Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Natural selection

Time allowed: 25 minutes

Subject code **0610**

Biology

Questions from Paper 1, Paper 2 and Paper 4

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.

Total marks

/ 25

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.

Information

- This paper has 10 questions worth 25 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 When is evolution by natural selection most likely to occur?

A when there is a stable population of predators

B when there is a stable environment

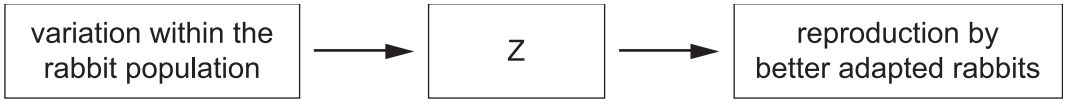
C when there is less variation in the population

D when there is more variation in the population

Natural and artificial selection Click for more variations

Answer D

2 The diagram shows some of the stages involved in natural selection in wild rabbits.



Which statement is missing from box Z?

A competition between rabbits for limited resources

B passing on of alleles to the next generation of young rabbits

C production of limited numbers of young rabbits

D selection by humans of rabbits with desirable characteristics

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Answer A

3 A species of insect usually has pale-coloured wings. This helps to camouflage them on pale-coloured tree trunks. A few of the insects in this species have darker coloured wings.

After a number of years the tree trunks become darker in colour due to environmental changes. The insects with dark-coloured wings become more common than insects with pale-coloured wings in this species.

Which process causes this change in the proportion of insects with dark-coloured wings?

A biotechnology

B conservation

C natural selection

D selective breeding

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Answer C

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4 The list shows statements about selection.

1 Individuals reproduce and pass on their alleles to the next generation.

2 Genetic variation exists between individuals and many offspring are produced.

3 Individuals struggle for survival and compete for resources.

4 Individuals that are better adapted to the environment survive.

5 Individuals with desirable features are selected by humans.

Which statements are correct descriptions of natural selection?

A 1, 2, 3 and 4

B 1, 2 and 5 only

C 2, 3 and 4 only

D 3, 4 and 5 only

Natural and artificial selection Click for more variations

Answer A

5 Bacteria such as MRSA are resistant to antibiotics.

These processes can occur in bacteria.

1 artificial selection

2 genetic variation

3 mutation

4 natural selection

Which processes lead to the development of antibiotic resistance?

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 2, 3 and 4 only

D 2 and 4 only

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Answer C

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6 The photograph shows a species of fish called a leafy sea-dragon.

Leafy sea-dragons live in areas of the sea where seaweed is present.



Which statements explain how natural selection caused the leafy sea-dragon species to develop?

1 Leafy sea-dragons that looked like seaweed were better adapted to their environment.

2 Leafy sea-dragons that survived passed on the allele for their appearance to their offspring.

3 Humans selected leafy sea-dragons that looked like seaweed.

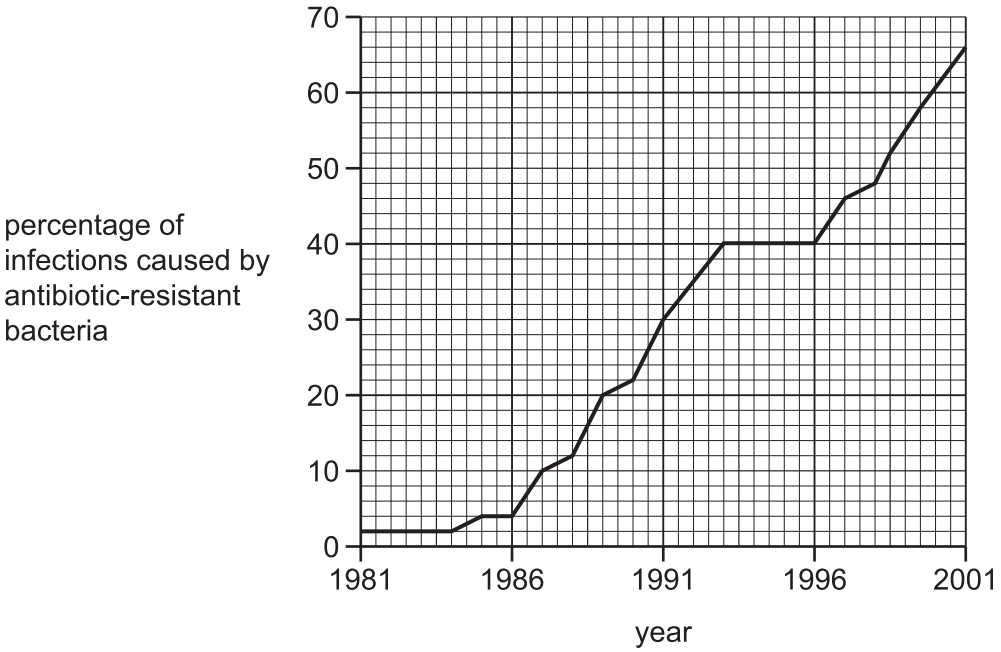
A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

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Answer B

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7 The graph shows the change in the percentage of infections caused by antibiotic-resistant bacteria in one country.



Which statements could explain the change in the percentage of infections caused by antibiotic-resistant bacteria?

1 The use of antibiotics has resulted in natural selection for resistant bacteria.

2 The use of antibiotics has caused a decrease in viral diseases.

3 The use of antibiotics when **not** essential increased the percentage of antibiotic-resistant infections.

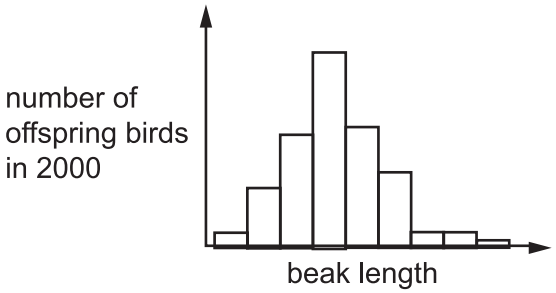
A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 only

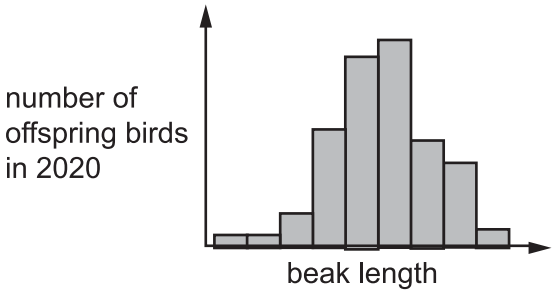
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Answer B

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8 The graphs show the beak length of offspring of a wild bird population in 2000 and in 2020. The graphs are drawn to the same scale.





Which change has taken place in the overall beak length of the bird population, and what type of selection has brought this about?

	change in the beak length of the bird population	type of selection
A	decrease	artificial
B	decrease	natural
C	increase	artificial
D	increase	natural

Measurements, tables, graphs and conclusions Click for more variations

Answer D

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9 The Galápagos Islands are a group of small islands in the Pacific Ocean.

In 1839 Charles Darwin published a book that described differences in a family of birds called finches.

Each species of Galápagos finch had:

- a different diet
- a different beak shape, as shown in Fig. 5.1.

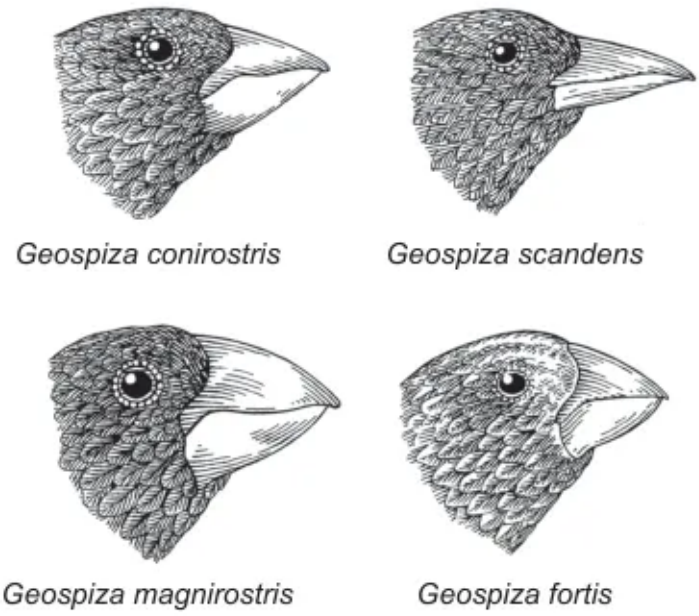


Fig. 5.1

(a) State the genus name for the Galápagos finches shown in Fig. 5.1.

..... [1]

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(b) Galápagos finches share a common ancestor.

Suggest how Galápagos finches have evolved different shaped beaks.

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..... [5]

[Total: 6]

Natural and artificial selection Click for more variations

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9(a)(i)	*Geospiza* ;	**1**
9(a)(ii)	*any five from:* natural selection ; variation (in beak shapes) ; mutation / description ; those birds with, selective advantage / unique beak shape, more likely to find food and survive ; the birds that survive reproduce ; pass on their alleles ; continues over many generations ; AVP ;	**5**

10 Bacteria are classified in the Prokaryote kingdom.

(a) State **two** features of animal **and** plant cells that are **not** found in prokaryotes.

1 .....

2 .....

[2]

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(b) Methicillin-resistant *Staphylococcus aureus* (MRSA) is a type of bacterium that is resistant to some antibiotics.

Fig. 5.1 shows how a population of bacteria may develop antibiotic resistance and how the antibiotic resistance can be passed from one strain of bacterium to another.

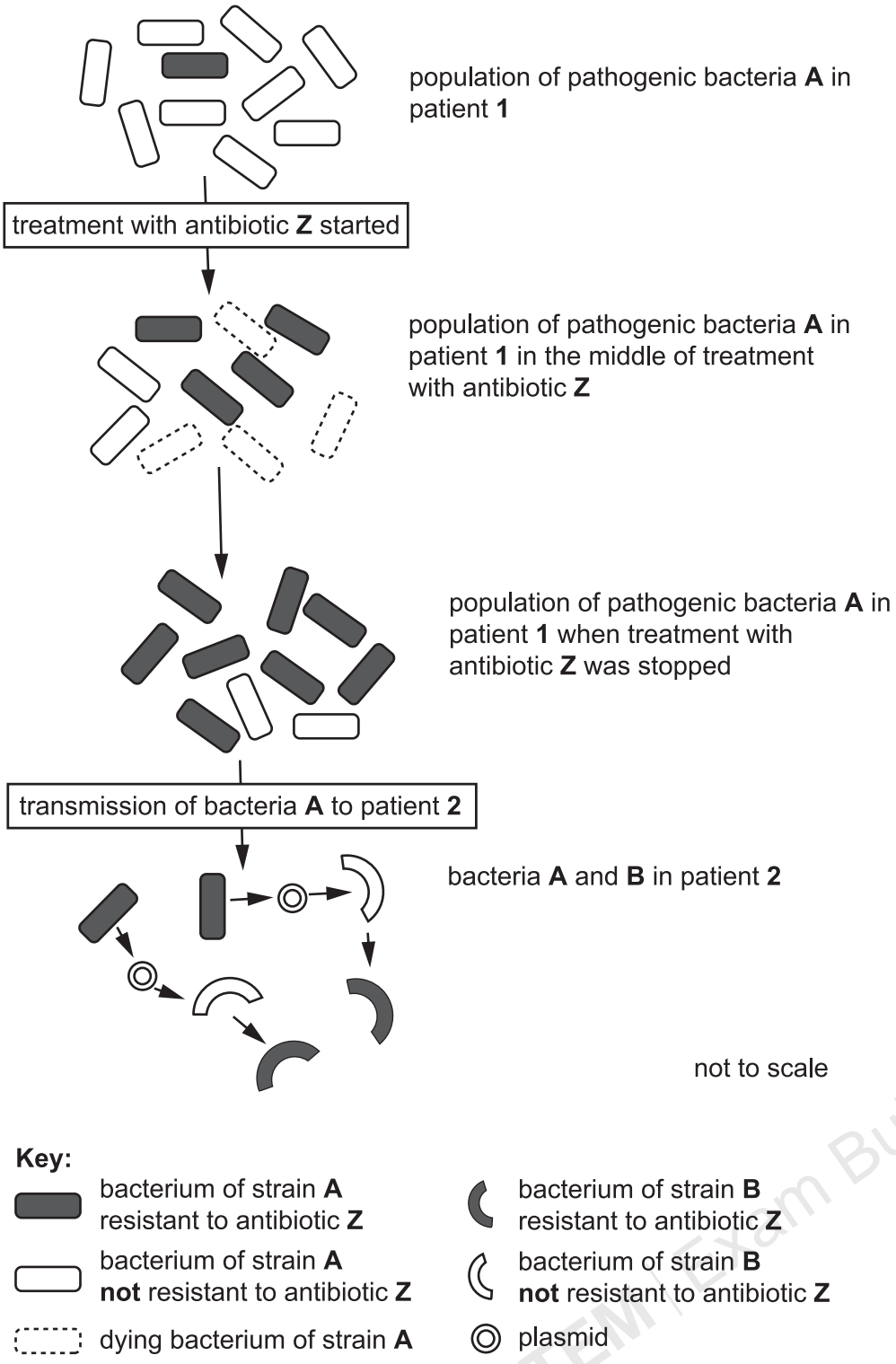


Fig. 5.1

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Explain how resistance to an antibiotic develops in a population of bacteria and spreads in the human population.

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(c) Explain how the development of resistant bacteria, such as MRSA, can be minimised.

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..... [3]

[Total: 11]

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10(a)	*any two from:* nucleus / nuclear membrane / nuclear envelope ; (linear) chromosomes ; mitochondrion ; endoplasmic reticulum ; vacuoles / vesicles ; AVP ;	**2**

10(b)	*any six from:* resistance arises by mutation ; in small number of bacteria ; ref. to a random event (not related to presence of antibiotic) ; antibiotic kills bacteria that do not have the mutation / AW ; resistant bacteria have no competition ; resistant bacteria reproduce ; pass on, gene / allele, for resistance ; natural selection ; method of transmission from one person to another described ; gene transferred to other bacteria (of different type) in a plasmid ; AVP ;	**6**
10(c)	*any three from:* prescribe / use, antibiotics less often ; do not use for, viral / fungal, infections ; make sure people complete the course of antibiotics / AW ; develop new antibiotics ; do not use the same antibiotics for too long / rotate antibiotics / AW ; use combinations of antibiotics ; AVP ;; e.g. isolation of patients with antibiotic-resistant infections / good hygiene to prevent spread of infection / reduce use of antibiotics in farming	**3**

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