

General Certificate of Education (A-level)
June 2011

Biology

BIOL1

(Specification 2410)

Unit 1: Biology and Disease

Final

Mark Scheme

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Mark Scheme – General Certificate of Education (A-level) Biology – Unit 1: Biology and Disease – June 2011

Question	Marking Guidance	Mark	Additional Guidance
1(a)(i)	Hydrolysis;	1	Accept phonetic spelling. Ignore reaction.
1(a)(ii)	(Alpha) glucose;	1	Accept α glucose. Reject β glucose / beta glucose
1(b)(i)	Add Benedict's (reagent) <u>and</u> heat / warm; Red/orange/yellow/green (colour);	2	Reject Add HCl Accept brown, reject other colours
1(b)(ii)	2 products / 2 sugars produced;	1	Look for idea of <u>two</u> Accept named monosaccharides produced. "More" insufficient for mark Neutral if incorrect products named Neutral "lactose is a polysaccharide" Neutral "lactose is not a reducing sugar" Neutral: Reference to surface area.
1(c)	1. Galactose is a similar shape / structure <u>to lactose</u> /both complementary; 2. (Inhibitor / Galactose) fits into / enters / binds with <u>active site</u> (of enzyme); 3. Prevents/less substrate fitting into / binding with (active site) / fewer or no E-S complexes;	2 max	1. Q Reject: <u>Same</u> shape / structure 2. Accept blocks active site Look for principles: 1 Shape 2 Binding to active site 3 Consequence

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1(d)	Low / decreased <u>water potential</u> (in gut); Water enters gut / lumen / leaves cells by <u>osmosis</u> ;	2	Neutral ref to concentrations Accept ψ for water potential
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Question	Marking Guidance	Mark	Additional Guidance
2(a)	In one country where the percentage of fat (in the diet) is 35%, the death rate (from breast cancer) is 20 per 100 000;	1	<u>Must</u> have reference to country Accept 1 per 5 000 / 0.02%
2(b)	- No. of deaths from breast cancer divided by total population $\times 100\,000$; - No. of deaths from breast cancer divided by all deaths $\times 100\,000$; - Sample and count deaths from breast cancer in 100 000 people;	1 max	If sample not 100 000 then must scale appropriately
2(c)	- Positive correlation; - But correlation does not show causation / some other (named) factor may be involved; - Evidence against positive correlation e.g. different death rates at same % fat / similar death rates at different % fat / some countries with higher death rate have lower fat intake;	3	- Accept description of positive correlation / directly proportional. Accept positive relationship. - Do not accept casual in place of causal. - Answer must be consistent with data.

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Question	Marking Guidance	Mark	Additional Guidance
3(a)(i)	Increase to 30°C/31°C <u>and</u> then decreases / optimum or max rate at 30°C/31°C;	1	Accept: peak at 30°C/31°C
3(a)(ii)	1. Enzyme denatured / hydrogen bonds/bonds holding tertiary structure broken / tertiary structure changed; 2. Change in shape of <u>active site</u> (of enzymes); 3. Substrate / protein no longer fits / binds (into active site) / few or no ES complexes; 4. More enzyme (molecules) denatured as temperature increased;	3 max	1. Reject: Peptide bonds broken Denatures active site = 2 marks for mp 1 and 2 2. Q Only allow second point if active site is used correctly Accept: active site no longer complementary 3. Accept: Substrate cannot bind to enzyme
3(b)(i)	Use <u>buffer</u> / test pH (at end/ at intervals);	1	Accept a method of measuring pH. Reject litmus.
3(b)(ii)	(30°C/31°C)Maximum rate / optimum temperature;	1	Accept other valid answers e.g. temp below 30°C as enzyme not denatured.
3(b)(iii)	Works best at pH 6 / at higher pH activity decreases;	1	Accept converse Insufficient: pH 6 had largest clear area

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Question	Marking Guidance	Mark	Additional Guidance
4(a)	Volume (of air in lungs) decreases;	1	Accept: Results decrease
4(b)	Correct answer 1.4;; Incorrect answer showing (vol. air breathed out =) 6.5 – 2.3 / 4.2 (dm ³);	2	
4(c)	Reduced flow rates / less air breathed out / more air left in lungs (after breathing out);	1	Insufficient: More air in lungs / high volume of air in lungs
4(d)	1. Alveoli break down / collapse / rupture / fewer alveoli / larger alveoli or alveolar wall/epithelium walls thicken; 2. Reduced surface area / increased diffusion pathway; 3. (So) less diffusion; 4. Less elastin / elastic (tissue) / not recoiling / loss of elasticity / elastin permanently stretched; 5. Reduced flow rate / less air expelled; 6. So small / reduced diffusion or concentration gradient;	4 max	1. Neutral: Damage. Accept alveoli burst - Less surface area for diffusion = 2 marks (mark points 2 and 3) 3. Accept diffusion less efficient. Reject diffusion of air. 4. Elastic tissue must be in context of lungs. 6. Accept: Not maintaining a steep diffusion/ concentration gradient.

Question	Marking Guidance	Mark	Additional Guidance
5(a)	1. Uses energy / ATP; 2. Against concentration gradient / low to high concentration; 3. Does not use channel proteins / <u>only</u> uses carrier proteins;	2 max	Assume “it” refers to active transport. 1. Facilitated diffusion is passive - neutral 2. Along / across concentration gradient- neutral Accept up/ down concentration gradient Accept AT does not need concentration gradient.
5(b)(i)	To see the effect of the drug / effect not due to anything else in the tablet;	1	Neutral “to compare results”
5(b)(ii)	Placebo / dummy drug / tablet without drug; (Otherwise) treated the same;	2	No drug - neutral Accept: Example e.g. tablet given at same time
5(c)	Decrease for 3 hours;	1	Accept decreases from 1 - 4 hours

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Question	Marking Guidance	Mark	Additional Guidance
6(a)	0.1 and 0.5; Pressure in ventricle greater (than pressure in atrium);	2	Both figures must be correct. Comparison needed
6(b)	1. (Ventricle has) thick wall / more muscle; 2. So <u>contractions</u> are stronger / harder;	2	2. Neutral: Contracts to produce more pressure 2. Neutral: Pump harder. 2. Neutral: Reference to a need to pump blood further/round the body.
6(c)	85 / 86 / 85.7;	1	Ignore additional decimal places

Question	Marking Guidance	Mark	Additional Guidance
7(a)	<u>Coronary</u> artery / vessel is blocked/narrows; - Restricts oxygen supply to heart muscle / cells / tissue; - Prevents respiration / ATP production / or (heart) muscle / tissues/cells die;	3 max	Q Do not accept references to veins or capillaries. - Do not accept “Heart dies”
7(b)(i)	<u>Protein</u> on (surface of) <u>chlamydia</u> ; That initiates an immune response (in mice) / causes antibody production;	2	Neutral “foreign protein” Do not accept glycoprotein. 2. Accept description of initiating immune response.
7(b)(ii)	- Antibodies/memory cells against chlamydia (protein/antigen) are present; - Protein on heart (muscle) similar to chlamydia protein/antigen; - T cells / antibodies (attack heart muscle cells);	2 max	- Look for idea that both proteins are similar - Detail of what is attacking the heart muscle cells
7(c)	FOR - Prevents / reduces heart disease/attacks; - Cheaper to vaccinate than treat heart disease; AGAINST - Vaccination costly; - Don’t know frequency of chlamydia infection; - Research in mice might not be replicated in humans / humans might have a different protein; - Vaccine could cause heart disease or immune response against heart (muscle);	3 max	2 max for arguments against Accept other valid answers

Question	Marking Guidance	Mark	Additional Guidance
8(a)	1. Phagocyte attracted to bacteria by chemicals / recognise antigens on bacteria as foreign; 2. Engulf/ingest bacteria; 3. Bacteria in vacuole / vesicle; 4. Lysosome fuses with / empties enzymes into vacuole; 5. Bacteria digested / hydrolysed;	4 max	1. Accept names chemical e.g. toxin 2. Allow description of engulfing 3. Accept: bacteria in phagosome. 5. Neutral: Break down 5. Accept digestive enzymes destroy bacteria 5. Do not accept “destroy bacteria” as it is in question stem
8(b)	1. Microvilli; 2. Large/increased surface area; 3. Many mitochondria; 4. (Mitochondria/respiration) produce ATP / release or provide energy (for active transport); 5. Carrier proteins for active transport; 6. Channel / carrier proteins for facilitated diffusion; 7. <u>Co-transport</u> of sodium (ions) and glucose or symport / carrier protein for sodium (ions) and glucose; 8. Membrane-bound enzymes digest disaccharides / produce glucose	6 max	1. Reject villi on epithelial cells 1. Accept brush border 2. Accept large SA:vol ratio 3. Need idea of “lots” 4. Reject: energy produced 5. Accept Na⁺K⁺ pump 7. Neutral: Channel proteins 8. Accept named example