PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

BIOLOGY



MARK SCHEME

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

SCORE	PERCENTAGE
/113	%

STEMUP

These questions belong to Pearson Edexcel, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by Pearson Edexcel. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with Pearson Edexcel and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. Pearson Edexcel has not endorsed, approved or been involved in the production of it. Pearson Edexcel and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

Pearson Edexcel publishes its past papers, mark schemes and examiner reports. Always check the current specification at qualifications.pearson.com before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

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	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**

Q4.

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)**

Q5.

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)**

Q6.

	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)	eat different foods accept comparison between 2 beaks and food source	**(2)**

	• less competition between species (1)	more species are able to co-exist (1)	
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

Q7.

	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)

Q8.

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)**

Q9.

Question number	Answer	Mark
	An answer that combines the following points of application of knowledge and understanding to provide a logical description: • genetic variation means that some plants will be tolerant of drought conditions and these can be selected (1) • cross-pollinate these plants and grow the seeds under drought conditions (1) • select offspring and repeat over several generations (1)	**(3)**

Q10.

Question number	Answer	Additional guidance	Mark
	An answer that combines the following points of application of knowledge and understanding to provide a logical description: • best characteristics/named characteristic chosen (1) • parents bred together (1) • offspring produced showing some of the best characteristics are selected(1) • selection and breeding process repeated (1)	accept reference to pollination / fertilisation	**(3)**

Q11.

Question number	Answer	Mark
	An answer that provides a description by making reference to: • an extra/new gene (1) • present in the DNA/chromosome (1)	**(2)**

Q12.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	ligase	accept reasonable misspellings e.g. lygase reject lipase	**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	Two from the following • leaves single stranded ends /overhangs / sticky ends (1) • complementary / bases pair up (1) • hold gene in place while ligase joins the DNA / makes inserting gene into plasmid more successful (1)	 accept (single stranded DNA) matches up ignore join together easily	**(2)**

Question Number		Indicative Content	Mark
QWC	* **(b)**	A description to include some of the following points Sweets • made using invertase/sucrase • converts sucrose into glucose and fructose • reduces viscosity of sugar mixture • increases simple sugar content, increasing sweetness • production of soft centred sweets • production of lower calorie sweets Vegetarian Cheese • made using chymosin • produced by genetically modified organisms • Chymosin initiates clotting/protein coagulation • reduces the use of rennet extracted from animals Lactose free milk • made using lactase • using immobilised enzymes • lactose converted to galactose and glucose • beneficial to people with lactose intolerance	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description of the use of enzymes in the production of at least one food **or** naming an enzyme linked to its use • 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 description of at least two food products linked to their named enzyme **or** a detailed description of the production of one food including the name and role of the enzyme • 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 description of most stages of the production of two or more food products made using enzyme technology including the name and role of the enzymes • 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
(c)	A description including two from the following **digestive** enzymes/named digestive enzyme (1) breakdown **named biological** stain (1) stains into soluble products (1)		**(2)**

Q13.

	Answer	**Acceptable answers**	**Mark**
	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)**

Q14.

Question number	Answer	Mark
	An explanation that combines application of knowledge (2 marks) and reasoning/justification – application of understanding (2 marks) • The phosphorescent gene needs to be isolated from the DNA of the phosphorescent organism using enzymes to expose sticky ends(1) • The plasmid is removed from the bacterial cell and cut open using the same enzymes to expose complementary sticky ends (1) • The phosphorescent gene is inserted into the bacterial cell matching the sticky ends using the enzyme ligase (1) • The plasmid is inserted back into the bacterial cell and is grown on a petri dish each bacterial cell will express the phosphorescent gene and glow in the dark (1)	**(4)**

Q15.

Question Number	Answer	Additional guidance	Mark
(i)	An explanation linking two of the following: • cut the {plasmid/gene/DNA} with a **restriction enzyme** (1) • insert the gene into the plasmid using **ligase** (1) • gene and plasmid have the same sticky ends / complementary sticky ends (1)	accept vector for plasmid	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
(ii)	An evaluation that combines three of the following points: At least one from benefits • (yeast grows rapidly) increasing yield (1) • it can be produced in a shorter time period (1) • production is cheaper/easier to extract (1) • takes up less space than growing plants (1) • yeast growth is not weather dependent (1) At least one from risks • concerns over the genetically modified yeast being manufactured illegally (1) • the painkillers may not be identical/as effective (1) • concerns over GM organisms entering environment (1)	Max of 2 marks for benefits. Max of 2 marks for risks. accept possible health risks of painkillers from GM yeast	(3) AO 2 1

Q16.

Question number	Indicative content	Mark
*	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO1 (6 marks)** • bacteria reproduce rapidly generating a large population • there is variation among a bacterial population • some bacteria develop a resistance to antibiotics through mutation • antibiotic treatment exerts a selection pressure • bacteria resistant to antibiotics survive • antibiotic resistance inherited • non-resistant bacteria do not survive • levels of antibiotic resistance in a population of bacteria increase	**(6)**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3–4	• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5–6	• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure that is clear, coherent and logical. (AO1)

Q17.

Question number	Answer	Additional guidance	Mark
	An explanation linking four of the following: • the population of great tits shows variation (1) • bird feeders provide a selection pressure (1) • birds with longer beaks {can feed from bird feeders/get more food} (1) • these birds are more likely to {survive/ reproduce} / survival of the fittest (1) • pass the {allele/gene /characteristic} for long beaks to their offspring (1) • over many generations the beak length of the bird population increases (1)	accept there is a mutation that leads to some birds having longer beaks accept there is competition for food / birds with longer beaks outcompete accept birds with shorter beaks can't get food accept birds with shorter beaks die out accept offspring have long beaks accept the process continues/repeats itself	**(4)** **AO2 1**

Q18.

Question number	Answer	Additional guidance	Mark
	An explanation linking the following: • cut the gene (from the genome) using **restriction** enzymes (1) • cut the plasmid with a **restriction** enzyme (1) • to leave {complementary / matching} sticky ends (1) • join the DNA using **ligase** (1)	accept endonucleases accept endonucleases accept the same sticky ends reject lipase	**(3)** AO1(1)

Q19.

Question number	Answer	Additional guidance	Mark
	An explanation linking four of the following: • people do not finish their course (of Colistin) (1) • natural selection /evolution (occurs) (1) • some bacteria have a mutation/ (genetic) variation (1) • (these) resistant bacteria survive /resistant bacteria reproduce (1)	accept overuse / repeated exposure (to the antibiotic) accept they have evolved accept some bacteria have a {**gene/allele**} for resistance accept the non-resistant bacteria die / the fittest bacteria survive ignore immune bacteria	**(4)** AO2 1

Q20.

Question Number	Answer	Additional Guidance	Mark
	An explanation linking **three** from: • **plasmid** is cut with **restriction** enzymes/ chymosin gene is cut with a **restriction** enzyme (1) • sticky ends are complementary (1) • ligase is used to connect the chymosin gene and the plasmid (1) • recombinant plasmid is inserted back into the bacterial cell (1)	accept insert a plasmid with chymosin gene into the bacteria	**(3)** **AO2 1**

Q21.

Question number	Answer	Mark
	An explanation that combines identification - knowledge (1 mark) and reasoning/justification - understanding (1mark): • cut DNA at recognition sites (1) • to create areas called sticky ends (1)	**(2)**

Q22.

	Answer	Acceptable answers	Mark
	A suggestion including 3 of the following: • Predation / disease (1) • change in	Accept named environmental change / climate change Accept food source eaten by other animals / humans	**(3)**

	environmental conditions (1) • loss of food source / reduced food source (1) • increased competition (1) • limited adaptations / survival of the fittest (1) • unable to reproduce / reproduce less (1)	Accept unable to fly so cannot escape	

Q23.

Question Number	Answer	Acceptable answers	Mark
	A description to include three of the following selection of individuals with {favourable characteristics/largest cobs}/collect seeds from plants with large cobs (1) cross breeding (of selected individuals)/plant seeds together (from maize with large cobs) (1) selection of offspring (1) repeat process over time (1)	accept selective breeding	**(3)**

Q24.

Question Number	Answer	Acceptable answers	Mark
(a)	**B** Two cells that are genetically identical		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	A description to include 2 of the following points: select a species that glows (when UV light is shone on it) (1) identify the gene location (1) cut the gene out (1) . using a (restriction) enzyme (1)		**(2)**

Question Number		Indicative Content	Mark
QWC	***(b)(ii)**	a description to include some of the following: • diploid nucleus is removed from the genetically engineered cell • making a lone nucleus • a donor egg is enucleated/its nucleus is removed • the diploid nucleus from the GE cell is inserted into the enucleated egg cell • division of the nucleus is stimulated • by electric shock/chemicals • cell divides by mitosis • cells put into surrogate mother • cells divide further and differentiates to form an embryo • Tegon born and is a glow in the dark beagle The above points could be made diagrammatically, but a written description is also required.	**(6)**

Level	**0**	No rewardable content
1	**1 - 2**	• a limited description including at least one stage of cloning in an appropriate context • 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 description of at least two stages of cloning linked sequentially in an appropriate context • 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 most of the stages of cloning • answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Q25.

Question number	Answer	Additional guidance	Mark
	• to produce more food (1) • to improve quality of food (1)	bigger plants , produce more kernels, more sweet/juicy, pest resistant,	**(2)**

Q26.

	Answer	Acceptable answers	Mark
(a)	A suggestion including any three linked points • ref to use of enzymes (1) • isolate / remove /cut out gene / DNA (for resistance)(1) • (coding for) enzyme (1) • from bacteria (1) • insertion of gene / DNA into crops / plants (1)	Any named enzyme must be in correct context. Ignore plasmids Reject replace	**(3)**
(b)	• in the phloem (1)	Accept phonetic spelling e.g. phloem /flowem	**(1)**
(c)(i)	A description including two of the following points • 0 to 10/11 no effect / change / difference (1) • 10/11 to 28 / 29/30 decrease in mass / yield (1) • Over 28 / 29/30 no change (1)	Accept decreases for 1 mark (if no other marks awarded) ecf throughout	**(2)**

(c)(ii)	B - 30 arbitrary units		**(1)**
(d)(i)	• number of **species**increase / go up (1)	Ignore number of weeds	**(1)**
(d)(ii)	Suggestions including two of the following linked points • increased use of herbicideresistant crops (1) • increased use (concentration / time) of herbicide (1) • ref to transfer of genes into weeds from other plants / cross pollination (1) • mutation(1)	Ignore ref to evolution / natural selection Ignore immune (to herbicide) Accept a description eg continued use of herbicide Accept cross breeding / reproduction / contamination	**(2)**

Q27.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	**B** *Homo erectus*		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	any value between 0.7-0.9 million (years)	any value between 700 000-900 000 (years)	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	A description including two of the following structural features/shape of fossil (1) (age of the fossil from) location in rock layers (1) structure of stone tools (1)	 accept comparison to other fossils radioactive dating (of rocks) ignore references to carbon dating ignore references to DNA analysis ignore brain size	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)	A comparison including three of the following more abundant than nuclear DNA (1) higher mutation rates (1) less likely to degrade (1)	 accept {large supply/lots} of mitochondrial DNA only inherited down the female line/no crossing over/recombination (1)	**(3)**

Question Number	Answer	Acceptable answers	Mark
(d)	An explanation linking the following: habituation / learned response (1) stop responding to {neutral signal /harmless signal} (1)	 accept become used to a harmless stimulus ignore references to getting used to the sound of the waterfall	**(2)**

Q28.

Question Number	Answer	Acceptable answers	Mark
(i)	**B** ☒ arrow head		**(1)**

Question Number	Answer	Acceptable answers	Mark
(ii)	**A suggestion including two of the following** hunting/fighting/defence (1) {preparing/ cooking/foraging for} food (1) making clothes (1) construction of {shelters/new tools/sharpening tools} (1) making fire (1)	 accept weapons accept skinning animals for food/scrapping bones accept skinning for clothes accept chopping wood	**(2)**

Q29.

Question Number	Answer	Acceptable answers	Mark
	A description including two of the following show **changes** in body structure (1) **changes** in stone tools (1) a specific example eg Ardi/Lucy/*Homo erectus* (1)	 accept development of named structural changes	**(2)**

Q30.

Question number	Answer	Mark
(i)	A Eukarya **i. The only correct answer is A** ***B*** *is not correct because plants are not single celled prokaryotic organisms* ***C*** *is not correct because plants are not single celled prokaryotic organisms and Monera is a kingdom* ***D*** *is not correct because Protista is a kingdom and not a domain*	**(1)** AO1 (1)

Question number	Answer	Mark
(ii)	A oxygen produced sunlight absorbed by chlorophyll **ii. The only correct answer is A** ***B*** *is not correct because photosynthesis doesn't produce carbon dioxide and sunlight is not absorbed by mitochondria* ***C*** *is not correct because sunlight is absorbed by chlorophyll not mitochondria* ***D*** *is not correct because photosynthesis doesn't produce carbon dioxide it produces oxygen*	**(1)** AO1 (1)

Question number	Answer	Mark
(iii)	Any one from: • (improved) genetic analysis (1) • DNA/RNA {screening/sequencing} (1) • domain theory is based on genetics (1) • differences between coding and non-coding DNA (1)	**(1)** AO1

Q31.

	Answer	Acceptable answers	Mark
	D ☒ speciation		**(1)**

Q32.

	Answer	Acceptable answers	Mark
	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)**

Q33.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	8-10 (hours)	accept any value between 8 and 10	**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	(85/100) x 500 (1) Or (500/100) x 85 (1) 425 (plants)	award two marks for correct bald answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
(a)(iii)	plant can flower all year round/flowering not limited to one period of the year/plant can flower for longer/flower at any time.	ignore references to growing accept pollination for flowering	**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(iv)	**C** photoperiodism		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	less likely to be eaten (by animals / herbivores)	accept kills pests/reduces damage done by pests reject predators	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	An explanation linking **two** of the following: the bamboo **mutated** to produce cyanide (1) or bamboo plants that produced cyanide survived to reproduce/ increase in numbers/increase in size (1) **and** **mutation** in greater bamboo lemur allowed them to tolerate cyanide (1) or greater bamboo lemurs get more food so survive to breed/reproduce (more) (1)	accept some bamboo plants have the {**gene/allele**} to produce cyanide ignore bamboo plants not eaten accept lemurs have {**gene/allele**} to tolerate cyanide ignore {adapted to tolerate/resistant to} cyanide accept lemurs have less **competition** for food	**(2)**

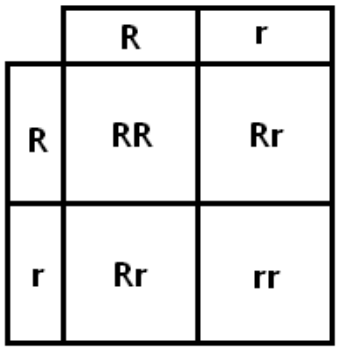
Question Number	Answer	Acceptable answers	Mark
(c)(i)	**A** aggression		**(1)**

Question Number	Answer	Acceptable answers	Mark
(c)(ii)	An explanation linking two of the following: sounds can be heard over a long distance /heard in the dark (1) do not need to have visual contact/allows communication with more animals (1) or more different types of sound (1) more {emotions/ behaviour/ information} can be conveyed (1)	accept quicker communication method accept doesn't require good vision	**(2)**

Q34.

Question Number	Answer	Acceptable answers	Mark
(a)	Genus; Species;	Must be in the correct order	**(2)**

Question Number	Answer	Acceptable answers	Mark
(b)	A suggestion including the following points: • rats with the mutation survive to reproduce (1) • pass on the allele which makes the offspring resistant to warfarin (1)	accept breed / produce offspring etc for reproduce accept gene / mutation for allele	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)	 Correct gametes (1) Correct offspring (1)	If incorrect gametes are entered into the Punnett square but the offspring for those gametes are correct 1 mark can be awarded as an error carried forward	**(2)**

Question Number		Indicative Content	Mark
QWC	* **(d)**	A explanation to include some of the following points • MRSA is a bacterial infection • number of cases increased from 1995 to 2006 • MRSA is resistant to antibiotics • so MRSA infection not easy to treat • number of cases were similar between 2005 and 2007 • antiseptics killed the bacteria • less bacteria were transferred from person to person • number of cases decreased from 2007 • antiseptics kill bacteria on surfaces • causing less infections from MRSA	**(6)**
Level	**0**	No rewardable content	
1	**1 – 2**	• a limited explanation of the graph including correct data reading or the use of antiseptics or antibiotics to kill bacteria/treat MRSA • 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 one trend of the graph including correct data reading and the effect of the use of antiseptics or antibiotics to kill bacteria/treat MRSA • 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 trends of the graph linking it to antibiotic resistance and antiseptic programme • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Q35.

	Answer	**Acceptable answers**	**Mark**
(I)	An explanation including **two**of the following: the dodo was multicellular (1) the dodo fed on other organisms /fed heterotrophically (1) the dodo did not have chlorophyll / cell walls (1)	Accept animals can't make food for themselves by photosynthesis Accept chloroplasts for chlorophyll Ignore references to legs /backbone etc	**(2)**
(ii)	has a (supporting) rod / spinal cord	**Accept** backbone / spine / vertebrate	**(1)**

(iii)	**B** ☒ genus		**(1)**	

Q36.

	Answer	Acceptable answers	Mark	
(a)(I)	An explanation including **two** of the following: the dodo was multicellular (1) the dodo fed on other organisms /fed heterotrophically (1) the dodo did not have chlorophyll / cell walls (1)	Accept animals can't make food for themselves by photosynthesis Accept chloroplasts for chlorophyll Ignore references to legs /backbone etc	**(2)**	
(a)(ii)	has a (supporting) rod / spinal cord	**Accept** backbone / spine / vertebrate	**(1)**	
(a)(iii)	**B** ☒ genus		**(1)**	
(b)	A suggestion including 3 of the following: • Predation / disease (1) • change in environmental conditions (1) • loss of food source / reduced food source (1) • increased competition (1) • limited adaptations / survival of the fittest (1) • unable to reproduce / reproduce less (1)	Accept named environmental change / climate change Accept food source eaten by other animals / humans Accept unable to fly so cannot escape	**(3)**	

(c)	**D** ☒ speciation		**(1)**	
(d)	A description to include two of the following: genetic (variation) (1) due to mutation (1) due to sexual reproduction / interbreeding / hybridisation (1) environmental (variation) (1)	Accept references to different genes/DNA Accept named environmental change e.g.change in climate	**(2)**	