2002

# XVIII

1583

**Time allowed**

**55 Minutes**

**Score**

/46

**Percentage**

%

# Biology

## Mark Scheme

# AQA
# AS & A LEVEL

## 3.4 Genetic information, variation and relationships between organisms

1    (a)    (i)    1.    Groups within groups;

> *1. accept idea of larger groups at the top / smaller groups at the bottom*

2.    No overlap (between groups);

**2**

(ii)    (Grouped according to) evolutionary links / history / relationships / common ancestry;

> *Neutral: closely related*

> *Neutral: genetically similar*

**1**

(b)    (i)    1.    (Only) one amino acid different / least differences / similar amino acid sequence / similar primary structure;

2.    (So) similar DNA sequence / base sequence;

**2**

(ii)    1.    Compared with humans / not compared with each other;

> *Accept: degenerate code / more than one triplet (codes) for an amino acid*

2.    Differences may be at different positions / different amino acids affected / does not show where the differences are (in the sequence);

**1 max**

(iii)    1.    All organisms respire / have cytochrome c;

> *Accept: converse arguments for haemoglobin*
> *1. Accept 'more' instead of 'all'*
> *1. Accept 'animals' instead of organisms☐*

2.    (Cytochrome c structure) is more conserved / less varied (between organisms);

> *2. Neutral: cytochrome c is conserved*

**1 max**

**[7]**

**2** (a) 1. Group of similar organisms / organisms with similar features / organisms with same genes / chromosomes;

*1. Accept: same number of chromosomes*

*1. Accept: smallest taxonomic group*

*1. Reject: genetically identical. Only allow 1 max if mentioned*

*1. **Q** Neutral: similar genes / chromosomes*

2. Reproduce / produce offspring;

*2. Accept: breed / mate*

3. That are fertile;

*3. Neutral: that are 'viable'*

*'Produce fertile offspring' = 2 marks*

**2 max**

(b) (i) Correct answer of 6.97 to 7 = 2 marks;

One mark for 6320 as numerator or 906 as denominator;

**2**

(ii) 1. Decrease in variety of plants / fewer plant species;

*1. Accept: reference to monoculture or description*

*1. Neutral: fewer plants*

2. Fewer habitats / niches;

*2. Neutral: fewer homes / less shelter*

3. Decrease in variety of food / fewer food sources;

*3. Neutral: less food*

*3. Accept: less variety of prey*

**3**

**[7]**

**3** (a) (i) 1. Groups within groups;

*Accept: idea of larg<u>er</u> groups at the top **or** small<u>er</u> groups at the bottom*

**2**

2. No overlap (between groups);

**1**

(ii) **3**;

(iii) Chordata;

*Accept: if phonetically correct eg 'Cordata'*

**1**

(b) (i) 1. (To provide) genetic variation;

*Genetic variation must be directly stated and not implied*

2. (Allows) different combinations of maternal and paternal chromosomes / alleles;

*Accept: any allele of one gene can combine with any allele of another gene*

**2**

(ii) 1. (Zedonk has) 47 / odd / uneven number of chromosomes;

*Accept: diploid number would be odd*

*Reject: if wrong number of chromosomes is given*

2. Chromosomes cannot pair / are not homologous / chromosome number cannot be halved / meiosis cannot occur / sex cells / haploid cells are not produced;

*Accept: cannot have half a chromosome*

***Q** Reject: meiosis cannot occur **in** sex cells*

**2**

**[8]**

4    (a)    PKNJ.

**1**

(b)    *Lutra lutra.*

**1**

(c)    Bone / skin / preserved remains / museums.

**1**

(d)    1.    (Hunting) reduced population size(s), so (much) only few alleles left;
           *Accept bottleneck*

       2.    Otters today from one / few surviving population(s);
           *Accept founder effect*

       3.    Inbreeding.
           *Allow any **two***

**2 max**

(e)    1.    Population might have been very small / genetic bottleneck;
       2.    Population might have started with small number of individuals / by one
           pregnant female / founder effect;
       3.    Inbreeding.
           *Allow any **two***

**2 max**

**[7]**

**5** (a) 1.    Kingdom, Phylum, Class, Order, Family; 2.
            *Luscinia svecica.*

                *1 mark for each correct column*

                *Allow Genus and Species if both placed in box for species
                but not if both placed in genus box*

2

**EXAM**

(b)    Number of different alleles of each gene.

                *Accept number of different base sequences (found) in each
                gene*

1

(c)    1.    Has greater proportion of genes / percentage of genes showing
            diversity;
        2.    Percentage is 35% compared with 28% / proportion is 0.35 compared
            with 0.28.

                *Allow correct figures that are not rounded up, i.e., 34.9% /
                0.349 and 27.8% / 0.278*

2

[5]

6  (a)  Aves;

1

(b)  Gallicolumba kubaryi;

*Must have <u>both</u> words and in <u>this</u> order*

*Must be capital G*

*If starts with k, award mark as impossible to recognise difference*

*Ignore: underlining*

*Accept: phonetic spelling*

*Accept: G kubaryi (must be a capital / upper case G)*

1

(c)  No overlap.

1

[3]

**7** (a) 1. Recognise / identify / attract same species;
          *Ignore: references to letting them produce fertile offspring*

    2. Stimulates / synchronises mating / production / release of gametes;

    3. Recognition / attraction of mate / opposite sex;
          *Accept finding a mate*
          *Accept: gender*

    4. Indication of (sexual) maturity / fertility / receptivity / readiness to mate;
    5. Formation of a pair bond / bond between two organisms (to have / raise young).       **3 max**

 

(b) 1. Use a (real) male (with intact wings / no wing removed);
          *Mark ignoring reference to birds / or other types of animals*
          *Accept: use a real cricket, since only males sing*       **2**

    2. Determine (percentage) response (of females compared with **L**).
          *Accept: compare results with* **L**

(c) 1. Lowest / only 30% courtship with no song / K / (or) courtship still occurred when no song played / **K**;
          *Note: throughout, for courtship accept response / stimulation / reaction*
          *Neutral: references to methodology*
          *Answer must make clear there is no song / version K*

    2. Reduced courtship when no ticks / M / there is some courtship when no ticks / M;

    3. Reduced courtship when no chirps / N / there is some courtship when no chirps / N;
          *Accept: use of figures from the table <u>in an explanation</u>*

    4. (So) courtship must involve a visual stimulus / other factor involved;

    5. Chirps more important as lowest courtship when none / N / ticks less important as similar courtship when changed / M;
          *Must make comparison to gain mark*

    6. Data only show presence and absence of chirps / 0 and 7 chirps.

    *Note: 'courtship still occurred when no sound played so a visual stimulus / other factor / something else (e.g. pheromone?) must be involved'*
    *= 2 marks*       **4 max**     **[9]**