Mark schemes

Q1.

(a) to compare (with the other tubes)

or

to show the effect of chemical **Q**

ignore as a control

*do **not** accept control variable*

allow to show the difference

1

(b) $\frac{100}{0.01}$

1

10 000 / 10^4 (times)

1

(c) 0.1 arbitrary units

1

(d) reduced / no (root) growth at high(er) concentrations

allow no (root) growth in tube 6 / 100

allow answer in terms of specific tubes / concentrations

ignore the higher the concentration, the fewer roots grow unqualified

1

(e) **Level 2:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.

3–4

Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical thinking.

1–2

No relevant content

0

Indicative content

Taking cuttings:

- quicker
  - (because) do not have to wait as long for flowers / fruits / seeds (to form)

- all offspring identical (in appearance) **or** all have large / brightly-coloured flowers
  - (because) all have the same alleles / genes / DNA

- asexual reproduction **or** not sexual reproduction **or** cloning
  - (so) no fusing of gametes
  - (so) no mixing of alleles / genes from two parents
  - (so) offspring are identical (in appearance)

- involves mitosis
  - (which) copies genetic material / chromosomes

- does not involve meiosis
  - (which) gives different genetic material / chromosomes

- avoids variation in flowers
  - due to pollination / cross pollination (from other geraniums)
  - (as) no mixing of alleles / genes from two parents

- increased profitability
  - less resources needed
  - quicker turnover
  - consistent quality of plants / flowers

[9]

Q2.

(a) a change in:

- DNA
- base code **or** nucleotide sequence
- base (in DNA)
- gene / allele
- part of a chromosome
- number of chromosomes
- genetic code / material

ignore genetic information / variation

ignore reference to amino acids or proteins

1

(b) any **three** from:

allow in terms of an example

ignore mutation

- variation (between members of a species)
- better adapted survive
- (better adapted or survivors) reproduce
- pass on (favourable) allele(s) / gene(s) / mutation(s)

allow survival of the fittest

allow converse

*ignore passing on genetic material **or** chromosomes **or** characteristic*

3

(c) Alfred Wallace and Charles Darwin

1

(d) hoverfly looks like a wasp

allow pattern of the markings is similar (on the hoverfly and wasp)

ignore predator / animal thinks the hoverfly is a wasp

1

predator / animal avoids **wasps** so it does not get stung

1

(so) predator / animal does not attack / eat hoverfly

allow correctly named predator

ignore bite / harm

1

[8]

Q3.

(a) any **one** from:

- variation of a named / described (desirable) characteristic

  allow eg different flavour / colour
- not all susceptible to the same disease / pathogen
- maintain / increase gene pool

  allow different customer preferences

1

(b) any **one** from:

- they have the same named /(desirable) characteristic(s)

  *allow eg all high yield **or** all disease-resistant **or** same (desirable) flavour*
- they grow at the same rate
- they ready to harvest at same time

1

(c) (a group of) cells are grown (into a new organism)

ignore clones

1

(d) any **one** from:

different

- water

  allow rain
- minerals / ions

  allow named example

  ignore nutrients
- light

  ignore sun unqualified
- herbivores

  allow named example
- disease

  allow named example
- plant density
- soil pH

1

allow different temperature

allow different environmental conditions

(e) male gametes = **X** + **Y**

1

female gametes = **X** + **X**

1

*if neither mark awarded, allow **1** mark for*

*male = **X** + **X** **and** female = **X** + **Y***

offspring genotypes correctly derived from gametes

allow correct for chromosome assignment in mp1 & mp2

1

(f) 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

(g) any **two** from:

- temperature
- type / amount of food

allow (volume / amount of) water

- light
- whether chickens are kept indoors or outdoors
- amount of movement / space (allowed)

allow same stocking density

allow same number of each type

ignore same number unqualified

- time of year

allow mass at start

allow age of chicken(s)

*allow same medication **or** all healthy*

2

(h) any **one** from:

- (more) valid / representative

or

reduce the effect of anomalies

allow can calculate a valid mean

- (more) accurate mean

allow (more) accurate results

allow (more) reliable mean / results

1

(i) breed best of **A** and **B** (together)

*allow cross / mate best of **A** and **B***

1

select offspring with highest egg numbers **and** heaviest / fastest growing

allow select the best offspring for both desired characteristics

1

breed (these) offspring together

1

repeat over many / several generations

*do **not** accept reference to repeated breeding of the original parents*

1

[15]