edexcel

Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCSE
in Biology (5BI2H) Paper 01
Unit 2: The Components of Life

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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.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Acceptable answers	Mark
1(a)	A description including any **two** from the following: Bacterial cells • contain plasmid(s) (1) • have a flagellum(1) • have a (slime) capsule (1) • do not contain a nucleus (1) • do not have mitochondria (1)	Allow reverse argument for each marking point Accept: bacteria have chromosomal DNA Accept: bacterial cells do not contain a vacuole (1) Accept specific answers describing other bacterial structures that are not found in yeast.	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	mitochondria	Accept any reasonable spelling	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	A description including any **two** from the following: Aerobic respiration • **uses** oxygen (1) • **produces** water (1) • releases more energy (1) • does not produce / release alcohol (1)	Accept cells will respire aerobically if oxygen is present Accept: anaerobic respiration occurs in the cytoplasm (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	• Allow any number between 10 and 24 (cm^3)		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	An explanation linking two of the following: • differences are due to changes in pH (1) • <u>optimum</u> pH is {7 / neutral} (1) • at pH 5/acid or pH 9 / alkaline the {enzyme / active site} has changed shape (1)	Accept: a pH between 6.2 and 7.2 Accept: denatured for changed shape.	**(2)**

Total for question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2 (a)	peristalsis	Accept any reasonable spelling	**(1)**

Question Number	Answer	Acceptable answers	Mark
2 (b) (i)	A description to include any **two** from the following: • increases from 0 to 120s (1) • levelled off by / from 120s (1) • credit correct manipulation of data for numbers from 0 to 120s (1)	Accept: increases from 0 to any time between 100 and 120s Accept **starts** to level off **after** 90s	**(2)**

Question Number	Answer	Acceptable answers	Mark
2 (b) (ii)	An explanation linking: • amylase / enzymes / maltase /carbohydrase (1) • have digested starch / carbohydrates (in the bread) (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
2 (b) (iii)	The tube / tights have: larger holes / allow solid particles through / no muscles in the sides / no blood vessels in the sides / no **villi** / have a smaller surface area (1)	Accept: ORA for the intestines Accept: the small intestine has other enzymes present Ignore: references to size / length / strength / and flexibility	**(1)**

Question Number	Answer	Acceptable answers	Mark
2 (c)	A ☒ statement 1 only		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(d)	C ☒ fats and increase the pH		**(1)**

Total for question 2 = 8 marks

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	D ☒ Group D were extinct 10 million years ago		**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (a)(ii)	A description including two of the following: • 1 upper bone / humerus / femur (1) • (connected to / then) 2 lower bones / radius and ulna / tibia and fibula (1) • (then) wrist / ankle bones (1) • **five** digits / fingers / phalanges (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
3(a) (iii)	A suggestion including **three** of the following: • population of A has decreased (1) • a change in the environment / natural disaster (1) • species A not as well adapted (to the new conditions) (1) • predation increased (1) • habitat destroyed / disease / less food / less water / fewer nesting sites (1) • idea of outcompeted (by other species / group B or C) (1)	Accept: conditions were not suitable for fossils to form	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(b)	630 X 3 (1) 1890	Allow full marks for correct bald answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)	An explanation to include two of the following: • one (or more) bases may have changed (on DNA) (1) • {changed / different} mRNA / reference to different codon / triplet / anticodon / tRNA (1) • a change in the amino acid (in the protein) (1) • (resulting in) a change of **shape** of protein (1)	Accept: proteins are made / mRNA is read on the ribosome (1)	**(2)**

Total for question 3 = 10 marks

Question Number	Answer	Acceptable answers	Mark
4 (a) (i)	An explanation to include any **two** from the following: • DNA is in the nucleus / mitochondria (1) • crushing to break down the cells / cell wall / membrane (1) • (detergent) dissolves / breaks down (cell / nuclear) **membrane** (1)	 Accept: chromosomes for DNA Accept: to increase surface area Accept: allow enzymes to get to more cells / nucleus Accept: detergent breaks down the nucleus	**(2)**

Question Number	Answer	Acceptable answers	Mark
4 (a) (ii)	B ☒ digest proteins in the nucleus		**(1)**

Question Number	Answer	Acceptable answers	Mark
4 (b)	A description to include any **two** from the following: • used information from other scientists / used Franklin's X ray pictures (1) • made a model of DNA (1) • showed how the bases fitted together (1) • showed how the (DNA) back bone was arranged / that DNA is a double helix (1)	 Accept used X rays of DNA Accept showed the 3D structure of DNA Accept A-T / G-C	**(2)**

Question Number	Answer	Acceptable answers	Mark
4 (c)	A description to include any **three** from the following: meiosis • produces four cells (instead of two) / has two cell divisions (instead of 1) (1) • **genetically** different (1) • haploid (instead of diploid) (1) • gametes (instead of somatic / body / cells)(1)	 Accept have half the number of chromosomes (compared to parent cell) Accept: named gametes	 **(3)**

Question Number	Answer	Acceptable answers	Mark
4 (d)	A description to include any **two** from the following: • stem / meristematic cells (1) • **differentiate** (1) • by changing shape / size/ metabolic ability(1) • becomes a named cell eg root hair cell / muscle cell / neurone (1)		 **(2)**

Total for question 4 = 10 marks

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	C pulmonary vein		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	A explanation including any **three** from the following: • Y is the **right** atrium (1) • (blood flows into the) right ventricle / ventricle (1) • Heart / muscle / atrium / ventricle **contracts** (1) • (blood flows) through pulmonary artery (to the lungs) (1) • Correct references to any valve through which the blood flows (1)		**(3)**

Question Number	Answer	Acceptable answers	Mark
5(a)(iii)	An explanation including any **two** from the following: • glucose/oxygen/carbon dioxide/other valid named substance (1) • diffuses (1) • from a high concentration to a low concentration / down a concentration gradient (1)	Accept equivalent marks for osmosis if water is stated as the substance moving between capillaries and body cells (in either direction).	**(2)**

Question Number		Indicative Content	Mark
QWC	***5(b)**	A suggestion to include some of the following points **Effect on heart:** • less blood flow (through the coronary artery) • to cardiac / heart muscle /muscle cells • heart muscle / cells dies / does not work as effectively • may cause a heart attack / angina • less forceful contraction **Effect on rest of body:** • less blood flows/ blood flow slower to **body cells /organs** • lactic acid builds up / more likely to get cramp • fatigue / tiring easily • less oxygen in the blood **Effect on heart cells and / or body cells** • less oxygen • less glucose • less **aerobic** respiration • less energy released • **body cells** start / increase anaerobic respiration • less waste products removed	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited suggestion that covers **ONE** effect of narrowed arteries within the heart e.g. the heart muscle receives less oxygen **OR** the body cells eg less blood is pumped to the body • 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 suggestion that explains the effect of narrowed arteries on the function of the heart **OR** body including at least one area from the final section of indicative content. 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 suggestion that links the effect of narrowed arteries on the function of the heart **AND** body including at least **TWO** areas from the final section of indicative content. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for question 5 = 12 marks

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	A ☒ carbon dioxide into the leaf for photosynthesis		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	An explanation to include any **three** from the following: • chloroplasts / chlorophyll absorb light / are site of photosynthesis (1) • **more** light at the top of the leaf (1) • (so) {more chloroplasts /more glucose made / more photosynthesis} in palisade cells (1) • some / few / less chloroplasts in spongy / mesophyll (cells) as some light gets through / not absorbed by palisade cells (1) • chloroplasts in guard cells to open / shut them (1)	Accept less light at the bottom Accept no chloroplasts in upper epidermis as (UV) bright light destroys the chlorophyll.	**(3)**

Question Number	Answer	Acceptable answers	Mark
6(b)	An explanation linking: • Something (other than light) has become the **limiting factor** (1) • Named example, eg carbon dioxide (concentration) / temperature / amount of chlorophyll or chloroplasts. (1)	Accept light is no longer a limiting factor Accept water	**(2)**

Question Number		Indicative Content	Mark
QWC	**6(c)***	An explanation including some of the following points **Stage 1 - Water enters root** • osmosis • through root hair cells • root hairs increase surface area • from a high water concentration to a low water concentration • as more solutes in cytoplasm of root cells (than in soil) • through a partially permeable membrane **Stage 2 - Water moves across root to xylem** • cell to cell • by osmosis • as next cell in sequence has lower water concentration **Stage 3 - Water moves up stem (to leaves)** • up the xylem • xylem is a tube • transpiration stream • capillary action • water moving from xylem into leaf cells draws more water up xylem • transpiration / evaporation of water maintains gradient • water moves from xylem to leaf cells by osmosis	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation of at least one stage • 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 detailed explanation of the way that water moves through **ONE** stage and **ONE** of: osmosis, xylem, transpiration. **OR** a simple explanation of at least two stages and **ONE** of: osmosis, xylem, transpiration stream. • 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 at least **TWO** stages from soil to leaves and **TWO** of: osmosis, xylem, transpiration stream. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for question 6 = 12 marks

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