



Natural selection: practice questions

5 questions · 16 marks · mark scheme at the back

For IB Diploma Biology SL undefined. **HL only** is additional higher level content, for HL students only.

Name

Total / 16

1 PAPER 1A STYLE [1 mark]

Which process generates new alleles?

- A. ☐ Mutation
- B. ☐ Crossing over
- C. ☐ Random orientation of bivalents
- D. ☐ Random fertilisation

2 PAPER 1A STYLE [1 mark]

Which is a density-independent selection pressure?

- A. ☐ Competition for nesting sites
- B. ☐ A very cold winter
- C. ☐ Predation by owls
- D. ☐ Spread of disease in a crowded population

3 PAPER 2A STYLE [2 marks]

A gardener grows a plant in rich, fertile soil and it grows very tall. Explain why its offspring will not inherit this extra height.

[6 marks]

Mean number of spots per male guppy			
Treatment	0 months	5 months	14 months
No predator	10.0	11.2	12.5
Rivulus	10.0	11.0	12.2
Crenicichla	10.0	9.1	8.4

[illegible]

[6 marks]

[illegible]

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

A A [1]

2. [1]

B B [1]

3. [2]

- height was acquired due to an environmental factor / soil, not genes [1]
- acquired characteristics are not encoded in the base sequence of genes / DNA of gametes [1]
- so they cannot be passed on / only heritable traits can evolve [1]
- max 2

4. [6]

- (a) $(12.5 - 10.0) \div 10.0 \times 100$ [1]
- (a) +25% / increase of 25% [1]
- (b) Rivulus: spots increased (10.0 to 12.2) whereas Crenicichla: spots decreased (10.0 to 8.4) [1]
- (b) both start at the same value / both change in the same time / difference grows with time [1]
- (c) brightly coloured males are more conspicuous / more likely to be eaten by Crenicichla [1]
- (c) males with fewer spots survive and reproduce more, passing on alleles for fewer spots [1]
- (c) predation outweighs sexual selection / female preference for colourful males OWTTE [1]
- max 6

5. [6]

- variation exists between individuals in a population [1]
- mutation generates new alleles [1]
- sexual reproduction / meiosis and fertilisation generate new combinations of alleles [1]
- more offspring are produced than the environment can support / overproduction [1]
- population exceeds carrying capacity so there is competition for limited resources, e.g. food [1]
- selection pressures, e.g. predation / extreme temperature, affect individuals differently [1]
- better-adapted individuals / those with higher fitness survive and reproduce more [1]
- they pass on alleles for the favourable traits to offspring [1]
- only heritable traits / not acquired characteristics are passed on [1]
- over many generations the frequency of the favourable trait / allele increases [1]
- max 6