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BIOLOGY

BL01 (9610)

Unit 1 The Diversity of Living Organisms

Mark scheme

January 2021

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211XBLO1/MS

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MARK SCHEME – INTERNATIONAL AS BIOLOGY – BL01 – JANUARY 2021

Question	Marking guidance	Mark	Comments
01.1	A = (slime) capsule; B = flagellum;	2	Allow flagella
01.2	Ribosomes/cell membrane/cytoplasm/DNA;	1	Allow chromosomes/flagellum/cell wall
01.3	6.4;;	2	Allow range of measurement ± 1 mm. Range 6.3-6.5 1 mark for evidence of measured length divided by magnification 50 mm = 6.3 μ m (6.250/6.25) 52 mm = 6.5 μ m
01.4	1. Magnification is greater; 2. Resolution is greater;	2	Allow cristae/ribosomes/endoplasmic reticulum/Golgi visible
01.5	Mitochondria = respiration/release of energy/production of ATP; Rough endoplasmic reticulum = making <u>proteins/joining amino acids</u> (to form enzymes/hormones); Golgi apparatus = packing/export of enzymes/hormones to be released from the cell;	3	Reject creating/producing energy, reject reference to anaerobic respiration Allow transport (of proteins) within the cell Allow reference to lysosomes/modification of proteins/forming glycoproteins/reference to lipids

Question	Marking guidance	Mark	Comments
02.1	1. Smaller groups placed within larger groups; 2. With no overlap;	2	
02.2	Mammalia/mammals;	1	
02.3	Pan;	1	
02.4	1. Chimpanzee albumin is different shape/structure/sequence of amino acids to Species X albumen; 2. (Anti-species X albumin) antibodies specific/complementary to species X albumin/less binding to chimpanzee albumin;	2	Ignore less closely related
02.5	1. Species X most closely related to chimpanzee AND gorilla; 2. Chimpanzee and gorilla equally related to species X; 3. Species X least closely related to orangutans;	2 max	
02.6	5, 3, 1 (top row) 3, 1 (middle row) 1 (third row);	1	
02.7	1. For: Species X and chimpanzee have the most amino acids in common/species X and orangutan have the least amino acids common; 2. Against: Gorilla has fewer amino acids in common with species X (same % precipitation as chimpanzee with immunology test);	2	2. Allow Chimpanzee and gorilla should have the same number of amino acids in common

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Question	Marking guidance	Mark	Comments
03.1	A = Nitrogenous/nitrogen containing base; B = Sugar/pentose/deoxyribose; C = Phosphate/phosphate group/PO ₄ ⁻ ;	3	Allow organic base/adenine Reject uracil Reject ribose/glucose Reject phosphorus/PO ₃ Allow PO ₄ ³⁻
03.2	1. mRNA contains ribose, DNA contains deoxyribose; 2. mRNA shorter; 3. mRNA contains uracil, DNA contains thymine; 4. mRNA single stranded/no hydrogen bonding, DNA double stranded;	2 max	Points must be comparative to gain mark Ignore introns 3. Allow U and T Reject thiamine 4. Ignore double helix
03.3	1. Each carries a specific amino acid; 2. <u>Anti-codon</u> complementary/binds to mRNA <u>codon</u> ; 3. Allows (ribosomes to) link amino acids by peptide bonds;	3	1. Reject amino acid formed
03.4	(Met) – Phe – Gln – Gln – Lys – Gln – Phe;;	2	Allow 1 mark for 5 correct

Question	Marking guidance	Mark	Comments
04.1	1. Retains one original strand; 2. New strand formed by complementary base pairing OR 2. Original strand acts as template;	2	
04.2	1. Bacterial cells broken open; 2. Contents of cells spun at high/suitable speed;	2	1. Allow description/sonication/homogeniser/use of osmosis 2. Allow ultracentrifugation
04.3	DNA from ^{15}N bacteria/group Y more dense than DNA from ^{14}N bacteria/group X;	1	Ignore heavy/light
04.4	1. DNA molecules has one ^{15}N strand and one ^{14}N strand; 2. New strand contains ^{14}N ;	2	2. Allow template strand contains ^{15}N

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Question	Marking guidance	Mark	Comments
05.1	Oxygen;	1	Ignore just O
05.2	(molecules with) same empirical/chemical formula but different structural formula;	1	Allow same number of atoms but arranged differently
05.3	Glycogen/starch/amylopectin;	1	
05.4	1. Formula is $C_6H_{12}O_6$; 2. Therefore $30 + 24 + 36$;	2	1. Allow description e.g. 6 carbons, 12 hydrogens, 6 oxygens; 2. Allow both marks for $6 \times 5 + 12 \times 2 + 6 \times 6 (=90)$
05.5	170;;	2	Allow $(90 \times 2 = 180) - 10$ Allow reference to $C_{12}H_{22}O_{11}$ for 1 mark Allow 1 mark for idea of removing water molecule (-10g)
05.6	Nitrogen;	1	Ignore N
05.7	38.5;;	2	Allow description e.g. 2 carbons, 5 hydrogens, 2 oxygens, 1 nitrogen. Allow $(2 \times 5) + (5 \times 2) + (2 \times 6) (1 \times 6.5)$ For 1 mark allow correct amino acid structure/chemical formula

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Question	Marking guidance	Mark	Comments
06.1	Burette/pipette/syringe;	1	Ignore measuring cylinder
06.2	1. (Washing) To remove contamination/residue from previous solutions; 2. (Drying) Avoid dilution of next mixture;	2	Allow description of effect of presence of previous solutions
06.3	1. pH; 2. Use of a buffer solution;	2	
06.4	1. Less accurate/difficult to determine end point; 2. Casein not hydrolysed by end of experiment so X not be seen; 3. Differences in individuals (in when they perceive X);	2 max	1. Allow subjective
06.5	2.9 % change min^{-1} ;;	2	Allow range 2.3-3.5 1 mark if tangent line drawn in appropriate place but calculation incorrect
06.6	1. (calculated rate likely to be lower) because lower concentration of substrate/casein molecules (than at start); 2. Less chance of substrate/casein binding/entering active site/E-S complex formation;	2	

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Question	Marking guidance	Mark	Comments
6.7	1. Increases then plateaus/constant/steady/rate does not change; 2. Correct reference to 34% min ⁻¹ OR 0.4 gdm ⁻³ ;	2	Ignore peaks/reaches maximum/stops increasing/no effect Do not allow: rate decreases/reaction stops
6.8	(0.1 gdm ⁻³ casein) 1. Substrate (concentration); 2. As substrate concentration increases, rate increases/positive correlation (rate and substrate concentration)/more successful collisions/more ES complexes formed; (0.5 gdm ⁻³ casein) 3. Enzyme concentration; 4. All active sites occupied/saturated/maximum number of ES complexes;	3 max	4. Reject active sites used up
6.9	(Idea of) substances present that are not protein/digested by trypsin;	1	Allow other substance in milk/named substance that have not been broken down

Question	Marking guidance	Mark	Comments
07.1	1. Glucose and fructose molecules; 2. Joined by a glycosidic bond;	2	Reject β -glucose
07.2	Condensation (reaction);	1	Allow esterification
07.3	9;	1	
07.4	Be saturated or unsaturated/contain C to C double bonds;	1	Allow fatty acid chain could contain double bond(s)
07.5	Is too large; Or No transport proteins;	1	Ignore insoluble Reject hydrophobic

Question	Marking guidance	Mark	Comments
07.6	Any one from: Have a high carbon/hydrogen content (allow low oxygen content) Store more energy per gram Release more energy Produce more metabolic water Less soluble Also provide insulation/mechanical protection;	1	
07.7	1. (Mix/shake sample) with ethanol, then water OR Add ethanol/alcohol and shake/mix then pour into/add water; 2. White/milky (emulsion);	2	1. Sequence is important 1. Allow Add Sudan III and mix 2. Ignore cloudy 2. Reject precipitate 2. Allow (for Sudan III) top (layer) red
07.8	Vitamins pass out in Olestra/cannot be absorbed OR Results in vitamin deficiency;	1	