AQA GCSE Biology | 8461

SPECIFICATION POINT 4.6.2.3

Selective breeding

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**1**
Available paper years	**2023–2023**

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

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	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.
03.2	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.
03.3	(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

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	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.
03.5	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.
03.6	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

4.6.2.3 Selective breeding

Answer 01 · Mark scheme

June 2023 | 8461/2H | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	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.
03.8	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

June 2023 | 8461/2H | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.9	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 3	**15**

4.6.2.3 Selective breeding

Answer 01 · Examiner comments June 2023 | 8461/2H | Original Q3

Question 3

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

4.6.2.3 Selective breeding

Answer 01 · Examiner comments June 2023 | 8461/2H | Original Q3

03.1 The advantage given by most for growing genetically-different tomatoes was that some might be less susceptible to disease. Almost two-thirds of students gave a suitable answer.

03.2 Deciding on an advantage for growing genetically-identical tomatoes proved more problematic and only one third 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.

03.3 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. Fewer than 1 in 5 gave an appropriate answer.

03.4 More than two-thirds of 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.

03.5 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 three-quarters were successful in the completion of the Punnett square.

03.6 The explanation of why a litter of six puppies might be expected to consist of three males and three females was straightforward for most: 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).

03.7 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. While most students could suggest at least one suitable control variable, fewer than half could give two.

03.8 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). Three-quarters of students were successful.

03.9 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 20 students scored all 4 marks, and only a third gained half-marks.