AQA, OCR, Edexcel

A Level

A Level Biology

Populations Questions

Name:

MME

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Total Marks: /26

Populations

1. Genetics doesn't just focus on the genes within an individual organism or its parents, often the genetics of a whole population are examined to gain information about a species and how it interacts with its environment.

   a)
   i) Complete the table below with the correct definitions: (3 marks)

POPULATION
GENE POOL
ALLELE

   b) The Hardy-Weinberg principle is used to predict allele frequency.

   i) Explain the equation shown below. (3 marks)

   $$p^2 + 2pq + q^2 = 1$$

   ii) A genetic disease affects 1 in 2,500 individuals in the UK. It is caused by a recessive allele. Calculate the frequency of the carrier genotypes in the population as a percentage. (4 marks)

   c) In a population of field mice are either grey or brown. Brown mice possess the dominant allele (B), the frequency of this allele is 0.75.

   i) Work out the frequencies of the different genotypes and phenotypes of the mice in the population as a percentage.
   (3 marks)

ii) The Hardy-Weinberg principle only works under certain conditions, with regard to the population of field mice mentioned above, identify three of these conditions. (3 marks)

iii) Why is it important that these conditions remain constant? (1 mark)

2. Selection affects the frequency of alleles; there are different types on selection.

a) Two main types of selection are stabilising selection and directional selection.

i) Describe how the two main types of selection work (4 marks)

ii) The environment can act as a selection pressure. Using the graph below, discuss how changes in selection pressures has led to the trend in antibiotic resistance. (5 marks)

Increase in Antibiotic Resistance[1]