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General Certificate of Education (A-level)
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Biology BIOL1

(Specification 2410)

Unit 1: Biology and Disease

Final

Mark Scheme

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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) and 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 **two** 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 to lactose/both complementary; 2. (Inhibitor / Galactose) fits into / enters / binds with active site (of enzyme); 3. Prevents/less substrate fitting into / binding with (active site) / fewer or no E-S complexes;	2 max	1. **Q** Reject: Same shape / structure 2. Accept blocks active site Look for principles: 1 Shape 2 Binding to active site 3 Consequence

1(d)	Low / decreased water potential (in gut); Water enters gut / lumen / leaves cells by osmosis;	2	Neutral ref to concentrations Accept ψ for water potential

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	Must have reference to country Accept ….1 per 5 000 / 0.02%
2(b)	1. No. of deaths from breast cancer divided by total population ×100 000; 2. No. of deaths from breast cancer divided by all deaths x 100 000; 3. Sample and count deaths from breast cancer in 100 000 people;	1 max	If sample not 100 000 then must scale appropriately
2(c)	1. Positive correlation; 2. But correlation does not show causation / some other (named) factor may be involved; 3. 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	1. Accept description of positive correlation / directly proportional. Accept positive relationship. 2. Do not accept casual in place of causal. 3. Answer must be consistent with data.

Question	Marking Guidance	Mark	Additional Guidance
3(a)(i)	Increase to 30°C/31°C and 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 active site (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 buffer / 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

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

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)	1. Coronary artery / vessel is blocked/narrows; 2. Restricts oxygen supply to heart muscle / cells / tissue; 3. Prevents respiration / ATP production / or (heart) muscle / tissues/cells die;	3 max	1. **Q** Do not accept references to veins or capillaries. 3. Do not accept "Heart dies"
7(b)(i)	Protein on (surface of) chlamydia; 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)	1. Antibodies/memory cells against chlamydia (protein/antigen) are present; 2. Protein on heart (muscle) similar to chlamydia protein/antigen; 3. T cells / antibodies (attack heart muscle cells);	2 max	2. Look for idea that both proteins are similar 3. Detail of what is attacking the heart muscle cells
7(c)	**FOR** 1. Prevents / reduces heart disease/attacks; 2. Cheaper to vaccinate than treat heart disease; **AGAINST** 3. Vaccination costly; 4. Don't know frequency of chlamydia infection; 5. Research in mice might not be replicated in humans / humans might have a different protein; 6. 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. Co-transport 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

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