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**INTERNATIONAL AS**

**BIOLOGY**

**BL02 (9610)**

Unit 2 Biological Systems and Disease

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Mark scheme

January 2020

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\*201XBL02/MS\*

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Question	Marking guidance	Mark	Comments
01.1	1. Deletion; 2. Circle around any <u>one</u> C from position 3 in triplet 26 to position 3 in triplet 27;	2	2. Allow position of mutation in either base sequence for cat with coloured fur or albino cat 2. Reject if whole triplet circled
01.2	Leu-pro-pro-leu-leu-met-trp-asn-phe-ala(-STOP);	1	Reject if val/any amino acid given after STOP
01.3	1. (Frameshift mutation) so different sequence of amino acids/primary structure; <b>OR</b> 1. Premature STOP put in (at 36) so protein shorter than normal; 2. (Change in primary structure so) would change tertiary structure/3D shape leading to change in shape of <u>active site</u> / no longer complementary; 3. (As active site changed) so unable to form ESC/bind to substrate;	3	
01.4	1. Silent mutation changes the (DNA) base (sequence) but does not change the amino acid (sequence)/same primary structure/same tertiary structure; 2. <u>Degenerative/degenerate</u> nature of DNA code; 3. Any correct example from table;	3	1. Allow amino acid changed but same bonds able to form (so same tertiary structure). 1. Reject amino acid formed/produced If no other marks awarded then allow 'different triplets can code for same amino acid' for 1 mark

<p>01.5</p>	<p>1. Prokaryotes/bacteria reproduce by binary fission/asexually;                  2. All daughter cells are clones/genetically identical to parent (so no variation without mutation);                  3. No meiosis/crossing over/independent assortment (so mutation only source of variation);                  4. Mutation always expressed in phenotype/is not masked by a non-mutated allele (as only 1 chromosome);                  5. Mutation will be in functional gene as no introns/non-coding regions;                  6. Short generation time means lots of offspring in short time/mutation will quickly spread through population;</p>	<p>3 max</p>	<p>1. Reject mitosis                   3. Allow no gametes formed                   3. Allow idea that other (named) sources of variation in eukaryotes make mutations less significant than in prokaryotes</p>
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Question	Marking guidance	Mark	Comments
02.1	Glucose; 2.7;	2	
02.2	0.53;	2	Allow 1 mark for 0.534 <b>or</b> 0.54 <b>or</b> for 534 (cm <sup>3</sup> ) Allow 1 mark for correct working, i.e. (15 x 8.9 x 4)/1000 but no/incorrect answer

Question	Marking guidance	Mark	Comments
03.1	Artificial, active;	1	
03.2	1. Only 88.8/89% of people vaccinated in Austria so below herd immunity level <b>OR</b> 96.8/97% vaccinated in Portugal so above herd immunity level; 2. If pathogen enters vaccinated person it can't be passed on; 3. (If most people vaccinated) unlikely susceptible/unvaccinated person will come into contact with infected person/become infected;	3	3. Allow converse for Austria, i.e. (If fewer people vaccinated) more likely susceptible/unvaccinated person will come into contact with infected person/to become infected
03.3	For: 1. Would ensure herd immunity achieved/prevent spread in population; 2. Overcome apathy/indecision; 3. Reduces illness/deaths/costs later as fewer people get disease/disease eradicated;  Against: 4. Side effects/some people allergic/compromised immune system; 5. Against religious/personal beliefs/right of individual to make own choice; 6. High cost of vaccine (especially if disease rare/almost eradicated)/limited availability of vaccine;	3 max	For full marks must give reasons for <u>and</u> against  2. Allow apathy to cover excuses eg too busy, don't want child to feel pain from needle 3. Allow converse, i.e. disease would have caused illness/death  4. Allow named side effect

Question	Marking guidance	Mark	Comments
04.1	1. Build-up of fatty deposits/plaque/cholesterol/LDL; 2. In wall/under lining/endothelium of artery; 3. Block/narrow/restricted blood flow (in) <u>coronary</u> artery; 4. (so) restrict oxygen/glucose to heart muscle/cells/tissues (leading to heart attack);	3 max	4. Allow: increase risk of aneurysm/thrombosis/angina
04.2	(Yes) 1. Negative correlation between daily fibre intake and death rate/as fibre intake goes up death rate goes down; 2. Non-overlap of standard deviation bars indicate that death rate in first 4 groups ( $\leq 13$ to $23.7$ – $28.9$ g) likely to be significantly different; 3. Small standard deviation bars indicate little variation in data so data valid 4. Large sample size so data valid (No) 5. Correlation is not causation; 6. Deaths could be due to something other than CHD; 7. Groups are ranges/consumption changes over time/subjects may under or over report fibre intake; 8. Overlapping standard deviation bars indicate that death rate in last 2 groups ( $23.7$ – $28.9$ and $\geq 29$ g) unlikely to be significantly different; 9. No information on control variables;	3 max	For full marks must include both yes <u>and</u> no answers 1. Reject death rate due to CHD  4. Allow reliable  6. Allow suitable examples e.g. smoking, high salt diet, high saturated fats, high bp, obese, low exercise. 6. Allow non-lifestyle factors like genetics or gender.  9. Allow examples of control variables, e.g. age, gender, ethnicity, BMI, amount of exercise, general health, genetics

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04.3	<p>1. Total bread <u>and</u> white bread decreased;</p> <p>2. Brown bread increased but then dropped/brown shows overall (small) increase/brown remains (fairly) constant/brown still lower than white;</p> <p>3. Brown + white doesn't equal total (so must be other forms of bread);</p> <p>4. Use of appropriate data to show a trend for any of 3 lines;</p>	3 max	<p>4. e.g. total bread was 1000g per person per week in 1974 but had decrease to 520 g by 2018</p> <p>4. Reject if no units/incorrect units shown</p>
04.4	Mode is 5;	1	
04.5	Median is 6;	1	
04.6	6 + 18.4 = 24.4 g No;	1	<p>No mark for yes/no alone, must show how arrived at.</p> <p>Must use their value given in Question <b>04.5</b> correctly</p> <p>Allow yes if median value from Question <b>04.5</b> + 18.4 exceeds 25.</p>



Question	Marking guidance	Mark	Comments
05.1	1. (Yellow patches) less chlorophyll so less photosynthesis; 2. Less glucose/starch/cellulose/protein/named biological molecule (that would increase biomass and therefore yield) made;	2	2. Allow sugar
05.2	1. Number/density of seeds 2. Amount of fertilizer 3. Amount of watering 4. Type of soil/pH 5. Same/similar aspect 6. Same variety/type of wheat 7. Same time after release/for growth	2 max	Reject Number/type of aphids
05.3	1. Yield with or without aphids same; 2. If spread by aphids would expect lower yield in with-aphid fields OR 2. Yield reduced in used soil (by about 50%) <b>so</b> soil is cause/aphids are not cause;	2	
05.4	1. Could be factor/vector in soil e.g. worm/fungus/parasites 2. Could be (named) mineral/ion/nutrient deficiency in soil;	1 max	Accept first answer only

Question	Marking guidance	Mark	Comments
06.1	No cells in mitosis/no chromosome/chromatids visible/all cells in interphase OR Cells are elongated rather than square/nucleus at end not in middle of cell/only intact nuclei present;	1	
06.2	1. Cells taken from too far back from root tip <b>or</b> from too close to root tip 2. Therefore cells not from the meristem/zone of cell division	2	1. Allow taken from wrong end of root tip
06.3	Anaphase;	1	
06.4	1. (Chromosomes) line up on the equator of spindle/centre of cell (during metaphase); 2. Attached by centromeres; 3. Spindle fibres (contract and) pull chromatids to opposite side of cell;	3	Reject mp1 if homologous pairs
06.5	11;	2	Allow 1 mark for correct value not given as whole number, eg 11.09/11.092/11.1 Allow 1 mark for correct working, i.e. $236 \times 4.7/100$ but incorrect/no answer

Question	Marking guidance	Mark	Comments
07.1	Not healthy/may have heart condition/disease;	1	Allow example of relevant health condition, e.g. high blood pressure Allow idea that trial could have adverse effect/be dangerous to their health, e.g. cause heart attack, death 'Unfit' alone not enough
07.2	1. Disaccharidase/sucrase enzymes; 2. Hydrolyses/digests it to glucose and fructose; 3. In small intestine/ileum; 4. Absorbed via villi/microvilli (in small intestine to blood stream); 5. Active transport/facilitated diffusion/cotransport;	3 max	2. Allow breaks it down
07.3	1. Sucralose cannot bind/fit in active site (of enzyme)/is not complementary shape to (active site)/no ESC formed; 2. No hydrolysis/digestion 3. No glucose monomer in sucralose (so would not alter glucose concentration);	3	2. Allow no breakdown
07.4	Placebo/remove psychosomatic effect/so don't know if they are given sugar or not/so know any effects due to sucrose not just the drink;	1	

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<p>07.5</p>	<p>(Similarities)</p> <ol style="list-style-type: none"> <li>1. Stress increases mean heart rate/bpm then reduces in recovery phase (in both groups);</li> <li>2. Increase in mean heart rate is less (in both groups) in stress 2;</li> </ol> <p>(Differences)</p> <ol style="list-style-type: none"> <li>3. Mean heart rate increases more in group 1;</li> <li>4. Mean heart rate reduces back to baseline in group 2 <b>or</b> stays above baseline in group 1 <b>or</b> group 1 remains higher than group 2 during recovery;</li> </ol>	<p>3 max</p>	<p>Group 1 is sucrose/sugar group Group 2 is sucralose group</p> <p>Accept correct use of data to indicate increase/decrease in mean heart rate</p>
<p>07.6</p>	<p>(Yes)</p> <ol style="list-style-type: none"> <li>1. Stress increases heart rate more with high sugar;</li> <li>2. Heart rate does not return to resting within recovery time (with high sugar);</li> </ol> <p>(No)</p> <ol style="list-style-type: none"> <li>3. Only on men/young people;</li> <li>4. Unknown if men in trial had diabetes;</li> <li>5. No stats/error bars/don't know if differences significant;</li> <li>6. Only 1 trial/no replicates/small sample/more trials needed;</li> <li>7. How stressful is stressful enough?/not same as real life stress;</li> <li>8. Other variables that affect heart rate are not controlled, e.g. caffeine</li> </ol>	<p>3</p>	<p>Must include yes <u>and</u> any 2 no for full marks</p>

