

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

1 a Which of the following is the best definition of **evolution**?

Tick **one** box.

- A** changes in the population number of a species over time
- B** when animals and plants die out because of natural selection
- C** the extinction of species that are not well adapted
- D** gradual changes in the characteristics of a species over time

(1)

b Jean-Baptiste Lamarck (1744–1829) proposed a theory of evolution.

Lamarck said that the characteristics of individual organisms change during their lifetime and that these changes are passed on to their offspring.

State **one** way in which Charles Darwin’s theory of evolution differs from Lamarck’s theory.

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(1)

**(Total for Question 1 = 2 marks)**

2 Scientists who study human evolution are interested in the stone tools that early humans used.

Stone tools were used for hunting.

a State **two** other uses of stone tools.

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

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(2)

b Scientists use various methods to date stone.

Explain why stone tools are dated using the age of the rock in which they were found, and not the age of the stone from which the tool was made.

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(2)

c Explain how evidence from stone tools supports the idea that the brains of early human-like animals became bigger over time.

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(2)

(Total for Question 2 = 6 marks)

3 Scientists measured the beak depths of one species of bird living on a small island over 3 years.

The beak depths were measured to the nearest 0.1 mm.

- In **Year 1** beak depths were measured and are shown as white bars on **Figure 1**.
- In **Year 2** there was a very severe drought (lack of rainfall). Many birds died. No measurements were made in Year 2.
- In **Year 3** beak depths were measured and are shown as black bars on **Figure 1**.

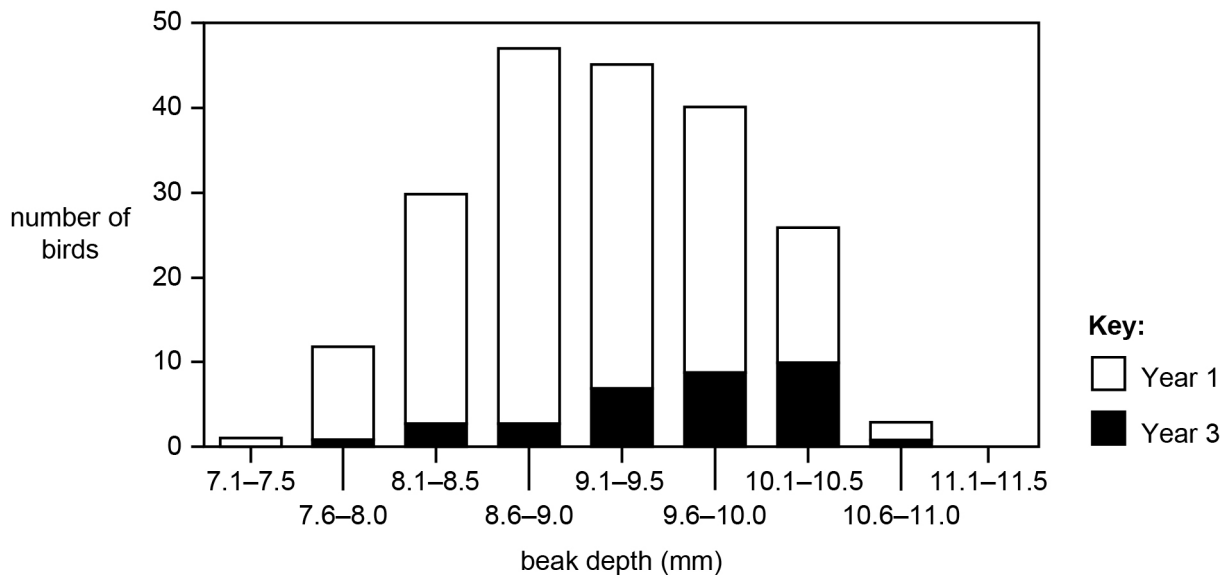


Figure 1

a Determine the modal class for beak depth in the Year 1 data.

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(1)

b Compare the results shown by the data for Year 1 and Year 3.

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(2)

(Total for Question 3 = 3 marks)

4 Organisms can be classified into different groups.

a The members of some kingdoms have cells with nuclei.

Identify the option that lists **all** of the kingdoms that have cells with nuclei.

Tick **one** box.

- A** animals and plants
- B** animals, plants and fungi
- C** animals, plants, fungi and protists
- D** animals, plants, fungi, protists and prokaryotes

(1)

b *Drosera magnifica* is an organism that was first discovered in 2015.

Its cells have permanent vacuoles and are surrounded by a layer of cellulose.

State the name of the kingdom that this organism belongs to.

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(1)

c Boxes W to Z show descriptions of four groups of organisms.

<b>W</b> organisms that have feathers	<b>X</b> organisms with multi-coloured feathers
<b>Y</b> multicellular organisms	<b>Z</b> organisms that have skeletons

Which is the correct sequence in which these groups would have evolved?

Tick **one** box.

- A** YWXZ
- B** ZYWX
- C** YZWX
- D** ZWXY

(1)

d Which technique was developed and showed that all organisms apart from prokaryotes have unused sections of DNA in their genes?

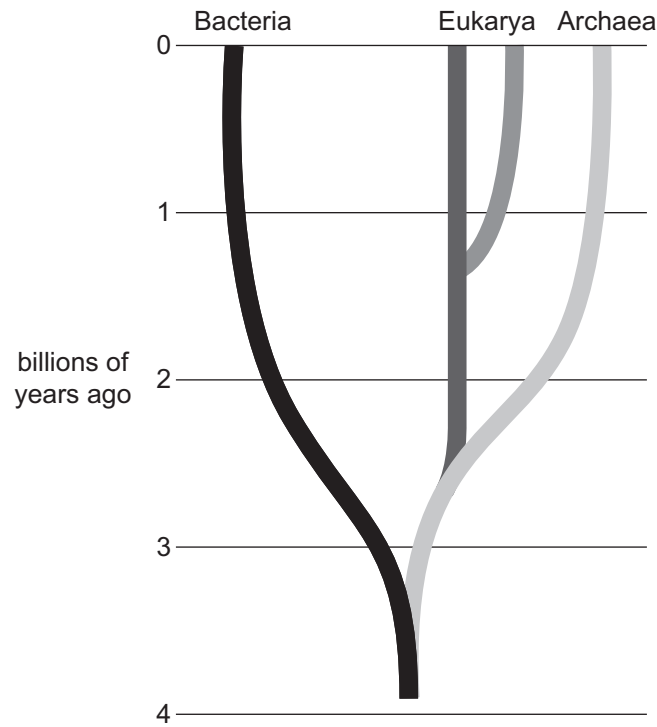
Tick **one** box.

- A** genetic analysis
- B** genetic coding
- C** genetic engineering
- D** genetic modification

(1)

More recently, scientists have started to classify organisms as belonging to one of three domains.

**Figure 2** shows how some scientists think the three domains of life evolved.



**Figure 2**

**e** Determine how long ago Eukarya and Archaea shared a common ancestor.

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(1)

**f** Archaea were once thought to be types of bacteria.

State **one** reason why Archaea are no longer classified in the same domain as bacteria.

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(1)

**(Total for Question 4 = 6 marks)**

5 *Clostridium difficile* is a bacterium that is resistant to many antibiotics.

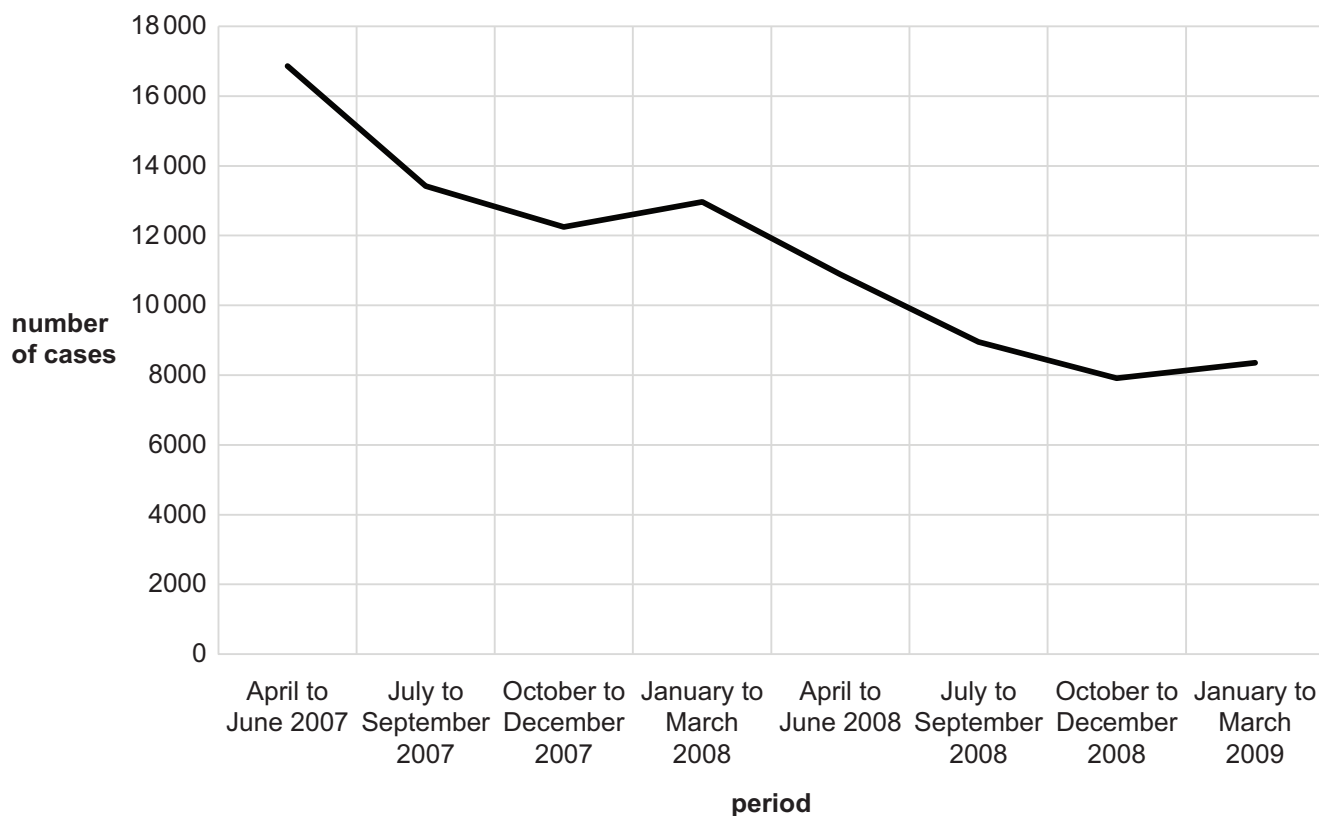
Hospitals have to report how many cases of *Clostridium difficile* they have had in the previous 3 months.

**Figure 3** is a table summarising the number of cases of *Clostridium difficile* reported in England between April 2007 and March 2009.

April to June 2007	July to September 2007	October to December 2007	January to March 2008	April to June 2008	July to September 2008	October to December 2008	January to March 2009
16864	13419	12248	12967	10883	8948	7907	8357

**Figure 3**

**Figure 4** is a graph of the data in **Figure 3**. It shows the number of cases of *Clostridium difficile* between April 2007 and March 2009.



**Figure 4**

a Describe the trend in the number of cases of *Clostridium difficile* over this period of time using **Figures 3** and **4**.

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(2)

- b Calculate the percentage change in the number of cases of *Clostridium difficile* between April–June 2007 and April–June 2008. Use the data in **Figure 4**.

\_\_\_\_\_ (2)

- c People who take antibiotics to treat an infection often stop taking them too early because they feel better.

Explain how not finishing a course of antibiotics could lead to the evolution of antibiotic-resistant bacteria.

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(3)

**(Total for Question 5 = 7 marks)**

6 Genetically-engineered bacteria are now commonly used to produce proteins for medical use.

a One example of a protein produced by genetically-engineered bacteria is insulin.

i State **two** enzymes used in genetic engineering to produce proteins such as insulin and explain what each enzyme is used for.

Enzyme 1: \_\_\_\_\_

Use: \_\_\_\_\_

\_\_\_\_\_

Enzyme 2: \_\_\_\_\_

Use: \_\_\_\_\_

\_\_\_\_\_

(4)

ii Plasmids may be used to transfer genes during genetic engineering.

State the term used to describe a plasmid being used in this way.

\_\_\_\_\_

(1)

b Genetic engineering and selective breeding can both be used to produce plants and animals in modern farming.

Evaluate the benefits and risks of genetic engineering and selective breeding in modern farming.

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(6)

**(Total for Question 6 = 11 marks)**  
**TOTAL FOR PAPER = 35 MARKS**