

Additional Science B

General Certificate of Secondary Education **B623/02**

Unit 1: Modules B3, C3, P3

Mark Scheme for June 2010

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Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	(rate) increases to pH 7 / increases to neutral / increases to optimum / increases to 41 (1) (rate) decreases above pH7 / decreases from neutral / decreases from optimum / decreases from 41(1)	2	assume description refer to increasing pH unless specified otherwise allow (rate) increases then decreases / reaction faster and then slower / lower (rate) at high and low pH (2) allow (rate) peaks at pH7 / (rate) is maximum at neutral / (rate) is highest at 41 (1)
		(ii)	7.0 (1)	1	allow answer in range 6.8 to 7.2 (1)
		(iii)	(amylase) <u>denatured</u> in stomach (1) by low pH / acid in stomach (1)	2	allow correct description of denaturing e.g. change shape of active site (1) not killed if no marks gained for denaturing or low pH allow maximum of 1 mark for food not in mouth long enough (1) continue to digest / break down carbohydrate / starch (in small intestine) (1)

Question		Expected Answers	Marks	Additional Guidance
	(b) (i)	diffusion (1) higher concentration in intestine / lower concentration in blood (1)	2	<p>explanation must be linked to correct process</p> <p>allow diffusion anywhere in answer (1) allow high concentration to low concentration (1) must be comparison e.g. high concentration in intestine, low concentration in blood (1) but high concentration in intestine = 0</p> <p>allow higher level answers in terms of active transport / active uptake (1) allow carrier (molecule) (1) allow needs energy (1) allow needs ATP (1)</p>
	(ii)	plasma (1)	1	
		Total	8	

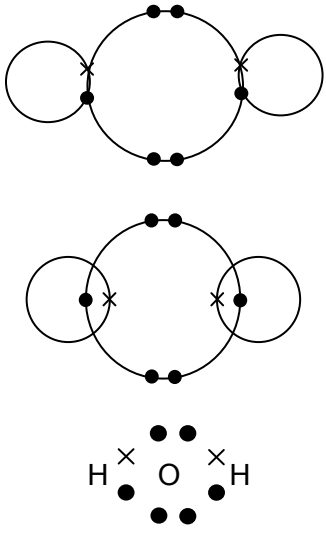
Question		Expected Answers				Marks	Additional Guidance	
2	(a) (i)	A and D (1)				1	both needed for 1 mark either order	
	(ii)	mitosis (1)				1	mark phonetically e.g. mytosis, meitosis, mytoesis not meiosis, meiotics	
	(b)		positive geotropism	negative geotropism	positive phototropism	negative phototropism	2 more than two ticks on a line = 0 for that line	
		shoot		✓	✓			(1)
		root	✓			✓		(1)
	(c) (i)	animal cells lose ability to differentiate (1)				1	allow plant cells retain ability to differentiate / ora (1) allow plants have undifferentiated cells / ora (1) ignore incorrect references to animal cloning	
	(ii)	(genetically) identical / know what you are getting / get required characteristics (1)				1	ignore faster / easier / cheaper / get more / selective breeding	
Total						6		

Question	Expected Answers	Marks	Additional Guidance
3 (a) (i)	isolate / remove / extract / take / select (insulin) <u>gene</u> (1) insert / inject / put (bacterial) DNA (with insulin gene) into bacteria (1)	2	allow use (restriction) enzyme to remove insulin gene (1) not remove DNA gene ignore remove insulin allow insert into bacteria (1) allow insert plasmid into bacteria (1) ignore add / mix with bacteria
(ii)	(bacteria contain) human (insulin) gene / human DNA (1)	1	allow idea of universal code e.g. inserted DNA made up of A T G C (1) allow human DNA code can be interpreted by bacteria (1) allow made from same gene (1)
(iii)	any one from : not natural (1) playing God (1) unethical (1) immoral (1) may have unexpected consequences / side effects (1) concern re future developments (1)	1	allow reduces gene pool (1) allow against religious beliefs (1) allow raises ethical questions (1) ignore it's wrong allow concern about designer babies (1) ignore where will it all end?
(b)	idea of being less efficient at moving materials in / out of cells (1) small(er) surface area to volume ratio / ora (1)	2	allow specific examples, e.g. cannot absorb enough oxygen (1) allow diffusion pathway too long (1)
	Total	6	

Question		Expected Answers	Marks	Additional Guidance
4	(a) (i)	oxygen (1)	1	allow any answer indicating candidate knows the gas is oxygen e.g. O / O ₂ / O ² (1)
	(ii)	2H ⁺ + 2e ⁻ → H ₂ correct formulae (1) balancing (1)	2	allow = for → but do not allow and for + allow any correct multiple of equation (1) allow e instead of e ⁻ e.g. H ⁺ + e ⁻ → H ₂ (1) H ⁺ + 2e ⁻ → H ₂ (1) 4H ⁺ + 4e ⁻ → 2H ₂ (2) H ⁺ + e ⁻ → ½ H ₂ (2) H ₂ ⁺ + 2e ⁻ → H ₂ (0) not 2H ⁺ → H ₂ - 2e ⁻ (1) allow one mark for minor errors in subscript/superscript or case for a correct equation e.g. 2H+ + 2e ⁻ → h2 (1)
	(b) (i)	cathode / negative electrode / (1)	1	allow – (ve) (1) allow one attached to steel case (1) ignore unqualified steel case not steel electrode
	(ii)	reduce melting point (of aluminium oxide) / to dissolve aluminium oxide / reduce energy consumption / to lower operating temperature (1)	1	not neutralisation ignore speed up reaction more reactive ignore cost / reference to electricity ignore boiling point
	(iii)	large quantities of electricity (needed to make it) (1)	1	allow large energy / power requirement (1) allow high current required (1) allow frequent replacement of electrodes (1) allow need for high temperature (1)
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	sodium bromide (1) potassium chloride (1)	2	allow NaBr (1) not sodium bromine allow KCl (1) not potassium bromine
	(b)	sodium + chlorine → sodium chloride (1)	1	allow = for → but do not allow and for + allow correct formulae but equation does not need to balance e.g. <ul style="list-style-type: none"> • Na + Cl₂ → NaCl (1) • Na + Cl₂ → 2NaCl (1) allow mix of correct formulae and words (1) not Na + Cl → NaCl
	(c)	chlorine gains electrons more easily (than bromine) (1)	1	not chlorine gains electrons faster allow chlorine has smaller radius / fewer (shielding) shells / outer electrons closer to nucleus / ora (1) allow chlorine has stronger attraction (to electrons) / ora (1)
	(d)	electrons gained (1)	1	
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
6	(a)		2	three correct scores 2 one or two correct scores 1
	(b)	<p>benefits any two from: loss free power transmission (1) super-fast electronic circuits (1) powerful electromagnets (1)</p> <p>drawbacks only work at low temperatures / need to develop superconductors that work at room temperature (1)</p>	3	<p>assume use is a benefit allow no / less energy loss during transmission (1) ignore unqualified faster / efficient</p> <p>assume limitation is a drawback ignore cost unless clearly linked to maintaining/achieving low temperature</p>
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
7	(a) (i)	B (1)	1	if answer line is blank allow correct answer ticked, circled or underlined
	(ii)	A and C (1)	1	order unimportant if answer line is blank allow correct answer ticked, circled or underlined
	(b)	shared pair of electrons drawn (one from a H atom and one from an O atom) (1) remainder of diagram correct (1)	2	electrons can be drawn as all ● , all X or all other symbol e.g. e ignore lack of inner electrons in oxygen if neither shared pair is shown (0)  (2) (2) (2)
Total			4	

Question		Expected Answers	Marks	Additional Guidance
8	(a)	8.3 (2) but if answer is incorrect $100 \div 12$ (1)	2	allow 8.333 to any number of decimal places (2) allow 8 (2)
	(b) (i)	3 (2) but if answer is incorrect $9 \div 3$ (1)	2	
	(ii)	distance (travelled) (1)	1	allow how far he's run / gone (in the race) (1)
		Total	5	

Question		Expected Answers	Marks	Additional Guidance
9	(a)	60 000 (2) but if answer is incorrect 4 000 x 15 (1)	2	
	(b)	<p>braking distance max one from idea of one specified road condition / weather condition e.g. water / loose gravel / ice / leaves / snow / mud on road (1)</p> <p>idea of one specified car condition e.g. bald / poor tyres or worn / poor brakes (1)</p> <p>greater mass / load / people in car (1)</p> <p>thinking distance max one from driver tired (1) under influence of alcohol / drugs (1) distractions from inside or outside car (1)</p>	2	<p>read entire answer to ensure there are no contradictions e.g. a list of braking distance factors including a factor from the thinking distance list</p> <p>answer must be clearly linked to braking distance</p> <p>allow slippery road surface (1) ignore unqualified references to weather / road conditions e.g. bad weather = 0 but it's raining / snowing (1) ignore it's foggy / windy</p> <p>ignore unqualified references to tyres / brakes e.g. condition of tyres = 0 but tyres have poor grip (1)</p> <p>answer must be clearly linked to thinking distance</p> <p>allow named distraction e.g. passengers / phone / radio / kids in back seat / smoking / eating / drinking / pedestrians / signs at roadside (1) allow increased / older age (1)</p>

Question		Expected Answers	Marks	Additional Guidance
	(c)	braking distance depends on kinetic energy (1) but speed doubles, kinetic energy quadruples / increases as square of speed (2)	2	treat as level of response allow speed doubles, braking distance more than doubles (1) but allow speed doubles, braking distance quadruples / increases as square of speed (2)
		Total	6	

Question		Expected Answers	Marks	Additional Guidance
10	(a)	any two from: increases stopping or collision time (1) increases stopping or collision distance (1) reduces acceleration / deceleration (1)	2	ignore any reference to energy
	(b)	any one from: reducing the likelihood of a crash (1) giving the driver better control (in a hazardous situation) (1) reducing injury to occupants in the event of a crash (1)	1	allow idea of ABS stopping in a shorter distance (1) allow driver can concentrate / do not require driver's attention (1) allow less likely to be killed (1) allow protect driver in event of crash (1) ignore unqualified prevention of injury ignore unqualified reference to constant protection ignore reducing forces
		Total	3	

Question		Expected Answers	Marks	Additional Guidance
11	(a)	stays the same (1)	1	mark the answer line but if answer line is blank credit the correct answer ticked circled or underlined more than 1 answer scores zero
	(b) (i)	increases with speed (1)	1	allow speed increases (1) allow reference to greater rate of air flow over body (1) allow air hits her body faster / AW (1)
	(ii)	increased surface / area (presented to air) / AW (1)	1	ignore reference to aerodynamic / streamlining
	(iii)	drag = weight (1)	1	allow air resistance / friction for drag allow gravity for weight allow forces are balanced / same / equal (1)
	(c) (i)	remains constant / AW (1)	1	
	(ii)	idea of work done against friction (between Liz and air {molecules}) (1)	1	allow transferred to heat / internal energy (1) ignore transferred to kinetic energy
		Total	6	

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