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Mark Scheme (Results)

Summer 2013

GCSE Biology (5BI2H)
Paper 01

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	met, val, lys met – val – lys MET VAL LYS	Accept mix of upper and lower case Accept: metvallys / metvalys Not necessary to separate the words out.	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	translation	Accept spellings such as transation, transalation reject: transcription	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(iii)	**D** ribosome		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	An explanation including **two** of the following points: • ref to specific shape (1) • to bind to substrate / form enzyme substrate complex (1) • for reaction to take place / catalysed(1) • joining together {substrates / molecules} / break down {substrates / molecules} (1) • ref to lock and key mechanism / hypothesis (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)	A description including **three** of the following points: • a mutation is a change in a gene (sequence) / base pairs (1) • (change in DNA) causes a change in amino acid(s) /order of amino acids (1) • change in shape of {active site / protein / enzyme} (1) • prevent / reduce binding to substrate (1) • enzyme can no longer function / reduced function (1) • enzyme could be more effective (1)	accept change enzyme function / stops the function of the enzyme ignore: refs to denaturation	**(3)**

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	Any **two** of the following points: (yeast cell) • has a nucleus (1) • does not have a flagellum (1) • does not have a plasmid (1) (bacterial cell) • has chromosomal DNA / circular DNA (1) • has a capsule (1) • has a slime coat (1) • does not have mitochondria (1)	Accept: has a vacuole accept: named bacterial feature e.g pilli, small ribosome, if not labelled in yeast cell	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	does not have chloroplasts/chlorophyll	cannot photosynthesise	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	7×10^9 (-) 5×10^{10} **(1)** = (-)4.3×10^{10} or (-)43×10^9	two marks for correct bald answer accept 43 000 000 000 allow one mark for correct subtraction from wrongly selected numbers only accept the numbers in the table with a correct minus calculation	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	A description including any **two** of the following points: • involved in defence against disease / part of immune system (1) • phagocytosis (1) • antibody / antitoxin production (1)	accept: (fight pathogen / harmful microorganism / named microorganism) accept: engulf / ingest / surround /digest cells reject: make antigens ignore: refs to role of red blood cells or platelets	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	tired / lack of energy / lethargy / short of breath	anaemia /fainting / less oxygen / increased anaerobic respiration reject: references to asthma	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)	A description including **three** of the following points: • all have digits/fingers (1) • all have { similar bones /radius / ulna / carpals} (1) • all have a humerus bone (1) • pentadactyl limb (1)	accept: phalanges for fingers accept: same bone structure	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(b)	An explanation including **two** of the following points: • soft tissue of organisms does not form fossils (1) • some fossils are yet to be found (1) • fossils may be damaged (1) • conditions not correct for fossil formation (1) • fossils may only be fragments / not whole organisms (1)	accept: references to plant or animal tissue accept: reasons why they may not be found accept: reasons for damage e.g. earthquakes accept: named conditions e.g. pH	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c) (i)	D 9.0%		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c) (ii)	• lowered the level of carbon dioxide / carbon dioxide {removed / taken in} (1) • increased the level of oxygen / oxygen {produced / made}(1)	accept: percentage for level If CO_2 written must be correct, do not accept CO^2	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c) (iii)	Any **two** from: • large organisms {more complex/carry out greater number of functions / more cells} • for (more aerobic) respiration • for (more) energy		**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	0.5 / 0.5 picogram	Accept: 0.5 picograms accept: the same (mass) as the sperm cell	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	**C** haploid		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(iii)	**A** thymine with adenine, cytosine with guanine		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(iv)	weak hydrogen bonds / hydrogen bonds / hydrogen (1)	H (bond)	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	A description including **three** of the following points: • cell divides / cell division / cell splits(1) • two cells produced (1) • (both) diploid (1) • (both) cells are <u>genetically</u> identical (1)	credit correct reference to stages of mitosis: DNA replication / chromosomes duplicate (1) Chromosomes line up along the equator / middle of the cell (1) chromosomes pulled to either end of cell (1) cytokinesis / cytoplasm splits (1)	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	A description including **three** of the following points: • ref (to many) cell divisions / eq (1) • growth (1) • ref to differentiation / specialisation (1) • ref to stem cells (1)	 accept: gets bigger / larger accept: become specific cells	 **(3)**

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	A description including the following points: • increase in concentration of glucose / glucose diffused into water/eq (1) • levels off after 20 mins / at 0.79 g/cm^3(1)	small increase, followed by greater increase / eq	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	An explanation including **three** of the following points: • starch broken down into glucose (1) • by enzymes / amylase / carbohydrase (1) • glucose passes through visking tubing / eq (1) • by diffusion (1) • down the (glucose) concentration gradient (1) • (net) diffusion stops when {all starch is broken down / concentration of glucose is equal inside and outside the tubing}	reject: references to osmosis or active transport accept: from area of high concentration to area of low concentration	**(3)**

Question Number		Indicative Content	Mark
QWC	***5(a) (iii)**	An evaluation including some of the following points: Strengths • thin membrane • permeable membrane • presence of amylase • presence of (large) starch molecules • digestion into glucose • glucose diffuses out • concentration gradient • water represents the blood weaknesses • membrane not one cell thick • not a large surface area • shorter length / not same size • no villi /micro villi • only carbohydrate digestion • no other enzymes present • no peristalsis • no blood movement • other factors e.g. pH	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited evaluation of the model including **at least one** strength OR weakness of the model • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple evaluation of the model showing evidence of **at least one** strength AND at least one weakness of the model OR a detailed evaluation of several strengths or several weaknesses of the model • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed evaluation, commenting on **several** of the strengths AND weaknesses of the model and its limitations • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
5(b)	**C** store bile		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	A description including **three** of the following points: • into root hairs (1) • through a partially permeable membrane (1) • by osmosis (1) • down a concentration gradient (1)	 accept: through leaves (as correct for water plants) reject: active transport ignore: refs to diffusion accept: from a high concentration (of water) to a low concentration (of water)	**(3)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	An explanation including **two** of the following points: • less /slower movement of water into the plant (1) OR • more / faster movement of water out of the plant (1) • (because) less (free) water outside the plant than inside (1)	 accept: lowers concentration of water outside the plant (than inside) ORA	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(a)(iii)	**A** diffusion		**(1)**

Question Number		Indicative Content	Mark
QWC	***6(b)(ii)**	An explanation including some of the following points: water • through the xylem • capillary action • osmosis into cells in the leaf • evaporation from leaves • transpiration stream • diffusion into the atmosphere • through stomata glucose • converted to sucrose • dissolved in water • through the phloem • bidirectional mineral salts • dissolved in water • through the xylem • from root to tip	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation of the transport of one molecule e.g. water moves from roots to leaves • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation of the transport of two molecules including correct reference to at least one of the vessels phloem or xylem. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed explanation of the transport of all three molecules with correct reference to movement through phloem and xylem • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

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