



General Certificate of Education

Biology 1411

BIOL2 The variety of living organisms

Mark Scheme

2010 examination - January series

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Question	Part	Marking Guidance	Mark	Comments
1	(a)	Differentiation/specialisation	1	
1	(b)(i)	(cellulose) <u>Cell wall</u> ;	1	
1	(b)(ii)	Two marks for correct answer 2350– 2500;; One mark for a measured length divided by real length;	2	Accept measured and real lengths in different units for one mark.
1	(b)(iii)	<u>Chloroplasts</u> absorb <u>light</u> ; Large vacuole pushes <u>chloroplasts</u> to edge (of cell); Thin/permeable (cell) wall to absorb carbon dioxide;	1 max	Q Do not accept chlorophyll as alternative to chloroplasts

Question	Part	Marking Guidance	Mark	Comments
2	(a)(i)	Phylum, Class, Order, Genus; Mantophasma (M)/(Mantophasma) zephyra;	2	
2	(a)(ii)	Groups within (larger) groups; No overlap;	2	
2	(b)	Comparison of/look for similar features/structures/appearance;	1	

Question	Part	Marking Guidance	Mark	Comments
3	(a)(i)	<u>Deoxyribose</u> ;	1	pentose / 5C sugar = neutral
3	(a)(ii)	Phosphate/Phosphoric acid;	1	phosphorus/P = neutral
3	(b)	Hydrogen (bonds);	1	
3	(c)	381/384/387;	1	
3	(d)	(Gln) Met Met Arg Arg Arg Asn;	1	
3	(e)	Change in (sequence of) amino acids/primary structure; Change in hydrogen/ionic/disulfide bonds; Alters tertiary structure/active site (of enzyme); Substrate cannot bind / no enzyme-substrate complexes form;	3 max	Q Reject = different amino acids are formed

Question	Part	Marking Guidance	Mark	Comments
4	(a)	Increase in/more carbon dioxide; Curve moves to the right/depressed;	2	Q Any reference to haemoglobin increasing affinity for oxygen disqualifies second mark point.
4	(b)(i)	More haemoglobin; So can load/pick up more oxygen (in the lungs);	2	Q Second mark point must relate to idea of loading oxygen. Answers referring only to transport of oxygen should not be credited this mark.
4	(b)(ii)	(Haemoglobin) has lower affinity for oxygen / more oxygen released; In/to the cells/ tissues;	2	

Question	Part	Marking Guidance	Mark	Comments
5	(a)	Single layer of cells / few layers of cells; So that light that can pass through / cells absorb light;	2	
5	(b)	Method of determining area of field of view/area seen using microscope; Count number of stomata in field of view; Repeats and calculation of mean;	3	
5	(c)	Water <u>vapour</u> accumulates / increased humidity/ reduced air movement (around stomata); Water potential/diffusion gradient reduced;	2	

Question	Part	Marking Guidance	Mark	Comments
6	(a)	(Blood) plasma;	1	
6	(b)	More/larger proteins / less urea/carbon dioxide / more glucose/amino acids/fatty acids/oxygen/ high(hydrostatic) pressure;	1	Q Reference to blood cells/water potential = neutral Q <u>No</u> Protein should not be credited
6	(c)(i)	<u>Contracts</u> ;	1	Q Do not accept pumping of heart/heart beating
6	(c)(ii)	Loss of fluid/volume; Friction/resistance (of capillary wall);	1 max	Q Reference to a narrow lumen is not sufficient to gain a mark unless friction or resistance is mentioned.
6	(d)	<u>Water potential</u> (in capillary) not as low/is higher/less negative / water potential gradient is reduced; More tissue fluid formed (at arteriole end); Less/no <u>water</u> absorbed (into blood capillary); by <u>osmosis</u> ; (into blood capillary);	3 max	Q The last two marking points must be in context of movement into the blood capillary

Question	Part	Marking Guidance	Mark	Comments
7	(a)(i)	Two marks for correct answer of 4.3; One mark for incorrect answer that clearly shows understanding of $\Sigma n(n-1) / 188$ as denominator;	2	Q An answer of 4 scores 1 mark
7	(a)(ii)	Measures number of individuals (of each species) <u>and</u> number of <u>species</u> ; Some species only present in small numbers;	2	Q First marking point can only be awarded if there is a reference to species.
7	(b)(i)	Reduced as one crop/species grown / other species removed; Use of herbicides/weeding/ploughing; Wheat (better) competitor for named factor e.g. light/nutrients;	2 max	
7	(b)(ii)	(Reduced) as less variety of food sources; (Reduced) as fewer habitats/niches; (Reduced) by pesticides/chemicals;	2 max	Q Answers only referring to 'less food' should not be credited

Question	Part	Marking Guidance	Mark	Comments
8	(a)	Filaments/lamellae provide <u>large surface area</u> ; Thin/flattened <u>epithelium</u> / one/two cell layers so short <u>diffusion</u> pathway (between water and blood); Countercurrent/blood flow maintains concentration/diffusion gradient;	2 max	Q Do not credit thin cell walls/membranes
8	(b)(i)	Large/wide range of values (so can fit on graph);	1	
8	(b)(ii)	Decrease in uptake with increase in mass / negative correlation;	1	
8	(b)(iii)	Enables <u>comparison</u> ; As animals differ in size/mass;	2	
8	(b)(iv)	Smaller animals have larger surface area to volume ratio; Lose more heat per gram of tissue; Respire more/faster (relative to body mass); Oxygen used in respiration;	3 max	Allow converse for larger animals. Allow appropriately named animal as an alternative to smaller or larger animals.

Question	Part	Marking Guidance	Mark	Comments
9	(a)	Given only saline; Otherwise treated exactly the same way;	2	
9	(b)	Ethical consideration, e.g., leads to death/suffering of mice; Large number to improve reliability / reduce sampling error; Number of mice related to cost/space available/animal husbandry;	2 max	
9	(c)	Vary in shape / do not grow uniformly;	1	Q Allow descriptions of variation in shape.
9	(d)	7.44 and 1.74;; 7.42 and 1.72;; (Ratio) 4.28 : 1;; (Ratio) 4.31 : 1;; (Percentage decrease) 76.6%;; (Percentage decrease) 76.8%;;	2 max	Any of the answers shown gain two marks. An answer of 23.4% or 23.2% Percentage decrease gains one mark. Correct method of calculating rate/ratio/percentage increase with an incorrect answer gains one mark.
9	(e)	Reference to <u>Mitosis</u> ; As chromosomes cannot attach (to spindle)/ chromatids cannot separate (on spindle); Cell division/cell cycle slows down;	3	Q Do not penalise confusion between chromosomes and chromatids in second marking point Q Mitosis slows down = 2 marks Q Mitosis stopped = 1mark Q Mitosis must be spelt correctly
9	(f)(i)	(Degree of) spread/variation from the mean;	1	

9	(f)(ii)	Both chemicals (on their own) slow down growth/are effective; Taxol is more effective than OGF; Combined treatment (seems) most effective; <u>SD overlap</u> for OGF with taxol and taxol (on its own) so not conclusive/could be chance/both treatments could be equally effective;	4	Q Ignore all references to significance
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Question	Part	Marking Guidance	Mark	Comments
10	(a)	Recognition of same species; Stimulates release of gametes; Recognition of mate/opposite gender; Indication of sexual maturity/fertility;	2 max	
10	(b)(i)	Internal fertilisation / fertilisation occurs in pouch/limited area;	1	Q The term fertilisation is not required in the answer but must be implied.
10	(b)(ii)	Protection from predators (developing in pouch);	1	
10	(c)(i)	Less stress caused to seahorse / quicker/more accurate method / body is curved / head is linear;	1	Q Do not accept "easier" unless qualified.
10	(c)(ii)	Head length proportional to body length/or described;	1	
10	(d)	Positive correlation between head/body lengths of male and female/ female and male with similar head/body lengths pair together;	1	
10	(e)	Use line of best fit; And extrapolate/extend line as required;	2	

10	(f)	<p>(Compare) DNA;</p> <p>Sequence of bases/nucleotides;</p> <p>DNA hybridisation;</p> <p>Separate DNA strands / break hydrogen bonds;</p> <p>Mix DNA/strands (of different species);</p> <p>Temperature/heat required to separate (hybrid) strands indicates relationship;</p> <p>Compare same/named protein;</p> <p>Sequence of amino acids /primary structure;</p> <p><u>Immunological evidence</u> – not a mark</p> <p>Inject (seahorse) protein/serum into animal;</p> <p>(Obtain) antibodies/serum;</p> <p>Add protein/serum/plasma from other (seahorse) species;</p> <p>Amount of precipitate indicates relationship;</p>	6 max	<p>Q The marks awarded for reference to DNA and sequence of bases/nucleotides must be in a different context to DNA hybridisation.</p>
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