

INTERNATIONAL AS BIOLOGY (9610) BL02R

Unit 2 Biological Systems and Disease

Mark scheme

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2 4 1 X B L 0 2 R / M S

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Question	Marking guidance	Mark	Comments
01.1	1. RNA; 2. Reverse transcriptase / integrase / protease;	2	Reject mRNA/tRNA

Question	Marking guidance	Mark	Comments
01.2	67;;	2	Award one mark for: Working that shows 120 (nm) and 8000 (nm) OR 0.12 (µm) and 8 (µm) OR Answers not to 2 significant figures eg 66.7

Question	Marking guidance	Mark	Comments
01.3	1. Viral RNA used to make cDNA using reverse transcriptase; 2. Viral/HIV DNA used to form mRNA; 3. (Viral mRNA) translated into viral/HIV proteins; 4. (Translation) takes place at ribosomes; 5. Protease use to modify viral/HIV proteins;	4 Max	

Question	Marking guidance	Mark	Comments
01.4	Any three from the following: 1. (Both have a similar structure so) AZT competes with (the nucleotide containing) thymine/thymidine; OR AZT could be used as a nucleotide; 2. AZT does not have the hydroxyl/OH group needed for it to join with another nucleotide; 3. Formation of viral DNA strand is stopped OR Reverse transcription is stopped OR Prevents transcription of viral/HIV DNA OR Prevents the synthesis of viral/HIV proteins; 4. Viral replication is prevented so prevents an increase in the number of HIV (particles in the blood plasma);	3 max	2. AZT unable to form sugar-phosphate backbone OR DNA polymerase is unable to join new adjacent nucleotides to AZT

Question	Marking guidance	Mark	Comments
02.1	1. Pulse rate recorded at rest and after exercise; 2. Repeats and calculation of mean; 3. Detail of exercise carried out including at least one control variable; 4. Suitable safety precaution identified;	4	

Question	Marking guidance	Mark	Comments
02.2	1. Independent variable in the 1 st column and dependent variables in the reminder of the table; 2. Suitable headings in table with correct units in column headings only;	2	Ignore any additional data

Question	Marking guidance	Mark	Comments
02.3	1. Appropriate statistics test e.g. t-test OR Standard error and 95% confidence; 2. Looking at the difference between 2 sets of data/means; 3. Calculated value greater than critical value at 0.05 significance level OR Calculated probability less than critical value at 0.05 OR No overlap between SD / SE	3	3. Allow $P < 0.05$ so reject null hypothesis

Question	Marking guidance	Mark	Comments
02.4	1. Release of hormones / emotional state e.g. stress/fear; 2. Medication; 3. Caffeine; 4. Smoking;	2 max	Allow any two suitable examples e.g. gender, age, health conditions

Question	Marking guidance	Mark	Comments
03.1	Aphids e.g. same number/age/species/type of aphids; Crop plant e.g. same species/variety of plants/seeds, same space for each plant e.g. seed density; Named environmental factors e.g. growth medium, type of soil, mineral ion concentration, volume of water, concentration of carbon dioxide, pH, humidity;	2	Allow two variables from the same category Ignore fungal pathogen Allow same size of plants Ignore light, temperature, wind, air movement

Question	Marking guidance	Mark	Comments
03.2	- Weigh the plants (in each group) at intervals (during the drying process); (Repeat until a) constant mass is achieved;	2	Allow two marks for 'heat until constant mass is achieved'

Question	Marking guidance	Mark	Comments
03.3	(Individual effects of) aphids (B) and fungal pathogen (C) both decreased mean dry mass; - Combined effects of aphids and fungal pathogen (A) has the <u>largest</u> decrease in mean dry mass; - Effect of fungal pathogen greater than aphids (as mean dry mass for C is lower compared to B); - No overlapping of SD bars between groups so likely to be a <u>significant difference</u> OR overlapping of SD bars between groups A and C so not likely to be a <u>significant difference</u>;	4	4. Reject 'results are significant'

Question	Marking guidance	Mark	Comments
03.4	1. Aphids have stylets that are inserted into <u>phloem</u> vessels; 2. Aphids (feed on the sap and) remove photosynthetic products/sugars/amino acids from plant; 3. Less sugars for respiration / less amino acids for protein synthesis (leading to less plant biomass produced); OR Aphids as vectors of plant pathogens/viruses (which results in decrease in crop production/quality of produce);	3	1. Allow descriptions of stylets 3. Allow diseases for pathogens/viruses

Question	Marking guidance	Mark	Comments
04.1	1. Cut the shoot underwater OR Submerge apparatus in water for assembly; 2. Cover any joints in the equipment with petroleum jelly/Vaseline/wax; 3. (Turn the tap to) allow water (from the reservoir) to move air bubble back (to the start of the scale);	3	3. Allow idea of not leaving the experiment to run for too long

Question	Marking guidance	Mark	Comments
04.2	2.7/2.72;;;	3	Allow two marks for: $3.14 \times 0.25 \times 104/30$ OR Correct rate of water uptake for 10 cm and 50 cm 3.14/3.1 and 0.4/0.42 OR Use of diameter: 10.9/10.89 / 12.6/12.56 and 1.7/1.67 OR Use of radius not squared: 5.5/5.4/5.44 / 6.3/6.28 and 0.8/0.84 OR Not converted to min^{-1} 81.6/81.64 Allow one mark for: Difference in distance ($120 - 16 = 104$) OR Volumes correct 94.2 and 12.56 OR For a combination of two errors eg 326.6/326.56 (use of diameter and not converted to min^{-1})

Question	Marking guidance	Mark	Comments
04.3	1. (Potassium ions) lower the <u>water potential</u> of the guard cells and cause water to enter by <u>osmosis</u> OR (Potassium ions) cause water to move into the guard cell down a <u>water potential</u> gradient by <u>osmosis</u>; 2. Guard cells become turgid and stoma opens; 3. (Higher light intensity would cause) more stomata to open OR Stomata to open wider; 4. Higher light intensity results in higher rate of transpiration so higher rate of water uptake;	3 max	2. Allow guard cells increase in volume or swell up 3 & 4. Allow converse 4. Allow evaporation for transpiration

Question	Marking guidance	Mark	Comments
05.1	Artery wall is thicker (so keeps circular shape when cut into thin section);	1	Allow converse for vein Allow idea of more muscle/elastic tissue in artery wall

Question	Marking guidance	Mark	Comments
05.2	Mean length $\times$ total cross-sectional area;	1	

Question	Marking guidance	Mark	Comments
05.3	778;	1	

Question	Marking guidance	Mark	Comments
05.4	Allows more time for exchange of materials (by diffusion);	1	

Question	Marking guidance	Mark	Comments
05.5	1. Bars decreasing in height; 2. Line decreasing in height;	2	Allow bars touching

Question	Marking guidance	Mark	Comments
05.6	As mean diameter decreases, flow rate decreases;	1	Allow positive correlation Reject negative correlation

Question	Marking guidance	Mark	Comments
06.1	A (foreign) substance which produces an immune response;	1	Allow correct named substance e.g. protein, glycoprotein

Question	Marking guidance	Mark	Comments
06.2	Stage 1 1. B cell engulfs pathogen by phagocytosis/endocytosis; Stage 2 2. B cell presents the antigens on its surface; 3. Helper T cells binds to antigens (on surface) of B cell;	3	

Question	Marking guidance	Mark	Comments
06.3	Name of cells: Memory cells; Function: Remain to provide rapid response (if the same pathogen enters the body again);	2	

Question	Marking guidance	Mark	Comments
06.4	1. Two heavy and two light chains shown; 2. Antigen binding sites labelled; 3. Disulfide bridge/s labelled; 4. Constant/variable region labelled;	4	2. Reject 'active site'

Question	Marking guidance	Mark	Comments
06.5	3.5×10^8 ;;	2	Allow one mark for correct answer, but incorrect number of significant figures/not in standard form

Question	Marking guidance	Mark	Comments
06.6	1. Many mitochondria; 2. To release energy/produce ATP; 3. Lots of rough endoplasmic reticulum / many ribosomes; 4. For protein/antibody synthesis; 5. Lots of Golgi bodies; 6. For export/exocytosis/modification of antibody;	4 max	Mark in pairs Idea of many needed at least once for full marks

Question	Marking guidance	Mark	Comments
07.1	1. Bile salts associate with monoglycerides/fatty acids to form micelles; 2. Micelles carry monoglycerides/fatty acids to membrane of epithelial cells; 3. Monoglycerides and fatty acids <u>diffuse</u> into epithelial cells; 4. Monoglycerides and fatty acids recombine to form triglycerides in the endoplasmic reticulum; 5. Triglycerides combine with cholesterol/(lipo)proteins to form <u>chylomicrons</u> at the <u>Golgi body/apparatus</u>; 6. Chylomicrons leave epithelial cells by <u>exocytosis</u> and enter lacteals/lymph vessels;	5 max	

Question	Marking guidance	Mark	Comments
07.2	1. Saturated fats increase LDL (in the blood); 2. High LDL increases cholesterol level in the blood; 3. White blood cells take up LDLs/cholesterol; 4. Accumulation of lipid-containing material within the wall of coronary artery; 5. (Leads to formation) of <u>atheroma</u>; 6. Atheroma narrows lumen of coronary artery; 7. Reduced blood flow to heart muscle cells/tissue; 8. Reduced supply of oxygen/glucose so less respiration/ATP; 9. (Atheroma leads to) blood clot/thrombus which blocks coronary artery; 10. Weakened artery wall can lead to <u>aneurysm</u>;	5 max	Coronary artery must be mentioned at least once before awarding mp4, 6 & 9