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General Certificate of Education (A-level)
January 2011

Human Biology HBIO2

(Specification 2405)

Unit 2: Humans - their origins and adaptations

Final

Mark Scheme

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Question	Marking Guidance	Mark	Comments
1(a)	Fatty acids/triglycerides; Glycogen; Glucose; ADP; Phosphate; Oxygen; Lactate;	2 max	Allow fat/lipid
1(b)	Produces more ATP than anaerobic; Prevents build up of lactate; Would decrease pH of blood; Cause muscle fatigue;	3 max	

Question	Marking Guidance	Mark	Comments
2(a)	Centromere;	1	
2(b)	Same size; Same shape; Same genes; In same sequence/locus/loci;	2 max	
2(c)	Chromatids separate; (Chromatids) pulled to opposite ends of cell; By spindle fibres; Become part of new nuclei;	2 max	

Question	Marking Guidance	Mark	Comments
3(a)	pH; Aorta/aortic arch/carotid artery/carotid body; Medulla/respiratory centre/breathing centre;	3	
3(b)	(Breathing muscles) contract more frequently/faster; (Breathing muscles) contract more strongly;	2	Allow one mark for breathing deeper and faster Allow two correct references to diaphragm muscles or two correct references to intercostal muscles or one of each

Question	Marking Guidance	Mark	Comments
4(a)	Lives in another organism; Feeds from another living organism/obtains nutrients from small intestine; Causes harm to other organism/damages villi/microvilli;	2 max	
4(b)	Two suitable adaptations and explanations;;;; e.g. Ventral disc; Allows attachment/prevents being moved through intestine; Resistance to water treatment chemicals; *Giardia* can reinfect using water as transmission route; Cysts can survive for long periods in food and water; Greater chance of being ingested; Cysts unaffected by stomach acids; Able to reach small intestine; Able to absorb nutrients from small intestine; Energy for reproduction;	4 max	

Question	Marking Guidance	Mark	Comments
5(a)	G; Next level down from Hominidae/family/next level up from species/*Homo*; Other genus is *Homo*;	3	
5(b)	Similar bases/base sequences/structure of comparable gene (e.g. Hb gene)/mitochondrial DNA; Similarity of DNA linked to closeness of relationship; Same genus very similar; DNA hybridisation; The more heat needed to separate hybrid strands, the closer the relationship;	2 max	

Question	Marking Guidance	Mark	Comments
6(a)	Malignant tumour: Metastises/eq.; Is quick-growing; Is not enclosed by a membrane; Invades neighbouring tissues;	2 max	Allow converse for benign tumours "It" refers to a malignant tumour
6(b)(i)	More time for mutations to occur/more exposure to sun; In tumour suppressor genes;	2	Allow in (proto) oncogenes; as an independent extra mark
6(b)(ii)	Statement is valid up to age 60 – 64 as rate increases at same rate as total new cases; So risk to an individual is increasing; After this age number of new cases decreases but number per 100 000 continues to increase; Conflicting evidence/may not be valid number of new cases suggests decreasing risk total number suggests increasing risk; May not be the same for women;	3 max	

Question	Marking Guidance	Mark	Comments
7(a)	$\frac{2\,800\,000 - 700\,000}{100}$ = 21 000 (hectares);;	2	Correct answer (no units needed) scores two marks Incorrect answer with correct working scores one mark
7(b)(i)	Coniferous woodland: Is faster growing; Can be planted more densely; Few different tree species; Fewer insects herbivores/parasites;	2 max	Accept converse statement related to deciduous woodland
7(b)(ii)	Increase biodiversity; More habitats; due to more types of trees/other plants/all plants; ***OR*** More insects; provide more food for a range of predators;	2 max	

Question	Marking Guidance	Mark	Comments
8(a)(i)	Allow comparison; Different hominids are different sizes/masses; So might expect different brain masses anyway;	2 max	
8(a)(ii)	(Yes): General increase from 3 mya to 1.5 mya; Even though species are not all the same; (No): Between 1.5 mya to present capacity of each species remains more or less constant/within certain limits; Increase only occurs when new species emerges; Considerable overlap between *H. sapiens* and earlier species; Graph does not show (absolute) brain size/rise in % could be caused by fall in body mass;	3 max	
8(b)(i)	Potassium argon dating; Stratigraphy;	2	

8(b)(ii)	*Homo habilis* specimens over 1.5 - 2 million years old: Carbon dating not accurate at this age; As very little difference between readings after 60 000 years; No/very little C^{14} left after 100 000 years;	3 max	

Question	Marking Guidance	Mark	Comments
9(a)	**X** – nucleotide; **Y** – hydrogen bonds; **Z** – deoxyribose;	3	 No alternative is possible for **Z**
9(b)	Store large quantities of information/contain many genes; Leave the nucleus;	2	
9(c)(i)	DNA transforms the type R cells; No other molecules have any effect; So DNA must be the molecule that carries information from one generation to the next;	2 max	
9(c)(ii)	So that the effect of each molecule could be established; If they were added in combination, any effect could be due to one of a number of substances;	2	

9(c)(iii)	Animals harmed in the investigation; But the change to virulence of the bacterium is a clear cut change/easily measurable; Important knowledge gained; Much valuable research not possible without this;	2 max	Accept cell culture techniques not available at the time

Question	Marking Guidance	Mark	Comments
10(a)	Attracted some wolves into settlements/encouraged dogs to hunt with them with food; Chosen the most suitable animals; e.g. least aggressive/bond with humans easily/good hunters/good barkers/good herders; Breed these types only; For many generations;	4 max	Allow up to two marks for suitable features
10(b)(i)	Better communication; Share information about hunting conditions/food/water supply; Better education/training;	2 max	
10(b)(ii)	Allows more time for learning; Humans must learn complex skills; Such as language/problem-solving;	2 max	
10(c)(i)	Change in function of a gene; Alteration in base sequence of DNA;	2	

10(c)(ii)	Harvesting survival mutation gives an advantage; Ears/seeds/grain survive harvesting better; So more chance of being planted; More chance of mutant allele/mutation being passed on to next generation; Alteration of gene pool over time;	4 max	
10(d)	Changes in temperature and CO_2 allow increased photosynthesis; And increased food production; Harvesting mutation means less seeds/ears/grain will be lost; Food surpluses possible; Allowing storage of food; For times of shortage; More certain food supply; Increased survival;	6 max	