PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



MARK SCHEME

TOPIC 4: NATURAL SELECTION AND GENETIC MODIFICATION (PACK 1)

SCORE	PERCENTAGE
/39	%

STEMUP

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Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
(i)	An answer that combines knowledge (1 mark) and understanding (1 mark) to provide a logical description: • (scientists might look for) differences in the structural features of the fossil (1) • and *Ardipithecus ramidus* would be deeper in the rock layer than *Homo* {*habilis*/stone tools} (1)	e.g. *Ardipithecus ramidus* smaller cranial capacity	(2)

Question number	Answer	Additional guidance	Mark
(ii)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark): • likely to be out-competed by *Homo erectus* (1) • {for resources essential for survival/due to the presence of a new selection pressure} (1)	accept: named resources accept: named selection pressure, e.g. climate change, environmental change, disease	(2)

Question number	Answer	Additional guidance	Mark
(iii)	An explanation that combines identification via a judgement (1 mark) to reach a conclusion via justification/reasoning (1 mark): • stone tool B because it is more {sophisticated/worked} (1) • and *Homo erectus* lived more recently than *Homo habilis* (1)	accept: data quoted from the timeline	(2)

Q2.

Question number	Answer	Mark
(i)	A they have membrane-bound organelles **The only correct answer is A** **B** *is not correct because they have a nucleus* ***C*** *is not correct because they do not have a cell wall* ***D*** *is not correct because this is not a specific feature of eukaryotic cells*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(ii)	genetic analysis / based on {DNA/genetics} / DNA of Archaea more similar to eukaryotes (1)	accept more knowledge because of better microscopes	**(1)** **AO1 1**

Q3.

Question number	Answer	Mark
(i)	A they have membrane-bound organelles **The only correct answer is A** **B** *is not correct because they have a nucleus* ***C*** *is not correct because they do not have a cell wall* ***D*** *is not correct because this is not a specific feature of eukaryotic cells*	**(1)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(ii)	genetic analysis / based on {DNA/genetics} / DNA of Archaea more similar to eukaryotes (1)	accept more knowledge because of better microscopes	**(1)** **AO1 1**

Q4.

Question number	Answer	Additional guidance	Mark
(i)	An explanation including **four** of the following: • by natural selection / evolution (1) • mutation in the bacterium /variation in the population (1) • only the resistant bacteria **survived treatment by antibiotics /** resistant bacteria survive when people **don't finish the course** (1) • the resistant bacteria {reproduce / divide} (1) • offspring inherit the resistance / resistance passed onto future generations / process repeats increasing level of resistance (1)	accept *Klebsiella* for bacteria accept they evolve accept some bacteria have a **{gene/allele}** for antibiotic resistance accept non-resistant bacteria killed **by antibiotics** ignore offspring are identical	**(4)** **A02 1**

Question number	Answer	Additional guidance	Mark
(ii)	people not completing their course of antibiotics/overuse of antibiotics	accept acted as a selection pressure accept being used to treat viruses/examples ignore misuse unqualified	**(1)** **AO1 1**

Question number	Answer	Mark
(iii)	B it does not have a nucleus **The only correct answer is B** ***A*** *is incorrect because prokaryotic cells do not have chloroplasts* ***C*** *is incorrect because prokaryotic cells have ribosomes* ***D*** *is incorrect because prokaryotic cells can reproduce without a host*	**(1)** **AO1 1**

Q5.

	Answer	Acceptable answers	Mark
	An explanation of one advantage for **two** marks • crop produces a toxin that kills insects (that eat plant)(1) • so less damage by insect / increased crop yield (1) • less man-made chemicals used / specific to pests / less pollution (1) An explanation of one disadvantage for **two** marks • cross pollination / fertilisation with other plants (species) (1) • producing weeds that contain the toxin(1) • non target organisms may be affected (1) OR • idea of large areas of monocultures (1) • reduction in insect numbers / biodiversity (1) • negative impact on food chains (1) OR • GM crops cost more (1) • Farmers cannot afford them / become reliant on them (1)	accept references to ICP accept does not kill other insects	**(4)**

Q6.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	**C** Protoctista		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	**D** nucleus		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(iii)	(both) contain chloroplasts / chlorophyll	Both can photosynthesise	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	An explanation linking 3 of the following points: • autotrophs can make their own food (using sunlight) • heterotrophs eat other food • *Euglena* can make carbohydrates and/or eat carbohydrates • (so are) able to survive in different environments / survive in changing environments	autotrophs photosynthesise accept sugars/nutrients for carbohydrates	**(3)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	A suggestion including **two** of the following points: • publish findings in scientific journals • use the peer review process • attend scientific conferences	speak to other scientists	**(2)**

Q7.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	**C** Protoctista		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	**D** nucleus		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(iii)	(both) contain chloroplasts / chlorophyll	Both can photosynthesise	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	An explanation linking 3 of the following points: • autotrophs can make their own food (using sunlight) • heterotrophs eat other food • *Euglena* can make carbohydrates and/or eat carbohydrates • (so are) able to survive in different environments / survive in changing environments	autotrophs photosynthesise accept sugars/nutrients for carbohydrates	**(3)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	A suggestion including **two** of the following points: • publish findings in scientific journals • use the peer review process • attend scientific conferences	speak to other scientists	**(2)**

Q8.

Question Number	Answer	Acceptable answers	Mark
	Any three of the following points: the clones will all be genetically identical (1) so test results will be similar / not affect by genes (1) the clones could be GE to have specific human diseases /(dogs have) similar diseases / disorders to humans (1) dogs and humans are mammals / have similar anatomy / physiology / DNA (1)	 accept a disease will affect dogs in a similar way to humans accept dogs could be cloned who have (specific human) diseases / disorders accept dogs are similar to humans	**(3)**

Q9.

Question Number	Answer	Acceptable answers	Mark
	Any three of the following points: the clones will all be genetically identical (1) so test results will be similar / not affect by genes (1) the clones could be GE to have specific human diseases /(dogs have) similar diseases / disorders to humans (1) dogs and humans are mammals / have similar anatomy / physiology / DNA (1)	 accept a disease will affect dogs in a similar way to humans accept dogs could be cloned who have (specific human) diseases / disorders accept dogs are similar to humans	**(3)**

Q10.

	Answer	Acceptable answers	Mark
a(i)	Genus – Geospiza Species -conirostris	**accept geospiza** **accept Conirostris**	**(2)**
a(ii)	A suggestion including two of the following: • (different beak sizes/adapted) enable different finches to feed on different food types (1) • less competition between species (1)	eat different foods accept comparison between 2 beaks and food source more species are able to co-exist (1)	**(2)**
a(iii)	**B** ☒ geographic isolation		**(1)**
b	A suggestion linking **three** of the following points: • variation between species/ beak sizes/ shapes (1) • due to mutation(1) • competition for resources (1) • survival of the fittest /those best adapted to the environment survived (1) • those who survive pass their genes/characteristics onto their offspring (1) • natural selection (1)		**(3)**

Total for Question = 8 marks

Q11.

	Answer	Acceptable answers	Mark
a(i)	Genus – Geospiza Species -conirostris	**accept geospiza** **accept Conirostris**	**(2)**
a(ii)	A suggestion including two of the following:		

	• (different beak sizes/adapted) enable different finches to feed on different food types (1) • less competition between species (1)	eat different foods accept comparison between 2 beaks and food source more species are able to co-exist (1)	**(2)**
a(iii)	**B** ☒ geographic isolation		**(1)**
b	A suggestion linking **three** of the following points: • variation between species/ beak sizes/ shapes (1) • due to mutation(1) • competition for resources (1) • survival of the fittest /those best adapted to the environment survived (1) • those who survive pass their genes/characteristics onto their offspring (1) • natural selection (1)		**(3)**

Total for Question = 8 marks

Q12.

	Answer	**Acceptable answers**	**Mark**
(i)	Genus – Geospiza Species -conirostris	**accept geospiza** **accept Conirostris**	**(2)**
(ii)	A suggestion including two of the following: • (different beak sizes/adapted) enable different finches to feed on different food types (1) • less competition between species (1)	eat different foods accept comparison between 2 beaks and food source	**(2)**

		more species are able to co-exist (1)	

(iii)	**B** ☒ geographic isolation		**(1)**

Q13.

	Answer	**Acceptable answers**	**Mark**
(i)	Genus – Geospiza Species -conirostris	**accept geospiza** **accept Conirostris**	**(2)**
(ii)	A suggestion including two of the following: • (different beak sizes/adapted) enable different finches to feed on different food types (1) • less competition between species (1)	eat different foods accept comparison between 2 beaks and food source more species are able to co-exist (1)	**(2)**
(iii)	**B** ☒ geographic isolation		**(1)**

Q14.

Question number	Answer	Additional Guidance	Mark
(c)	A description linking **three** of the following: • they have a pentadactyl limb (1) • suggesting a **common ancestor** (1) • that also had a {pentadactyl limb / this limb structure} (1) • how the structure has been adapted to different functions / description of the adaptations for a function (1)	accept they have a **similar bone structure** / description of the **bone structure** ignore similar limb structure accept unlikely to have descended from different ancestors	**(3)** **AO1 1**

Q15.

Question number	Answer	Mark
	An answer that combines knowledge (2 marks) and understanding (2 marks) to provide a logical description: • use restriction enzymes to remove the gene and cut the plasmid (1) • use of ligase to join DNA molecules together (1) • cut the gene from the genome of the fungus and extract a plasmid from the bacteria (1) • insert the recombinant plasmid back into the bacteria (1)	**(4)**