;	1
6(a)(ii)	C_2H_4 ;	1
6(b)	cracking ;	1

Question	Answer				Marks
6(c)		true for alkanes only	true for alkenes only	true for both	3
	A bond between two carbon atoms has four shared electrons.		✓		
	The group of compounds have the same general formula.			✓	
	Complete combustion gives carbon dioxide and water.			✓	
	Adding aqueous bromine gives a colourless solution.		✓		
	<i>all four correct = 3 marks three correct = 2 marks two correct = 1 mark</i>				
6(d)(i)	acid ;				1
6(d)(ii)	nickel ;				1

Question	Answer	Marks
7(a)(i)	(moving with) constant speed ;	1
7(a)(ii)	$a = \Delta v \div \Delta t / 0.12 \div 1.5 ;$ 0.080 (m/s ²) ; negative sign ;	3

Question	Answer	Marks
7(a)(iii)	use of area under the graph ; correct calculation shown, $(\frac{1}{2} \times 0.12 \times 1.5) + (0.12 \times 1.5) + (\frac{1}{2} \times 0.12 \times 1.5) (= 0.36)$ / or equivalent ;	2
7(b)	unit conversion of g to kg / 0.13 seen ; $\Delta E_P = mg\Delta h / 0.13 \times 9.8 \times 0.36 ;$ $= 0.46 \text{ (J)} ;$	3

Question	Answer	Marks
8(a)	blue / indigo / violet ;	1
8(b)	speed of radio waves stated as $3.0 \times 10^8 \text{ m/s}$; recognition that radio signal travels down and back (i.e. divide time or distance by 2) ; $v = s \div t / 3.0 \times 10^8 \times 1.65 \times 10^{-6} ;$ 495 (m) ;	4
8(c)(i)	volume ;	1
8(c)(ii)	three from: mp1 idea that force = $P \times A$ / higher pressure causes higher force (on bottom) ; mp2 reference to force / pressure, created by collisions between particles and wall ; mp3 (when piston moves / volume decreases) the number of wall particle collisions increases / frequency of wall particle collisions increases ; mp4 (if mp3 is awarded) (reason for more collisions / higher collision rate) the idea that particle concentration increases / idea of more particles in smaller volume / particles are closer together ;	3

Question	Answer	Marks
9(a)(i)	nuclear fusion ; chemical ;	2
9(a)(ii)	total power received by solar cells = $1800 \times 12 / 21600 \text{ W}$; efficiency = useful power output $\div$ total power input $\times 100 / 3900 \div 21600 \times 100$; 18 (%) ;	3
9(b)(i)	heater ;	1
9(b)(ii)	4.8 (V) ;	1
9(b)(iii)	evidence for use of $R = V \div I / 4.8 \div 0.015$; 320 (Ω) ;	2