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Mark Scheme (RESULTS)
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GCE

GCE Biology (6106/03)

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Question Number	Answer	Mark
1 (a)	A 14 ; B 21 ;	**2**

Question Number	Answer	Mark
1 (b)(i)	no (viable) gametes produced / meiosis cannot occur / no (pairing of) homologous chromosomes ;	**1**

Question Number	Answer	Mark
1 (b)(ii)	1. chromosomes replicate ; 2. spindle fibres do not form / eq ; 3. chromosomes do not separate / all go to one pole / ref to non-disjunction ; 4. during mitosis / anaphase ;	**max 2**

Question Number	Answer	Mark
1(b)(iii)	1. (doubling of chromosomes) results in an even number of chromosomes ; 2. (doubling of chromosomes) results in formation of homologous chromosomes / ref. to pairing of homologous chromosomes ; 3. meiosis can occur / reduction division can occur ; 4. ref. to formation of gametes ;	**max 2**

Question Number	Answer	Mark
1(c)	1. reference to larger gene pool / 2. (more) genetic variation / 3. one species only reduces genetic variation / 4. may have beneficial genes / 5. may increase chances of long-term survival / eq / 6. may be able to grow in mineral deficient soils / eq ;	**max 1**

Question Number	Answer	Mark
2 (a)	1. carbon dioxide <u>diffuses</u> into red cells ; 2. {combines / eq} with haemoglobin ; 3. forms {carbaminohaemoglobin / carbamino compounds} ; 4. correct ref. to presence of carbonic anhydrase ; 5. carbon dioxide {combines / reacts} with water and forms carbonic acid / correct equation ; 6. carbonic acid dissociates / eq into H^+ and hydrogencarbonate / correct equation ; 7. ref. to hydrogencarbonate diffusing out of red cell (into plasma) ;	**max 4**

Question Number	Answer	Mark
2 (b)(i)	medulla (oblongata) ;	**1**

Question Number	Answer	Mark
2 (b)(ii)	1. volume of air breathed increases as carbon dioxide concentration increases / eq ; 2. ref. to small increase from 0.03 to 2.00% / greater change from 2 to 8 / greatest change from 6 to 8 % ; 3. credit a manipulated quantitative comment ;	**max 2**

Question Number	Answer	Mark
2 (b)(iii)	1. they both increase as CO_2 increases / eq ; 2. volume of air breathed by seal is higher up to 6.00 % / converse ; 3. at 8.00 % carbon dioxide, volume of air breathed by seal is less than human / converse ; 4. credit a manipulated quantitative <u>comparison</u> ;	**max 3**

Question Number	Answer	Mark
2 (c)(i)	1. ref. to more red blood cells ; 2. higher haemoglobin concentration ; 3. haemoglobin has a higher affinity for oxygen ; 4. therefore takes up more oxygen / more highly saturated (at a given partial pressure) ;	**max 2**

Question Number	Answer	Mark
2 (c)(ii)	1. seal muscle has <u>more</u> myoglobin (than human muscle) ; 2. myoglobin acts as an oxygen store ;	**2**

Question Number	Answer	Mark
2(d)	(lactic acid produced by) anaerobic respiration ;	**1**

	Outline scheme for marking essay questions 3, 4B and 5H 11 available for Scientific content (S) 2 available for Balance (B) 2 available for Coherence (C)	Mark

Scientific content (S)	Description
11 (good)	The essay demonstrates a sound understanding of the topic and contains a significant amount of material from most areas of the mark scheme, **including A2 content**. Suitable examples are included and the candidate has clearly and coherently linked together information from different parts of the specification.
9 (above average)	An above average essay, with accurate content. The essay includes a good balance of material from several areas of the mark scheme, **including A2 content**, and examples where appropriate. There may be some minor factual errors.
7 (average)	The essay includes relevant information from some areas of the mark scheme, **including A2 content**. The candidate links together some facts and principles. Some examples are included. There may be some minor factual errors.
5 (below average)	The essay includes some generally factually accurate and relevant material, and there is some attempt to link material from more than one area of the mark scheme. **The A2 content, in particular, lacks depth and accurate details**.
3 (poor)	There are some correct facts, but the essay lacks depth and accuracy. The essay contains **little or no relevant information from the A2 content**.
1 (poor)	There are very few correct facts. The essay is generally superficial and inaccurate.
0 (poor)	No correct or relevant material is included.

Notes

If a scientific content mark of 0, 1, or 3 is awarded, it is very unlikely that a balance mark of more than 1 is appropriate.

An essay containing AS content only can be awarded a max of 3 for scientific content.

An essay containing A2 content only can be awarded a max of 7 for scientific content.

S = 11

	Balance (B) **2** Most of the main topic areas outlined are covered Some discussion of each of the areas chosen, illustrated with suitable examples where appropriate Material included is all relevant to the topic and the candidate has linked information from more than one area of the specification. Few, if any, errors **1** Some of the main topic areas outlined are covered. Some discussion of each of the areas chosen. Some irrelevant material included. There are some examples which link together different areas of the specification. Some errors **0** Very limited account, possibly only one aspect chosen Material mostly irrelevant No examples of the candidate linking information from different topics Large number of errors	**B = 2**
	Coherence (C) **2** Material logically presented, with little or no repetition Essay has coherence, ideas are developed well; continuous prose used throughout Essay has an introduction and a conclusion, summing up the main points Technical terms have been used correctly Spelling, punctuation and grammar are sound **1** Material is presented in an orderly way and some ideas developed Continuous prose used throughout The introduction and conclusion may be present, but brief Technical terms are used and generally in the correct context Spelling, punctuation and grammar are generally sound **0** Essay style not used Material in note form or numbered points Very poor standard of spelling, punctuation and grammar	**C = 2**

Question Number	Answer	Mark
3 (a)	The structure and roles of carbohydrates in living organisms Introduction could include reference to the general nature of carbohydrates, monosaccharides, disaccharides, polysaccharides – structure of monosaccharides – formation of glycosidic bond – specific references to: pentoses – glucose, fructose, galactose – maltose, sucrose, lactose (disaccharides) – starch, cellulose, glycogen (polysaccharides) - pentoses in nucleic acids – glucose as an energy source – roles of disaccharides – glycogen as an energy store – cellulose in plant cell walls – starch as an energy store in plants - **glucose as a substrate for respiration** – **glucose – glycogen metabolism** – **synthesis of carbohydrate from GP in photosynthesis** – Could also expect references to glycoproteins in cell membranes – **Notes** *Scientific content 11 marks* *Balance 2 marks* *Coherence 2 marks*	**15**

Question Number	Answer	Mark
4B	The structure and roles of chloroplasts Introduction could include chloroplasts as organelles, as energy transducers, location in plants – **Structure of chloroplasts:** double membrane – stroma – DNA - thylakoids – grana – location of pigments – starch grains – **Functions:** **light-dependent reactions** – **cyclic and non-cyclic photophosphorylation** – **production of ATP, reduced NADP and production of oxygen** – **light-independent reactions** – **fixation of carbon dioxide onto ribulose bisphosphate** - **formation of GP** – **reduction of GP to form triose phosphate** – **regeneration of ribulose bisphosphate** - **Notes** *Scientific content 11 marks* *Balance 2 marks* *Coherence 2 marks*	**15**

Question Number	Answer	Mark
5H	The regulation of the internal environment in humans Introduction could include explanation of homeostasis and negative feedback, factors that are kept constant – Specific references to: regulation of body temperature – structure and roles of the skin – roles of thermoreceptors – hypothalamus – **reproductive hormones** – **regulation of body water** – **ADH** – **regulation of blood glucose** – **insulin, glucagon and adrenaline** - **Notes** *Scientific content 11 marks* *Balance 2 marks* *Coherence 2 marks*	**15**

PAPER TOTAL: 38 MARKS