

Cambridge IGCSE™

COMBINED SCIENCE**0653/43**

Paper 4 Theory (Extended)

May/June 2025**MARK SCHEME**Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2025 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

Question	Answer	Marks
1(a)(i)	red blood cell ;	1
1(a)(ii)	produce antibodies / phagocytosis ;	1
1(a)(iii)	prevent blood loss ; prevent entry of pathogens ;	2
1(b)(i)	larger / wider, lumen (than artery) ; thinner (muscular) wall (than artery) / less muscular wall ;	2
1(b)(ii)	magnification = image size ÷ actual size <i>in any form</i> or $15 \div 75$ or 0.2 ; 0.2×1000 ; 200 (μm) ;	3

Question	Answer	Marks
2(a)	G ; A ; B ;	3
2(b)	chlorophyll ; transfers light energy to chemical energy ; to synthesise / produce, carbohydrates / glucose ;	3
2(c)(i)	25 ($^{\circ}\text{C}$) ;	1
2(c)(ii)	enzymes denature (at high temperature) ; active site changes shape ; active site no longer complementary to substrate / substrate no longer fits active site ;	3

Question	Answer	Marks
3(a)(i)	bronchiole ;	1
3(a)(ii)	<i>any two from:</i> large surface area ; thin surface ; good blood supply ; good ventilation (with air) ; AVP ;	2
3(b)	$C_6H_{12}O_6 + 6O_2 \rightarrow 6H_2O + 6CO_2$; <i>correct reactants (in either order) and balanced = 1 mark</i> <i>correct products (in either order) and balanced = 1 mark</i>	2
3(c)(i)	<i>any two from:</i> decrease in photosynthesis ; so less carbon dioxide removed from atmosphere / carbon dioxide (in atmosphere) increases ; AVP ;	2
3(c)(ii)	<i>any one from:</i> habitat destruction ; reduced biodiversity ; extinction ; loss of soil ; flooding ;	1

Question	Answer	Marks
4(a)(i)	(compound) B (no mark) high MP (and BP) or MP (and BP) above 25 °C ; (and) does not conduct electricity ;	2
4(a)(ii)	(compound) C and is a gas (at room temperature) / has a low BP (and MP) ;	1

Question	Answer	Marks
4(b)	<i>arrangement:</i> from regular to random ; <i>energy:</i> increases ; <i>motion:</i> from fixed / vibrating, to, moving over each other / sliding over each other / moving around / moving freely ;	3
4(c)	compound A breaks down / electrolysis happens ; elements (from the compound) are formed ;	2

Question	Answer	Marks
5(a)(i)	<u>bromine</u> ;	1
5(a)(ii)	chlorine is more reactive than bromine OR A ;	1
5(a)(iii)	<u>endothermic</u> ;	1
5(b)(i)	sodium with 8 crosses in outer shell ; chloride with 7 dots and 1 cross in outer shell ;	2
5(b)(ii)	+ and – ions alternate along a row or down a column ; an adjacent row or column of correspondingly opposite ions ;	2
5(c)(i)	precipitation ;	1
5(c)(ii)	<u>sodium nitrate</u> ;	1

Question	Answer	Marks
----------	--------	-------

Question	Answer				Marks
6(a)(i)	molecule	formula of product	reaction conditions		4
	Br ₂ (aq)	C₂H₄Br₂ / CH₂BrCH₂Br ;	room temperature		
	H ₂ O(g)	C ₂ H ₅ OH	high temperature OR acid catalyst ;		
	H₂ ;	C ₂ H ₆	nickel catalyst ;		
6(a)(ii)	gas / gaseous ;				1
6(b)(i)	C₇H₁₄ ;				1
6(b)(ii)	same general formula / always has twice as many hydrogen atoms as carbon atoms / successive members differ by CH ₂ ; boiling points increase (down the series) ORA ;				2
6(b)(iii)	(they all) contain hydrogen / H and carbon / C only ;				1

Question	Answer	Marks
7(a)(i)	matter; gravitational ;	2
7(a)(ii)	$W = mg / 0.64 \times 9.8$; 6.3 (N) ;	2
7(b)(i)	$F = ma / 0.64 \times 0.25$; 0.16 (N) ;	2
7(b)(ii)	$(\Delta v =) a \times t$ or 0.25×5.2 ; 1.3 (m / s) ;	2
7(c)(i)	efficiency = $\frac{\text{power output}}{\text{power input}} \times 100$ OR $\frac{0.75}{3.00} \times 100$; 25 (%) ;	2
7(c)(ii)	energy transfer, to surroundings / internal energy of car / thermal energy of tyres, etc. or (by) work done against, friction / air resistance ;	1

Question	Answer	Marks
8(a)	heated water becomes less dense or heated water expands or heated molecules move further apart ; heated water rises ;	2
8(b)(i)	boiling ;	1
8(b)(ii)	(forces / they) decrease ;	1
8(c)(i)	alternating current / a.c. ;	1

Question	Answer	Marks
8(c)(ii)	$P = IV / 2000 \div 240$; 8.3 A ; 30 A fuse is not appropriate AND it would allow too large a current ;	3

Question	Answer	Marks
9(a)	13.8 billion years ;	1
9(b)	<i>any three from:</i> (from interstellar clouds of) gas / dust / a nebula ; due to gravitational attraction ; (stable stars are formed from) protostars ; gravity and pressure are balanced ;	3
9(c)(i)	$3.0 \times 10^8 \text{ m / s}$;	1
9(c)(ii)	ultraviolet ; visible light AND infrared ;	2
9(c)(iii)	sound waves need a medium (such as air) / cannot travel through a vacuum ORA or sound waves are longitudinal waves AND electromagnetic waves are transverse waves ;	1