

- M1.** (a) Kingdom/phylum/class; 1
- (b) (i) 6; 1
- (ii) Family; 1
- (iii) The two species of *Mirounga* shared a common ancestor more recently than they did with *Monarchus tropicalis*; 1
- (c) Difference in DNA/base sequence/alleles/genes; 1
- (d) (i) Genetic bottleneck linked to low genetic diversity/smaller gene pool;
Reference to very low seal population/population in 1910/under 100 seals/caused by hunting;
Must refer to data provided for second mark 2
- (ii) New colonies formed by small number (of seals)/ small number of founders;
Founders have different/fewer alleles/genes / have smaller gene pool; 2
- [9]
- M2.** (a) Is species specific / allows recognition of same species;
Greater similarity in calls the closer the relationship (between the species);
Accept: 'Similar species have similar calls' as first marking point.
Reference to courtship on its own is not sufficient for a mark.
Must refer to relationship for second marking point. 2
- (b) (i) *G. americana* and *G. monachus*;
Highest percentage (DNA hybridisation) / more bases are similar/complementary / more hydrogen bonds / more base pairings;
Second marking point can be awarded without first marking point. 2
- (ii) Higher temperature / more energy (required) the higher the percentage DNA hybridisation / more bases are similar/complementary / more base pairings;
Correct reference to breaking hydrogen bonds / more/less hydrogen bonds being present;
Accept: 'The greater the number of hydrogen bonds the higher the temperature/more energy required to break them' for one mark. 2

- (c) 1. More closely related (species) have more similarities in amino acid sequence/primary structure;
2. In same protein / named protein e.g. albumin;
3. Amino acid sequence is related to (DNA) base/triplet sequence;

OR

4. Similar species have a similar immune response to a protein/named protein;
5. More closely related (species) produce more 'precipitate' / antibody-antigen (complexes) / agglutination;

Accept: 'Similar species have similarities in amino acid sequence' for first marking point.

Accept: Converse for marking points 1, 4 and 5.

Marking point 5 is for measuring the extent of the immune response.

2 max

[8]

M3. (a) (i) Phylum, Class, Order, Genus;

Mantophasma (M)/(Mantophasma) zephyra;

2

(ii) Groups within (larger) groups;

No overlap;

2

(b) Comparison of/look for similar features/structures/appearance;

1

[5]

M4. (a) phylum, class, order;
species, *Acinonyx jubatus*;

2

(b) larger groups containing smaller groups;

1

- (c) (i) do not interbreed to produce fertile offspring / different DNA / different niches; 1
- (ii) fossil record;
evolutionary history/phylogeny;
biochemical differences e.g. DNA/proteins/cytochromes;
homologous features / named feature;
karyotype / number and form of chromosomes;
(discount any example credited in (i)) 2
- M5.** (a) (i) Order, Family, Genus.
(all correct = 2 marks; 2 correct = 1 mark) 2
- (ii) 3 concentric circles in Carnivora, labelled Felidae, Panthera and L; 1
- (b) (i) large groups split into smaller groups (which do not overlap); 1
- (ii) (phylogenetic) based on evolutionary history;
shows ancestry of groups / points of divergence;
example, e.g. reptiles and birds separated after
mammals / reptiles and birds more closely related
than mammals;
(hierarchical) based on shared characteristics (seen today); 3 max
- [6]
- [7]

