AQA GCSE Biology | 8461

SPECIFICATION POINT 4.6.2.3

Selective breeding

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**2**
Available paper years	**2023–2024**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.6.2.3 Selective breeding

Answer 01 · Mark scheme

June 2023 | 8461/2F | Original Q9

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	any **one** from: • variation of a named / described (desirable) characteristic • not all susceptible to the same disease / pathogen • maintain / increase gene pool	allow eg different flavour / colour allow different customer preferences	1	AO2 4.6.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	any **one** from: • they have the same named /(desirable) characteristic(s) • they grow at the same rate • they ready to harvest at same time	allow eg all high yield **or** all disease-resistant **or** same (desirable) flavour	1	AO2 4.6.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.3	(a group of) cells are grown (into a new organism)	ignore clones	1	AO1 4.6.2.5

4.6.2.3 Selective breeding

Answer 01 · Mark scheme

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	any **one** from: different • water • minerals / ions • light • herbivores • disease • plant density • soil pH	 allow rain allow named example ignore nutrients ignore sun unqualified allow named example allow named example allow different temperature allow different environmental conditions	1	AO2 4.6.2.1 4.7.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	male gametes = **X** + **Y** female gametes = **X** + **X** offspring genotypes correctly derived from gametes	if neither mark awarded, allow **1** mark for male = **X** + **X and** female = **X** + **Y** allow correct for chromosome assignment in mp1 & mp2	1 1 1	AO1 AO1 AO2 4.6.1.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.6	any **one** from: • half are XX and half are XY • equal probability of X or Y sperm fertilising an egg • (the Punnett square shows) 50% (chance of) male / female		1	AO2 4.6.1.8

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Answer 01 · Mark scheme

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.7	any **two** from: • temperature • type / amount of food • light • whether chickens are kept indoors or outdoors • amount of movement / space (allowed) • time of year	allow (volume / amount of) water allow same stocking density allow same number of each type ignore same number unqualified allow mass at start allow age of chicken(s) allow same medication **or** all healthy	2	AO2 4.6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.8	any **one** from: • (more) valid / representative **or** reduce the effect of anomalies • (more) accurate mean	allow can calculate a valid mean allow (more) accurate results allow (more) reliable mean / results	1	AO2 4.6.2.3

4.6.2.3 Selective breeding

Answer 01 · Mark scheme

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.9	breed best of **A** and **B** (together)	allow cross / mate best of **A** and **B**	1	AO2
	select offspring with highest egg numbers **and** heaviest / fastest growing	allow select the best offspring for both desired characteristics	1	AO1
	breed (these) offspring together		1	AO1
	repeat over many / several generations	do **not** accept reference to repeated breeding of the original parents	1	AO1 4.6.2.3

Total Question 9	**15**

4.6.2.3 Selective breeding

Answer 02 · Mark scheme

June 2024 | 8461/2F | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.1	kingdom		1	AO1 4.6.4

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.2	genus species		1 1	AO1 4.6.4

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.3	3 million years ago		1	AO3 4.6.4

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.4	black-backed jackal	ignore jackal do **not** accept golden jackal	1	AO3 4.6.4

4.6.2.3 Selective breeding

Answer 02 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.5	any **two** from: • drought • ice age • global warming • volcanic activity • asteroid collision • (new) predators • (new) disease / pathogen • competition for food • competition for mates • lack of habitat or habitat change	if none of these awarded, allow **1** mark for climate change ignore weather if neither of these, allow catastrophic event **or** natural disaster for **1** mark allow named example allow hunters allow named example allow lack of food allow lack of mates ignore competition unqualified ignore environment change ignore isolation ignore pollution	2	AO1 4.6.3.6

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.6	any **one** from: • wolves ate humans • wolves get left-over food from humans • humans gave food to wolves		1	AO3 4.6.2.3 4.7.1.1

4.6.2.3 Selective breeding

Answer 02 · Mark scheme

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Question	Answers	Extra information	Mark	AO / Spec Ref.
02.7	breed the least / less aggressive wolves		1	AO2
	breed (least / less aggressive) offspring	ignore repeat breeding of the original pair(s)	1	AO1 4.6.2.3

Total Question 2	10

4.6.2.3 Selective breeding

Answer 01 · Examiner comments

June 2023 | 8461/2F | Original Q9

Question 9

This was the third of the three questions common to both the Foundation and Higher Tier papers. The topic was reproduction and selective breeding.

09.1 The most common advantage given for growing genetically-different tomatoes was that some might be less susceptible to disease, although others, such as producing different-sized tomatoes, were also given. Just over one-third of students gave a suitable answer.

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Answer 01 · Examiner comments

June 2023 | 8461/2F | Original Q9

09.2 Deciding on an advantage for growing genetically-identical tomatoes proved more problematic and only one-fifth could suggest a feature such as all growing at the same rate or all having the same named desirable feature such as high yield, disease resistance or flavour.

09.3 Very few students could successfully describe what is meant by tissue culture. Use of tissue as the starting material was deemed inadequate and required amplification in terms of cells being grown. Only around 2 percent gave an appropriate answer.

09.4 Almost half of all students were able to suggest why genetically-identical tomatoes growing in a garden might not all attain the same height – for example, due to variations in light intensity, ions, water or temperature in different areas of the garden.

09.5 This question was about sex determination in dogs. Students had to use the symbols X and Y to complete a blank Punnett square. Most knew that the male dog would produce gametes containing either an X or a Y chromosome, and that all the female gametes would contain an X chromosome, and over a quarter were successful in the completion of all aspects of the Punnett square.

09.6 The explanation of why a litter of six puppies might be expected to consist of three males and three females was straightforward for only a minority of students: either in terms of the expected 1:1 ratio of males and females or the inheritance of a Y chromosome by only half of the offspring (as demonstrated in a correct answer to the previous question).

09.7 This question was about the breeding of chickens for meat production and egg production. Given the results of an investigation in Figure 5 which showed that chicken variety A had high egg production while variety B grew more quickly, students had to suggest two control variables for the investigation. Many answers were rather vague – such as the same ‘living conditions’ / ‘environment’. More specific conditions, such as temperature, lighting, amount or type of food, all being kept indoors or all outdoors, were required. The most common correct answer related to the chickens’ food. Fewer than half of the students could suggest at least one suitable control variable, and only 1 in 8 could give two.

09.8 The data in the investigation had come from 500 chickens of each variety and students had to give a reason why such a large number had been used. Acceptable answers included the idea this would be more representative, or would give a more valid mean, or would reduce the effects of any anomalies (and not that it would ‘eliminate’ anomalies). A little over one-third of students were successful.

09.9 In this question, students had to describe how selective breeding of the two chicken varieties might produce a new variety of chicken that was good for both meat production and egg production. Many answers lacked precision: thus it was not often evident that only the best from varieties A and B would be mated and that the best (for both qualities) from the offspring would then be selected and mated, and that this would be continued over several generations. Often, it was impossible to tell from students’ answers which generation of chickens was being used: the original parents, the first generation offspring or subsequent generations of offspring. The term ‘repeat’ was often used in an ambiguous context. Thus only 1 in 500 students scored all 4 marks, and only 1 in 25 gained at least half-marks.

4.6.2.3 Selective breeding

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

4.6.2.3 Selective breeding

Answer 02 · Examiner comments June 2024 | 8461/2F | Original Q2

Question 2 (low demand)

02.1 Almost 65% of students knew that balance is the function of the cerebellum.

02.2 A third of students were able to identify both classification groups that form the binomial name. However, a further 50% of students could identify at least one. It was common to see only one box ticked in this question; students are reminded to read the instructions given in the question carefully.

02.3 Almost 80% of students identified the correct time as 3 million years ago.

02.4 Just under two thirds of students gained this mark.

02.5 Almost half of students could give two possible causes of extinction, with a further one third of students able to give at least one. The most common causes given were predators and lack of food. A noticeable number of students failed to gain credit by only giving a vague statement about environment change.

02.6 25% of students could suggest a correct reason as to why wolves began to follow humans, with lots of vague statements about the similarities between wolves and humans in terms of what they ate and how they hunted.

02.7 Over half of students did not gain any credit on this question. Most commonly a student that gained one mark did so by describing the breeding of two less aggressive wolves but did not go further to describe breeding the offspring to achieve the second mark.