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

3.7 Genetics, populations, evolution and ecosystems

1 (i) 1. Identical twins show genetic influence / differences between them show environmental influence;

Neutral: allows a comparison

It must be clear which set of twins is being referred to

2. Non-identical twins (also) show an environmental / non-genetic influence;

It must be clear which set of twins is being referred to

Do not credit repetition of bullet points in stem

2

(ii) Genes play a greater role / environment plays a lesser role;

Must be comparative

Neutral: genes are involved

Neutral: involves genes and the environment

1

(iii) Any suitable suggestion for a maximum of two marks e.g.:

Neutral: 'environment' as in question stem

Neutral: unqualified ideas such as health / lifestyle

1. Age;
2. Sex (non-identical twins);
3. Family / medical history (of mental illness);
4. No use of recreational drugs;
5. Ethnic origins;

2 max

[6]

2 (a) 1. Allows (valid) comparison;

2. Number / sample size may vary;

2

(b) 1. Increased chance of (severe malaria) with blood group A / decreased chance of (severe malaria) with sickle cell;

Accept: converse for mild malaria i.e. increased chance of mild malaria with sickle cell / decreased chance of mild malaria with blood group A.

Accept: if answer is comparative e.g. greatest risk of severe malaria with blood group A.

2. One mark for one of the following:

almost equal chance with blood group O / slightly greater chance of mild malaria with O / slightly lower chance of severe malaria with O / 2.5 x / 2.48 x / more than twice the chance of severe with blood group A / (almost) 50% / half the chance of severe malaria with sickle cell / twice the chance of mild malaria with sickle cell;

Neutral: answers which only refer to or use ratios.

2

(c) 1. Individuals with the **Hb**^{C} (allele) reproduce;

2. Pass on **Hb**^{C} (allele) which increases in frequency;

3. **Hb**^{A} **Hb**^{A} individuals less likely to survive / reproduce / frequency of **Hb**^{A} (allele) decreases;

3

[7]

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) 0.32.

Correct answer = 2 marks

Accept 32% for 1 mark max

Incorrect answer but identifying 2pq as heterozygous = 1 mark

2

(b)
1. Mutation produced *KDR minus* / resistance allele;
2. DDT use provides selection pressure;
3. Mosquitoes with *KDR minus* allele more likely (to survive) to reproduce;
4. Leading to increase in *KDR minus* allele in population.

4

(c)
1. Neurones remain depolarised;
2. So no action potentials / no impulse transmission.

2

(d)
1. (Mutation) changes shape of sodium ion channel (protein) / of receptor (protein);
2. DDT no longer complementary / no longer able to bind.

2

[10]

5 (a) 1. Geographic(al) isolation;

2. Separate gene pools / no interbreeding / gene flow (between populations);

Accept: reproductive isolation

This mark should only be awarded in context of during the process of speciation. Do not credit if context is after speciation has occurred.

3. Variation due to mutation;
4. Different selection pressures / different abiotic / biotic conditions / environments / habitats;

Neutral: different conditions / climates if not qualified

Accept: named abiotic / biotic conditions

5. Different(ial) reproductive success / selected organisms (survive and) reproduce;

Accept: pass on alleles / genes to next generation as equivalent to reproduce

6. Leads to change / increase in allele frequency.

Accept: increase in proportion / percentage as equivalent to frequency

6

(b) 1. Capture / collect sample, mark and release;
2. Method of marking does not harm lizard / make it more visible to predators;
3. Leave sufficient time for lizards to (randomly) distribute (on island) before collecting a second sample;
4. (Population =) number in first sample × number in second sample divided by number of marked lizards in second sample / number recaptured.

4

(c) 1. High concentration of / increase in carbon dioxide linked with respiration at night / in darkness;
2. No photosynthesis in dark / night / photosynthesis only in light / day;

Neutral: less photosynthesis

3. In light net uptake of carbon dioxide / use more carbon dioxide than produced / (rate of) photosynthesis greater than rate of respiration;
4. Decrease in carbon dioxide concentration with height;

More carbon dioxide absorbed higher up

Accept: less carbon dioxide higher up / more carbon dioxide lower down

5. (At ground level)
less photosynthesis / less photosynthesising tissue / more respiration / more micro-organisms / micro-organisms produce carbon dioxide.

Neutral: less leaves unqualified or reference to animals

5

[15]