

Cambridge IGCSE™

COMBINED SCIENCE**0653/43**

Paper 4 Theory (Extended)

May/June 2024

MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **10** printed pages.

Question	Answer			Marks										
1(a)(i)	<table><tr><th>label</th><th>name</th><th>function</th></tr><tr><td>A</td><td>(sepal)</td><td>to protect / to support (the flower / bud / ovary)</td></tr><tr><td>(C)</td><td>anther</td><td>(produces) pollen / male gamete</td></tr><tr><td>D</td><td>stigma</td><td>(site of pollination)</td></tr></table>	label	name	function	A	(sepal)	to protect / to support (the flower / bud / ovary)	(C)	anther	(produces) pollen / male gamete	D	stigma	(site of pollination)	3
label	name	function												
A	(sepal)	to protect / to support (the flower / bud / ovary)												
(C)	anther	(produces) pollen / male gamete												
D	stigma	(site of pollination)												
1(a)(ii)	one mark for each correct row any one from: (large) petals ; anther inside (petals / flower) ; stigma inside (petals / flower) ;			1										
1(b)(i)	any two from: flagellum ; enzymes ; AVP ;			2										
1(b)(ii)	(nucleus of sperm cell) fuses / joins ; with <u>nucleus</u> of, ovum / egg ;			2										

Question	Answer	Marks
2(a)(i)	activation energy correctly labelled on both diagrams ; energy change of reaction shown by upward arrow for first diagram ; energy change of reaction shown by downward arrow for second diagram ;	3

Question	Answer	Marks										
2(a)(ii)	<table><tr><td>true</td><td>false</td></tr><tr><td></td><td>✓</td></tr><tr><td>✓</td><td></td></tr><tr><td>✓</td><td></td></tr><tr><td></td><td>✓</td></tr></table> <i>All correct = 2 marks 2 to 3 correct = 1 mark</i>	true	false		✓	✓		✓			✓	2
true	false											
	✓											
✓												
✓												
	✓											
2(a)(iii)	$2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$;	1										
2(b)	weak forces between molecules / weak intermolecular forces ; need low amounts of energy to change from liquid to gas / low amount of energy to, separate molecules / overcome / break the force ;	2										

Question	Answer					Marks
3(a)(i)	gamma radiation	ultraviolet		microwaves ;	radio waves	1
3(a)(ii)	sunburn / skin cancer / skin damage / eye damage ;					1
3(b)(i)	speed = distance ÷ time <i>in any form</i> OR $37\,000 \div 3.0 \times 10^5$; $12(.3) \times 10^{-2}$ OR 0.12 (s) ;					2

Question	Answer	Marks
3(b)(ii)	conversion km to m seen ; $v = f\lambda$ in any form / $3 \times 10^8 \div 12 \times 10^9$; 0.025 (m) ;	3

Question	Answer	Marks
4(a)(i)	pancreas labelled ;	1
4(a)(ii)	amylase breaks down or digests, starch / carbohydrate, or amylase has an active site complementary to starch ; protein (shape), is not complementary to / will not fit <u>active site</u> ;	2
4(a)(iii)	amino acids ;	1
4(b)(i)	lack of sunlight ;	1
4(b)(ii)	soft, bones / teeth ;	1
4(b)(iii)	thin walls / permeable walls / short diffusion distance ; to allow exchange of material / to allow substances to, diffuse / pass through the walls (between cells and blood) ;	2

Question	Answer	Marks
5(a)(i)	zinc sulfate ; zinc oxide / zinc hydroxide ;	2
5(a)(ii)	hydrogen ; water ;	2
5(b)	carbon dioxide ; water ;	2

Question	Answer	Marks
5(c)	full range / universal, indicator ; compare (colours) with chart / colour corresponds to a number ;	2
5(d)	add, calcium carbonate / limestone / calcium hydroxide / (slaked) lime / add a base ;	1
6(a)(i)	arrow pointing to right, touching bus and same length as arrow Q ;	1
6(a)(ii)	friction / air resistance ;	1
6(b)	force P = 75000 N or weight of bus = 75000 N ; no vertical motion / arrow R is same length as arrow P / no resultant force / R and P are balanced forces ;	2
6(c)(i)	acceleration = initial slope of graph OR 12 / 100 ; 0.12 ; m / s ² ;	3
6(c)(ii)	distance while accelerating = $\frac{1}{2} 100 \times 12$ OR 600 (m) ; distance at constant speed = 150×12 OR 1800 (m) ; total distance = (1800 + 600) = 2400 (m) ; (distance = 2650 – 2400 =) 250 (m) ;	3
6(c)(iii)		1

Question	Answer	Marks
7(a)(i)	both / they, transport (substances) ; and either xylem / X , also provides support / transports mineral ions / transports up the stem ; or phloem / Y , transports sugars / amino acids / transports up and down the stem ;	2

Question	Answer	Marks
7(a)(ii)	by evaporation (from the surface) ; water vapour moves to / out of, stomata ; (water vapour passes through stomata) by diffusion ;	3
7(b)	tip ; elongation ; gravity and light ;	3
7(c)(i)	small fish and clam ;	1
7(c)(ii)	tertiary carnivore large ;; <i>all correct = 2 marks</i> <i>two correct = 1 mark</i>	2

Question	Answer	Marks
8(a)(i)	they all have similar chemical properties / all contain a (carbon-carbon) double bond ;	1
8(a)(ii)	alkenes: C_nH_{2n} ; alkanes: C_nH_{2n+2} ;	2
8(b)	six carbon atoms bonded in a row (bonded with hydrogen atoms) ; 6 C and no double bonds and 12 H correctly bonded and continuation lines shown ;	2

Question	Answer	Marks
8(c)(i)	4 C atoms and 10 H atoms bonded in a row ; correct butane structure drawn to show single bonds ;	2
8(c)(ii)	any two from: high temperature ; high pressure ; catalyst ;	2

Question	Answer	Marks
9(a)	volts ; electrons / charge ;	2
9(b)(i)	power = $V \times I$ or 2.4×0.50 ; 1.2 (W) ;	2
9(b)(ii)	$Q = It$ or $9000 = 0.5 \times t$ or $(t =) 9000 \div 0.5$; (time = $9000 \div 0.5$) = 18000 s ; seconds to hours = 5(.0) h ;	3
9(c)(i)	lamps in parallel (instead of in series) ;	1
9(c)(ii)	greater (<i>no mark</i>) (reason) less resistance or current from source / total current, is sum of (separate) currents in, each lamp / each branch ;	1