

17.2 Natural & Artificial Selection

Question Paper

Course	CIEA Level Biology
Section	17. Selection & Evolution
Topic	17.2 Natural & Artificial Selection
Difficulty	Easy

Time allowed: 30
Score: /21
Percentage: /100

Question 1a

State the purpose of the Hardy Weinberg equation.

[1 mark]

Question 1b

The Hardy Weinberg principle states that the genetics of a population will remain constant from one generation to the next provided that certain conditions, or assumptions, are met.

State **three** of the assumptions made by the Hardy Weinberg principle.

[3 marks]

Question 1c

One of the Hardy Weinberg equations is given below.

$$p + q = 1$$

State what is represented by **p** in this equation.

[1 mark]

Question 1d

In a population, the frequency of the recessive allele is 0.21.

Use the equation provided in part (c) to calculate the frequency of the dominant allele in this population.

[2 marks]

Question 2a

Fig. 1 shows the effects of different types of selection, **A** and **B**, that can act on a population.

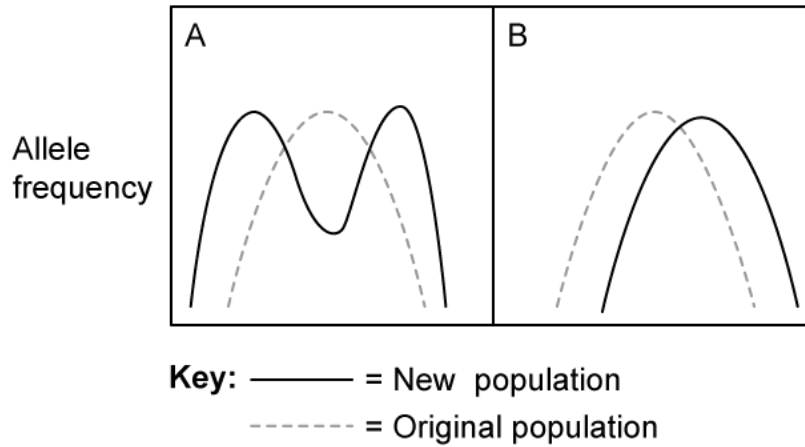


Fig. 1

Identify the type of selection represented by **A** and **B** in Fig. 1.

[2 marks]

Question 2b

Describe the type of selection represented by graph **A** in Fig. 1.

[2 marks]

Question 2c

A mutation occurs within a population that results in a new allele. Organisms with this allele have increased fitness compared to organisms that do not have the allele.

Define the term **fitness**.

[2 marks]

Question 2d

(i)

State which, from **A** or **B** in Fig. 1, would best represent the type of selection that may occur in the population described in part (c).

[1]

(ii)

Give a reason for your answer in part (i).

[1]

[2 marks]

Question 3a

Fig. 1 shows a male northern elephant seal.



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Fig. 1

Northern elephant seals (*Mirounga angustirostris*) are found along the west coast of the U.S. and Mexico. They were hunted to near extinction at the end of the 19th century and only a small population of about 100 seals survived.

Fortunately their population numbers have since recovered and it is currently estimated that around 150 000 northern elephant seals occur across their native range.

This event changed the allele frequency in the northern elephant seal population.

State the name of the event that has caused this change in allele frequency.

[1 mark]

Question 3b

Explain the disadvantage of the event described in part (a) for the population of northern elephant seals.

[2 marks]

Question 3c

The event described in part (a) may lead to a change in the allele frequency of a population over time.

Give **two other** processes that may change the allele frequency in a population over time.

[2 marks]

Question 3d

A change in the allele frequency may impact the genetic diversity of a population.

Define the term **genetic diversity**.

[1 mark]