

MARK SCHEME

GCSE

BIOLOGY

AQA - TRIPLE SCIENCE

B6 - TEST 4

GENETICS

Intermediate

Mark schemes

- 1.** (a) (i) in the chromosome(s)
ignore genes / alleles 1
- in the nucleus
allow nuclei
allow mitochondria 1
- (ii) the DNA / chromosomes / genes are replicated / copied / multiplied / doubled / duplicated
allow DNA is cloned
ignore same DNA / chromosomes / genes if unqualified 1
- (b) (i) 1 / one 1
- (ii) 2 / two 1
- (c) **B** 1
- [6]

- 2.** D
idea that twins have come from one (fertilised) egg
idea that Y sperm / Y chromosome produces boys
each for 1 mark
*allow 1 mark if candidate selects **A and** states that Y sperm / Y chromosome produce boys (reject Y gene unqualified) OR allow 1 mark if candidate selects **C and** states that twins must have come from one (fertilised) egg*
- [3]

- 3.** (a) (i) decrease 1
- rate of decrease slows 1

- (ii) any **one** from:
- more use of disinfectant
allow any reasonable increase in hygiene or sterilisation precautions
 - more use of hand washing
 - more careful / more often cleaning of patient facilities
 - raised awareness / education about hygiene

1

Explanation:

stops / reduces the bacteria being transferred / spreading

1

- (iii) $800 - 500 / 800 \times 100 =$

1

37.5 (%)

correct answer with or without working gains 2 marks

1

- (iv) any **one** from:

- numbers quite low now so hard to reduce further
- was a big campaign / much publicity (in 2009) so more people already doing it
- hygiene / cleaning now good so hard to improve
- hospitals short of money so less staff to clean

1

- (b) mutation occurred giving resistance (to methicillin)
*do **not** accept overuse caused mutation*

1

resistant bacteria not able to be treated / not killed

1

these bacteria multiplied / reproduced / spread quickly

1

[10]

4.

- (a) any **two** from:

- so that they do not have specific genetic defects
- to produce docile cats or so they are not aggressive
allow descriptions of aggression such as biting and scratching
- for aesthetic reasons
allow descriptions of suitable aesthetic reasons

2

- (b) (cats) are more likely to pass on (recessive) disorders
or
more likely to be susceptible to diseases

1

(c) **Level 2 (3–4 marks):**

A detailed and coherent explanation is given, which logically links the process of selective breeding with explanations of how this produces cats that do not cause allergic reactions.

Level 1 (1–2 marks):

Simple statements are made relating to process of selective breeding, but no attempt to link to explanations.

0 marks:

No relevant content.

Indicative content

process:

- parents with the desired characteristic are selected
- the parents are bred together to produce offspring
- offspring with the desired characteristics are selected and bred
- this is repeated over many generations.

explanations:

- parents who produce the least Fel D1 are initially selected
- in their offspring there will be individuals with differing amounts of Fel D1 produced
- care is taken to ensure cats are healthy and avoid possible problems associated with selective breeding
- over time the population of (selectively bred) cats will produce less Fel D1

4

[7]

5.

(a) organisms that reproduce together to form fertile offspring

1

(b) (i) fossils of **P** and **Q** in same stratum / layer / level / height

1

(ii) earlier – fossil in deeper layer / further down

1

(iii) the fossils of animals **S** and **T** have many features in common, but **T** is more complex than **S**

1

the fossil of animal **S** was found in a deeper layer of rock than the fossil of animal **T**

1

- (c) (i) **X** has white tail / shorter tail
allow other points eg X has furrier tail / smaller feet / is furrier
or
W has sharper claws / W has larger claws 1
- (ii) two (ancestral) populations separated / isolated (by geographical barrier / by canyon / river) 1
- genetic variation (in each population) / different alleles / different genotypes / (different) mutation(s) 1
- different environmental conditions / example described
allow abiotic or biotic example 1
- the better adapted survive / natural selection occurs
allow survival of the fittest
ignore they adapt to the environment 1
- so (different / favourable) alleles / genes passed on (in each population) 1
- eventually two types cannot interbreed successfully
allow to produce fertile offspring 1
- (iii) any **two** from:
- environments similar / described
allow example, e.g. similar predator(s) / food / climate
 - therefore similar adaptations / features / phenotypes suit
accept suitable named feature
 - original ancestor already well adapted
ignore reference to not enough time for evolution.
- 2

[14]

6.

- (a) auxin
accept other named plant hormones 1

(b) (i) any **three** from:

- no (fusion of) gametes / fertilisation
allow no meiosis or new cells only produced by mitosis
- only one parent
allow not two parents
- no mixing of genetic material
- no genetic variation **or** genetically identical offspring
allow clones

3

(ii) more / many offspring / plants (produced from one parent plant)
allow less damage to parent plant
ignore speed / cost

1

[5]

7.

(a) (i) fusion / joining / combining of gametes / egg **and** sperm / sex cells
accept fertilisation
allow fusion / joining / combining DNA from two parents
ignore meeting / coming together / mixing of gametes etc

1

(ii) (mixture of) genes / DNA / genetic information / chromosomes
ignore nucleus / inherited information but allow second mark if given

1

from both parents / horse **and** zebra
dependent on sensible attempt at 1st mark

1

(b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should apply a 'best-fit' approach to the marking.

0 marks

No relevant content

Level 1 (1-2 marks)

There is simple description of the early stages of adult cell cloning. However there is little other detail and the description may be confused or inaccurate.

Level 2 (3-4 marks)

There is an almost complete description of the early stages of the process and description of some aspects of the later stages. The description may show some confusion or inaccuracies.

Level 3 (5-6 marks)

There is a clear, detailed and accurate description of all the major points of how adult cell cloning is carried out.

Examples of Biology points made in the response could include:

- skin cell from zorse
- (unfertilised) egg cell from horse
- remove nucleus from egg cell
- take nucleus from skin cell
- put into (empty) egg cell
- (then give) electric shock
- (causes) egg cell divides / embryo formed
- (then) place (embryo) in womb / uterus

6

[9]

8.

- (a) (i) viruses live inside cells 1
- viruses inaccessible to antibiotic
allow drug / antibiotic (if used) would (have to) kill cell 1
- (ii) mutation 1
- ignore mutation caused by antibiotic*
- natural selection **or** no longer recognised by antibiotics
accept description of natural selection 1
- (b) (stimulate) antibody production 1
- ignore antitoxin*
- (by) white cells 1
- rapidly produce antibody on re-infection
ignore antibodies remain in blood 1

[7]

9.

(a) any **three** from:

factor for colour has two forms

accept gene for factor and allele for form

yellow dominant since all first generation yellow

accept F1 for first generation

green recessive since reappears in second generation

accept F2 for second generation

3

(b) (i) genes

accept alleles / genetic

1

(ii) nucleus

accept chromosomes / DNA

1

[5]