EXAM PAPERS PRACTICE

Boost your performance and confidence with these topic-based exam questions

Practice questions created by actual examiners and assessment experts

Detailed mark scheme

Suitable for all boards

Designed to test your ability and thoroughly prepare you

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) 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]

2 (a) Translation. **1**

(b) Transfer RNA / tRNA. **1**

(c) TAC;

UAC. **2**

(d) Have different R group.

Accept in diagram **1**

(e) 1. Substitution would result in CCA / CCC / CCU;
2. (All) code for same amino acid / proline;
3. Deletion would cause frame shift / change in all following codons / change next codon from UAC to ACC. **3**

[8]

3 (a) (No – no mark)

Graph / bar chart only shows number of species, not the name of the species.

1

(b) (No – no mark)

1. Mutations are spontaneous / random;
2. Only the rate of mutation is affected by environment;
3. Different species do not interbreed / do not produce fertile offspring;
4. So mutation / gene / allele cannot be passed from one species to another.

Ignore references to correlation does not prove causation

4

(c)
1. Initially one / few insects with favourable mutation / allele;
2. Individuals with (favourable) mutation / allele will have more offspring;
3. Takes many generations for (favourable) mutation / allele to become the most common allele (of this gene).

3

[8]

4 (a) 1. Chromosome is formed of two chromatids;
2. (Because) DNA replication (has occurred);
3. (Sister) chromatids held together by centromere.

3

(b) 1. Chromosomes in homologous pair;
2. One of each into daughter cells / haploid number.

2

(c) Separation of (sister) chromatids / division of centromere.

1

(d) 1. Independent segregation (of homologous chromosomes);
Accept random assortment
2. Crossing over / formation of chiasmata.

2

[8]

5 (a) 1. Change / mutation in base / nucleotide sequence (of DNA / gene); *Q.*

Ignore: references to changing base-pairing

Accept: affect for change, if in correct context

Accept: changes triplets / codons

2. Change in amino acid sequence / primary structure (of enzyme);

Accept: different amino acid(s) coded for

***Q** Reject: different amino acids produced / formed / made*

3. Change in hydrogen / ionic / disulfide bonds;

Accept: references to sulfur bonds

4. Change in the tertiary structure / shape;

Neutral: alters 3D structure / 3D shape

5. Change in active site;

6. Substrate not complementary / cannot bind (to enzyme / active site) / no enzyme-substrate complexes form.

Accept: no E S complexes form

6

(b) 1. Non-SR strain falls more / SR strain falls less / up to 10(µg / cm−3);

Must include 10 but only required once in either MP1 or MP2

Ignore: units or absence of

This must be a comparative statement

2. Above 10(µg / cm^{-3}), SR strain levels out / off and non-SR strain continues to decrease;

3. Greater difference between strains with increasing concentration of antibiotic.

This must be a comparative statement

2 max

(c) 1. Division stopped (of both strains by scientist);

Reject: references to mitosis stopping

2. SR strain still more resistant / fewer die / none die (at higher concentrations of antibiotic).

Accept: SR strain and non-SR strain would be similar if

resistance is due to only stopping division
Need some comparison with non-SR

2

(d) 1. Make a competitive / non-competitive inhibitor;
Mark in pairs
either MP1 <u>and</u> MP2 OR MP3 <u>and</u> MP4

2. Competitive competes with / blocks active site / non-competitive inhibitor affects / changes <u>active site</u>;
Do not mix and match

OR

3. (Make a drug) that inhibits / denatures / destroys enzyme / stringent response;
Accept: drug that 'knocks out' / destroys enzyme

4. Give at the same time as / before an antibiotic.

2 max

(e) (SR strain)

1. Fewer free radicals (than non-SR);
Note: has to be comparative statement

2. Produces more catalase (than non-SR);
Accept converse statements for non-SR.

3. Catalase (might be) linked to production of fewer free radicals / breaking down / removing free radicals.
Accept: hydrolysis of radicals by catalase.

3

[15]