

Cambridge IGCSE™

COMBINED SCIENCE**0653/42**

Paper 4 Theory (Extended)

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

Published

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Question	Answer			Marks											
1(a)	<table><tr><th>name of part</th><th>letter</th><th>function of part</th></tr><tr><td>stomach</td><td>C</td><td>digestion</td></tr><tr><td>small intestine</td><td>E</td><td>(digestion and) absorption (of digested food)</td></tr><tr><td>salivary gland</td><td>A</td><td>produce, saliva / amylase</td></tr></table>	name of part	letter	function of part	stomach	C	digestion	small intestine	E	(digestion and) absorption (of digested food)	salivary gland	A	produce, saliva / amylase	...	3
name of part	letter	function of part													
stomach	C	digestion													
small intestine	E	(digestion and) absorption (of digested food)													
salivary gland	A	produce, saliva / amylase													
1(b)	one mark for each correct row protease: digests / breaks down, proteins (into amino acids) ; hydrochloric acid: kills, (harmful) microorganisms / pathogens / bacteria ; provides optimum / acidic / low pH, for enzyme / protease ;			3											
1(c)	enzyme will denature ; active site changes shape ; active site no longer complementary to substrate / substrate no longer fits active site ;			3											

Question	Answer	Marks
2(a)(i)	(F) root hair (cell) ; (G) xylem ;	2
2(a)(ii)	surface area ; mineral ions ;	2
2(b)	y-axis labelled as rate of transpiration ; line constantly increasing / constantly increasing then levelling off ;	2

Question	Answer	Marks
2(c)	<i>any three from:</i> (requires) carbon dioxide / CO ₂ and water / H ₂ O ; (requiring presence of) chlorophyll ; light energy converted to chemical energy ; (synthesis of), carbohydrates / glucose / C ₆ H ₁₂ O ₆ and oxygen / O ₂ formed (as a by product) ;	3

Question	Answer	Marks
3(a)(i)	<i>any two from:</i> second infection results in higher number of antibodies (compared to first infection) ; less time to release antibodies in second infection / faster response to second infection ; antibody number remains high(er) after infection ;	2
3(a)(ii)	vaccination ;	1
3(b)	(clean water contains) no pathogens (to transmit diseases) ;	1
3(c)(i)	converts units to match or bacteria diameter ÷ virus diameter (seen) ; 2.5 (x) ;	2
3(c)(ii)	antibiotics, have no effect on virus / only kill bacteria ; (excessive use / misuse, of antibiotics) results in bacteria with antibiotic resistance ;	2
3(c)(iii)	protein coat ;	1

Question	Answer	Marks
4(a)	high boiling point ;	1
4(b)	sodium with 8 crosses in outer shell ; fluoride with 7 dots and 1 cross in outer shell ; (1)+ and (1)- charges ;	3

Question	Answer	Marks
4(c)(i)	decomposition of an ionic compound (when molten or in aqueous solution) ; by (the passage of an electric) current ;	2
4(c)(ii)	<i>positive electrode</i> : fluorine / F ₂ ; <i>negative electrode</i> : sodium / Na ;	2
4(d)	NaF + AgNO ₃ → NaNO ₃ + AgF ;	1

Question	Answer	Marks
5(a)(i)	(because decomposition / use of fossil fuels) produces CO ₂ ; (CO ₂) is a greenhouse gas ;	2
5(a)(ii)	bond breaking takes in energy ; bond forming gives out energy ; more energy taken in than given out ;	3
5(a)(iii)	products labelled and higher than reactants and a maximum shown ; <i>E_a</i> correctly labelled ; overall energy change labelled and upward arrow only ;	3
5(b)(i)	Ca(OH) ₂ ;	1
5(b)(ii)	<u>yellow</u> ;	1

Question	Answer	Marks
6(a)	<i>any two from:</i> same general formula ; similar chemical properties ; trend in physical properties ;	2
6(b)	a compound that contains a double carbon to carbon bond ;	1

Question	Answer	Marks
6(c)	<u>cracking</u> ;	1
6(d)	<u>monomer</u> ;	1
6(e)(i)	acid(ic) ;	1
6(e)(ii)	contains oxygen / contains atoms other than carbon and hydrogen ;	1

Question	Answer	Marks
7(a)(i)	P ;	1
7(a)(ii)	tram is not moving up or down / is stationary in the vertical direction ;	1
7(b)(i)	$F = ma$ or $32\,000 \times 0.75$; 24 000 ; N ;	3
7(b)(ii)	$(\Delta v =) at / 0.75 \times 8.0$; 6.0 (m/s) ;	2

Question	Answer	Marks
7(b)(iii)	Method 1 (energy calculation) $E_k = \frac{1}{2}mv^2$ in any form or $\frac{1}{2} \times 32\,000 \times 6.0^2$ or 576 000 ; (power calculation) $P = E \div t$ in any form or $576\,000 \div 8.0$; OR Method 2 (energy calculation) $W = Fd$ or $24\,000 \times 24$ or 576 000 ; (power calculation) $P = E \div t$ in any form or $576\,000 \div 8.0$; OR Method 3 (power calculation) $P = F \times v$ or $24\,000 \times v$; (average velocity) $6 \div 2$; (power =) 72 000 (W) ;	3

Question	Answer	Marks
8(a)	<u>variable resistor</u> ;	1
8(b)(i)	plastic / wood / AVP ;	1
8(b)(ii)	free / delocalised electrons or electrons move ; particle / lattice <u>vibrations</u> or particle collisions or collision of electrons with, particles / the metal / the lattice or electrons / thermal energy, move from <u>hot area to cold area</u> ;	2
8(c)	(LED symbol)  ; (d.c. supply symbol)  ; LED correctly connected for polarity of supply ;	3

Question	Answer	Marks
9(a)(i)	<u>mass</u> ;	1
9(a)(ii)	$v = 2\pi r \div T$ in any form ; correct time = $365 \times 24 \times 3600$ OR 31536000s OR correct distance = $2\pi \times 1.5 \times 10^8$ OR 9.42 $\times 10^8$ km ; (orbital speed =) 30 (km/s) ;	3
9(a)(iii)	Mars is further from the Sun (than Venus) ; less force of attraction / gravitational field (strength) of the Sun decreases with distance ;	2
9(b)(i)	supernova ; neutron star ;	2
9(b)(ii)	nuclear reactions or fusion ; fusion of hydrogen into helium ;	2