Variation and Evolution

Mark Scheme 1

Level	GCSE (9-1)
Subject	Combined Science – Trilogy - Biology
Exam Board	AQA
Topic	4.6 Inheritance Variation and Evolution
Sub-Topic	Variation and Evolution
Difficulty Level	Silver Level
Booklet	Mark Scheme 1

Time Allowed: **58 minutes**

Score: **/ 57**

Percentage: **/100**

Grade Boundaries:

M1.(a) wolves

1

(b) moose and wolves are on different scales

1

(c) wolf population has increased so more moose are eaten

*do **not** accept there are more wolves than moose*

1

(d) any **two** from:

- (other) predators
  allow correct examples
  allow 'humans hunting moose'
- (new) pathogens
  allow diseases
- competition

2

(e) any **four** from:

- variation (within species) of antler size
  allow description relating to antlers
- (caused by) different genes
- as a result of sexual reproduction / process of meiosis / mutation
- (phenotype) most suited to environment most likely to survive and breed
  ignore natural selection unqualified
- genes for large antlers (more likely to be) passed on to next generation

4

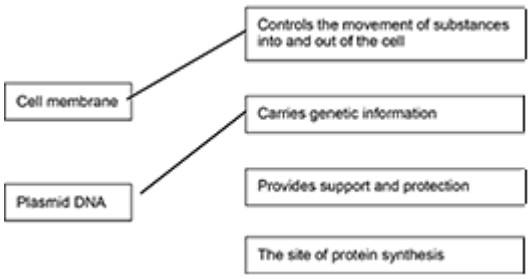
reference to mate selection
or
fighting
or
gaining territory
or
competition for mates

or
avoiding predation

1

[10]

M2.(a) **Feature** **Function**



extra lines from the left negate the mark

2

(b) Contaminated food

1

(c) any **two** from:

- cook food (thoroughly)
- pasteurise food
- wash hands properly
- disinfect work surfaces
- keep raw and cooked foods separate
- only drink clean water

2

(d) It will not cause sickness and diarrhoea side effects

1

(e) **E**

1

B

1

D

1

[9]

M3.(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 that **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]

M4.(a) kills weeds among crops / does not kill crops

1

(kills weeds) so less competition for named factor eg light / water / ions
ignore space

1

crops grow better / higher yield

1

(b) (i) plasmid

1

(ii) use an enzyme
allow correct example

1

(iii) only some cells become GM / take up the plasmid / take up resistance gene
allow idea of transfer of gene / plasmid to some plant cells from bacteria

1

GM cells survive / non-GM cells are killed

1

(c) Pro:
(positive) correlation between use of glyphosate and number of cases of kidney disease

*allow **1** mark for justified conclusion that the claim is not justified*

1

+ any **three** from:
Con:

- lack of controls / control group
- correlation does not prove a causal link
- some other factor could be the cause

  accept obesity / infection
- no evidence that kidney patients actually consumed GM crops / crops treated with glyphosate / no evidence about amount consumed
  or graph shows amount of herbicide not amount of GM crops grown
  or graph shows data only for maize and soya / not for other (GM) crops
- data have been manipulated by carefully chosen scales to make it look like they coincide
- data from some years is missing
- no data for the dosage of herbicide used

  allow kidney disease has been around for much longer than GM crops / better diagnosis of kidney disease.

3

[11]

M5.(a) (i) nucleus

correct spelling only
accept mitochondrion
ignore genes / genetic material / chromosomes

1

(ii) base(s)

Accept all four correct names of bases
ignore nucleotides and refs to organic / N-containing

1

(iii) 4

1

(iv) codes for sequence / order of amino acids

ignore references to characteristics

1

codes for a (specific) protein / enzyme

or

the sequence / order of three bases / compounds / letters

codes for a specific amino acid

or

the sequence / order of 3 bases / compounds / letters

codes for the order / sequence of amino acids

1

(b) (i) DNA

1

circular / a ring **or** a vector / described

1

(ii) kills any cells not having **kan**^{r} gene / so only cells with **kan**^{r} gene survive

1

hence surviving cells will also contain **Bt** gene / plasmid

1

(iii) cells divide by mitosis

ignore ref to asexual reproduction
correct spelling only

1

genetic information is copied / each cell receives a copy of (all) the gene(s) / all cells produced are genetically identical / form a clone

1

(iv) any **two** from:

- gene may be passed to pathogenic bacteria
- cannot then kill these pathogens with kanamycin
  or
  cannot treat disease with kanamycin
- may need to develop new antibiotics
- gene may get into other organisms

- outcome unpredictable

2

[13]