OXFORD

INTERNATIONAL AQA EXAMINATIONS

Topic Test: OxfordAQA International GCSE Biology 9201

Variation and evolution

Name: _____

Class: _____

Date: _____

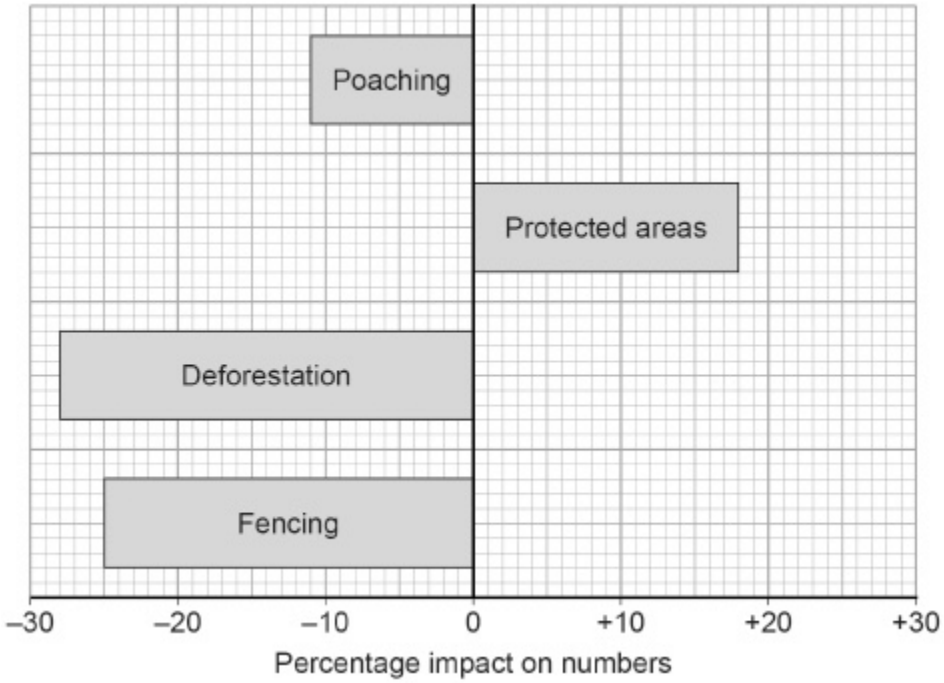
Time: **25 minutes**

Marks: **25 marks**

Comments:

1 **Figure 1** shows how different human activities affect the number of blue wildebeest in the wild.

Figure 1



(a) Describe the relative effects of human activities on blue wildebeest numbers.

(3)

(b) Over 1 million years ago the only wildebeest was the blue wildebeest.

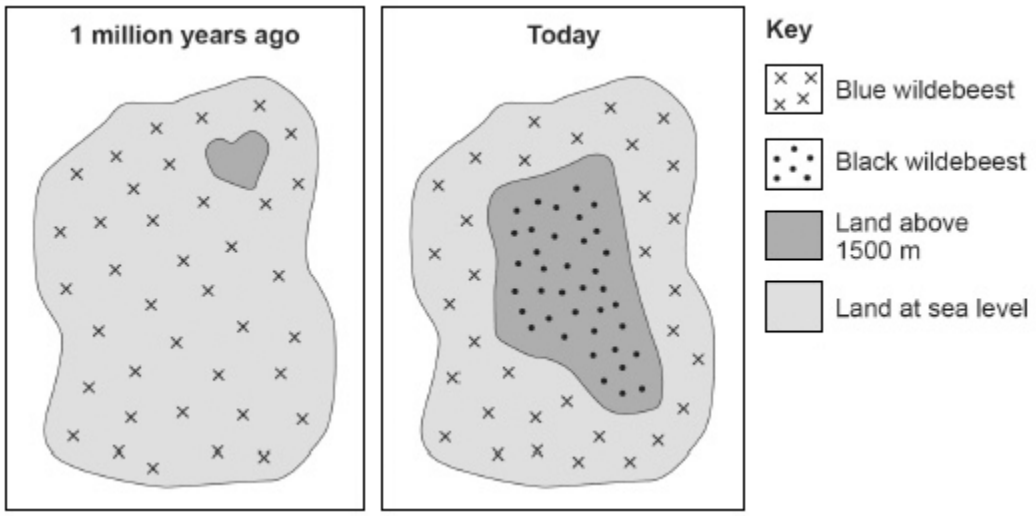
Over time the land where wildebeest lived changed. Some land rose high above sea level and is known as the Highveld.

The wildebeest must be on the same level as their partner to mate.

There are now two species: the original blue wildebeest and a newer species known as black wildebeest.

Figure 2 shows the distribution of wildebeest species 1 million years ago and today.

Figure 2



Explain how the development of the Highveld led to the formation of two separate species of wildebeest.

(5)

(Total 8 marks)

2 The drawings show two different species of butterfly.

Amauris

Hypolimnas

- Both species can be eaten by most birds.
- *Amauris* has an unpleasant taste which birds do **not** like, so birds have learned **not** to prey on it.
- *Hypolimnas* does **not** have an unpleasant taste but most birds do **not** prey on it.

(a) Suggest why most birds do **not** prey on *Hypolimnas*.

_____

_____

_____

_____

(2)

(b) Suggest an explanation, in terms of natural selection, for the markings on the wings of *Hypolimnas*.

_____

_____

_____

_____

_____

_____

(3)

(Total 5 marks)

3 Read the extract.

Super-bug may hit the price of coffee

The coffee bean borer, a pest of the coffee crop, can be controlled by the pesticide endosulphan However, strains of the insect that are up to 100 times more resistant to the pesticide have emerged on the South Pacific island of New Caledonia.

For full resistance to be passed on to an offspring two copies of the new resistance allele should be inherited, one from each parent. There is much inbreeding with brother-sister matings happening in every generation, so it takes only a few generations before all the descendants of a single resistant female have inherited two copies of the resistance allele.

If this resistance spreads from New Caledonia, it will mean the loss of a major control method. This will present a serious threat to the international coffee industry.

(a) Suggest how the allele for resistance to endosulfan may have arisen.

_____

_____

(1)

(b) (i) How would you expect the proportion of normal coffee bean borers on New Caledonia to change over the next few years?

_____

(ii) Explain why this change will take place.

_____

_____

_____

_____

_____

_____

(3)

(c) Explain why “it takes only a few generations before all the descendants of a single resistant female have inherited two copies of the resistance allele.” (lines 6-8)

_____

_____

_____

_____

_____

_____

(3)

(Total 7 marks)

4 The Blue-moon butterfly lives on a small island called Samoa, in the Pacific Ocean.

By Emoke Dénes [CC-BY-SA-2.5], via Wikimedia Commons

In 2006 Blue-moon butterflies almost became extinct.

Wolbachia bacteria killed males before they could hatch from eggs. Only females were resistant to the bacteria.

In 2006 the number of male Blue-moon butterflies had decreased to only 1 per cent of the population. Two years later, the number of males was equal to the number of females.

(a) Scientists believe that a change in a gene suddenly occurred to make some males resistant to the bacteria.

What scientific term describes a change in a gene?

_____

(1)

(b) The numbers of male Blue-moon butterflies in the population increased quickly after the new form of the gene had appeared.

Suggest why.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 5 marks)

1 (a) deforestation reduces numbers the most or poaching the least

allow use of figures

1

protected areas only increasing numbers

1

overall human activities reduce wildebeest numbers

1

(b) (populations became) geographically isolated

allow described

1

genetic variation within populations

allow wide range of alleles or mutations

1

alleles/genes/characteristics which help the organism to survive are selected

***do not** allow 'adapt to survive'*

allow same idea described in natural selection

1

these alleles/genes are passed onto offspring

allow mutations passed on

1

populations so different that breeding to produce fertile offspring is no longer possible

allow cannot successfully interbreed

1

[8]

2 (a) wing pattern similar to *Amauris*

allow looks similar to Amauris

1

birds assume it will have an unpleasant taste

1

(b) mutation / variation produced wing pattern similar to *Amauris*

*do **not** accept breeds with Amauris*

*do **not** accept idea of intentional adaptation*

1

these butterflies not eaten (by birds)

1

these butterflies breed **or** their genes are passed to the next generation

1

[5]

3 (a) mutation

for 1 mark

1

(b) fall,
idea that resistant beetles more likely to survive to breed,
∴ their offspring more likely to appear in the next generation

for 1 mark each

3

(c) inbreeding between resistant brothers and sister,
will produce some individuals with 2 copies of the resistance allele,
if 2 of these individuals breed all their offspring will be resistant

for 1 mark each

3

[7]

4 (a) <u>mutation</u>

correct spelling only

ignore other adjectives eg random / spontaneous

1

(b) *ignore references to X / Y chromosomes*

idea of mutant gene / new form / this allows <u>hatching</u> (of males)

1

(individual with advantage) (more) survive / (more) live / (more) don't die

allow immunity rather than resistance throughout

1

(so survivors) breed / reproduce

1

mutation / gene passed (from survivors) to offspring / next generation

allow resistance / characteristic for gene
'gene passed on' is insufficient

1

[5]