AQA GCSE Biology | 8461

SPECIFICATION POINT 4.6.3.7

Resistant bacteria

Past-paper questions

Tier	**Foundation**
Question groups	**10**
Available paper years	**2007–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.6.3.7 Resistant bacteria

Question 01

March 2007 | BLY1A | Original Q6 | Legacy

QUESTION SIX

Avian influenza (bird flu) is caused by a virus which was first identified in 1900. Recently there have been concerns that new strains of the virus may be able to infect humans.

Match words, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

A antibiotics

B natural selection

C pandemic

D resistance

Avian influenza cannot be treated with . . . **1** . . . .

The influenza virus may develop . . . **2** . . . to the drugs used as a result of . . . **3** . . . .

This may cause a . . . **4** . . . of the disease.

4.6.3.7 Resistant bacteria

Question 02

November 2008 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

In the 1840s, many women died from infections after giving birth in hospitals.
The table shows data for two maternity wards in the same hospital over a two-year period.

	Ward P	Ward Q
Number of women who gave birth	296	308
Number of these women who died from infections	109	42

9A The number of women who survived in ward **Q** was . . .

1 42

2 187

3 266

4 350

9B A doctor called Semmelweiss noticed that medical students were delivering babies in ward **P** just after they had been dissecting corpses as part of their studies.
Only midwives delivered babies in ward **Q**.

Which is the best hypothesis to explain the higher death rate in ward **P**?

1 Students were carrying infections from corpses to women.

2 Midwives are better at delivering babies than students.

3 The higher number of deaths occurred by chance.

4 The women who gave birth in ward **P** were poorer than those in ward **Q**.

4.6.3.7 Resistant bacteria

9C Semmelweiss instructed all medical students in the hospital to wash their hands thoroughly before treating patients.

Which row in the table shows the effect that this might have had on the death rate in the two wards?

	Death rate in ward P			Death rate in ward Q		
	Increase	**No change**	**Decrease**	**Increase**	**No change**	**Decrease**
1	✓				✓	
2		✓				✓
3			✓		✓	
4			✓	✓		

9D In the 1980s, antibiotics were often used to kill pathogens to prevent infections from spreading. However, antibiotics are now less effective than in the 1980s.

This is because . . .

1 medical staff do not wash their hands as often.

2 antibiotics have become useless against viruses.

3 mutations in bacteria have made them resistant to antibiotics.

4 people have become immune to antibiotics.

END OF TEST

4.6.3.7 Resistant bacteria

Question 03

March 2009 | BLY1AP | Original Q8 | Legacy

QUESTION EIGHT

Some infections are caused by bacteria.

8A Bacteria can change into strains that are resistant to a particular antibiotic.

What causes this change in a bacterium?

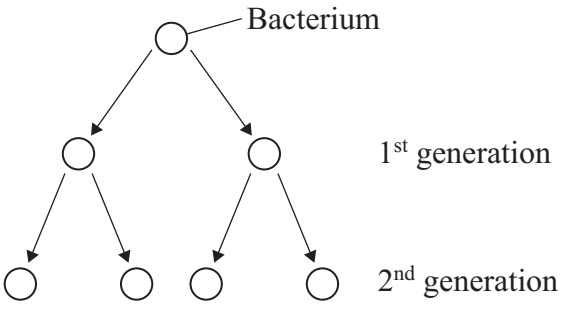
1 immunity

2 mutation

3 natural selection

4 reproduction

The diagram shows how the number of bacteria in the body changes after infection.



8B In ideal conditions, the population of bacteria doubles every 20 minutes.

In ideal conditions, how many bacteria will there be in the body 2 hours after infection with a single bacterium?

1 4

2 8

3 64

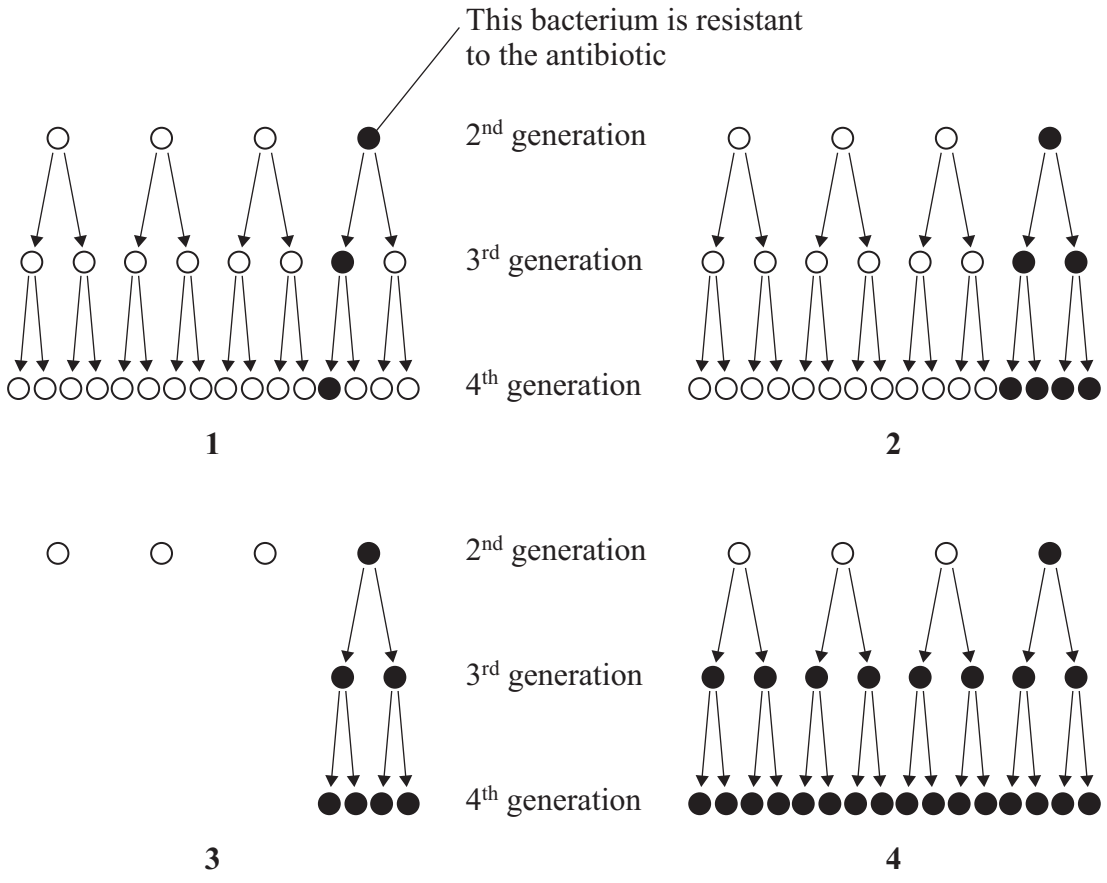
4 128

4.6.3.7 Resistant bacteria

Question 03 · continued March 2009 | BLY1AP | Original Q8 | Legacy

8C One of the second generation of bacteria changes so that it is resistant to an antibiotic.

Which diagram shows the way in which the population of bacteria changes when this generation is treated with the antibiotic?



8D The change in the proportions of non-resistant and resistant bacteria by the fourth generation is due to . . .

1 genetic engineering.

2 mutation.

3 natural selection.

4 reproduction.

4.6.3.7 Resistant bacteria

Question 04

November 2011 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

Some infections can be treated with antibiotics.

9A Virus infections cannot be treated with antibiotics because . . .

1 viruses live inside body cells.

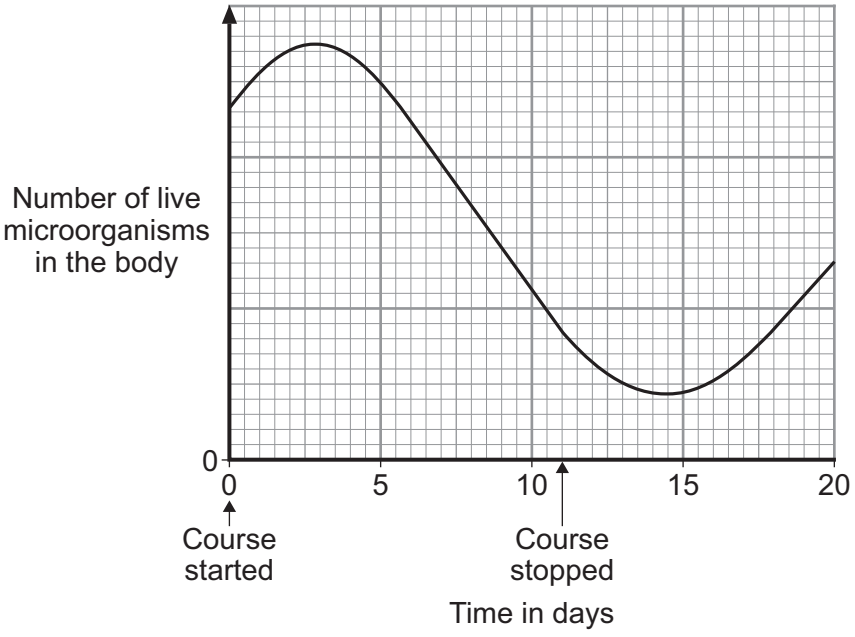
2 viruses are too small.

3 viruses have thick coats.

4 viruses are resistant.

Antibiotic tablets may be prescribed by a doctor. Patients are always told to finish the course of tablets, even though they may be feeling better.

The graph shows what happens to the number of live microorganisms in the body when someone does not finish a course of antibiotic tablets.



9B How many more days would the patient have needed to take the antibiotics to kill all the microorganisms in the body?

1 3

2 11

3 14

4 20

4.6.3.7 Resistant bacteria

9C After starting a course of antibiotics, a patient might feel more ill for two or three days.

Why?

1 Microorganisms are still multiplying in the body.

2 Antibiotics always cause side effects which make patients feel unwell.

3 Antibiotics do not kill microorganisms, antibiotics only relieve the symptoms.

4 The course of antibiotics was not completed.

9D Some microorganisms have become resistant to antibiotics.

An antibiotic-resistant population of a microorganism results from . . .

1 patients not completing their course of antibiotics.

2 toxins.

3 natural selection.

4 not enough people being vaccinated.

END OF TEST

4.6.3.7 Resistant bacteria

Question 05

January 2013 | BL1FP | Original Q3 | Legacy

3 Viruses and bacteria cause diseases in humans.

3 (a) Draw a ring around the correct word to complete the sentence.

Organisms that cause disease are called

algae.

pathogens.

vaccines.

(1 mark)

3 (b) In August 2011 the United Nations gave a warning that there was a new strain of the bird flu virus in China.

Bird flu may kill humans. The new strain of the bird flu virus could cause a *pandemic* very quickly.

3 (b) (i) What is a *pandemic*?

Tick (✓) **one** box.

A disease affecting the people all over one country. ☐

A disease affecting hundreds of people. ☐

A disease affecting people in many countries. ☐

(1 mark)

3 (b) (ii) The swine flu virus is carried by pigs.

The bird flu virus is likely to spread much more quickly than the swine flu virus.

Suggest **one** reason why.

.....

.....

(1 mark)

4.6.3.7 Resistant bacteria

Question 05 · continued

3 (c) This notice is from a doctor's surgery.

Unfortunately, antibiotics will NOT get rid of your flu.

3 (c) (i) Why will antibiotics **not** get rid of flu?

.....

.....

(1 mark)

3 (c) (ii) The symptoms of flu include a sore throat and aching muscles.

What would a doctor give to a patient to relieve the symptoms of flu?

.....

(1 mark)

3 (c) (iii) It is important that antibiotics are **not** overused.

Explain why.

Use words from the box to complete the sentence.

antibody	**bacteria**	**immune**	**resistant**	**viruses**

Overuse of antibiotics might speed up the development

of ..... strains of ..... .

(2 marks)

7

4.6.3.7 Resistant bacteria

Question 06

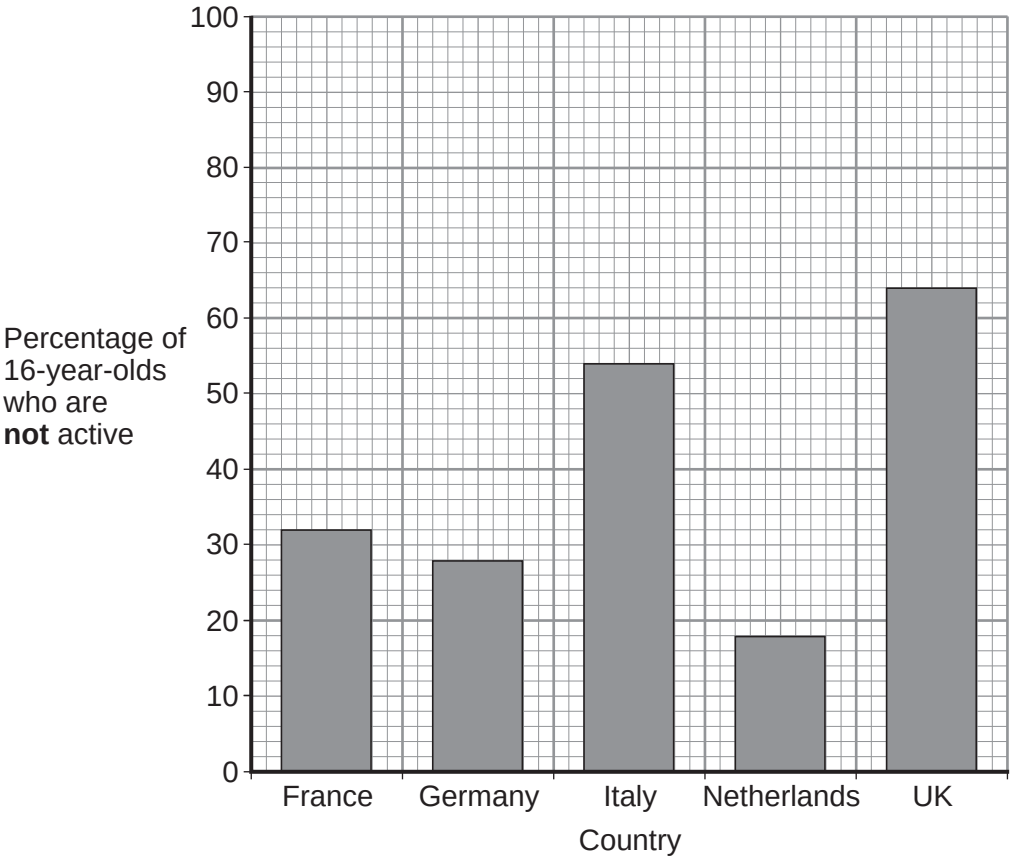
June 2015 | BL1FP | Original Q2 | Legacy

2 Scientists investigated the effect of different factors on health.

2 (a) People who are **not** active may have health problems.

Figure 3 shows the percentage of 16-year-olds in some countries who are **not** active.

Figure 3



2 (a) (i) What percentage of 16-year-olds in the UK are **not** active?

[1 mark]

..... %

2 (a) (ii) What percentage of 16-year-olds in the UK are **active**?

[1 mark]

..... %

4.6.3.7 Resistant bacteria

Question 06 · continued

2 (a) (iii) A newspaper headline states:

People in the UK are the laziest in the world.

Information in **Figure 3** does **not** support the newspaper headline.

Suggest **one** reason why the newspaper headline may be wrong.

[1 mark]

.....

.....

2 (b) Doctors gave a percentage rating to the health of 16-year-olds.
100% is perfect health.

Table 2 shows the amount of exercise 16-year-olds do and their health rating.

Table 2

Amount of exercise done in minutes every week	Health rating as %
Less than 30	72
90	76
180	82
300	92

What conclusion can be made about the effect of exercise on health?

Use information from **Table 2**.

[1 mark]

.....

.....

Question 2 continues on the next page

4.6.3.7 Resistant bacteria

Question 06 · continued

2 (c) Inherited factors can also affect health.

Give **one** health problem that may be affected by the genes someone inherits.

Draw a ring around the correct answer.

[1 mark]

being malnourished	**having a high cholesterol level**	**having a deficiency disease**

2 (d) White blood cells are part of the immune system.

Use the correct answer from the box to complete each sentence.

antibiotics	**antibodies**	**pathogens**	**vaccines**

2 (d) (i) When we are ill, white blood cells produce ..... to kill microorganisms.

[1 mark]

2 (d) (ii) Many strains of bacteria, including MRSA, have developed resistance to drugs called ..... .

[1 mark]

7

4.6.3.7 Resistant bacteria

Question 07

June 2017 | BL1FP | Original Q5 | Legacy

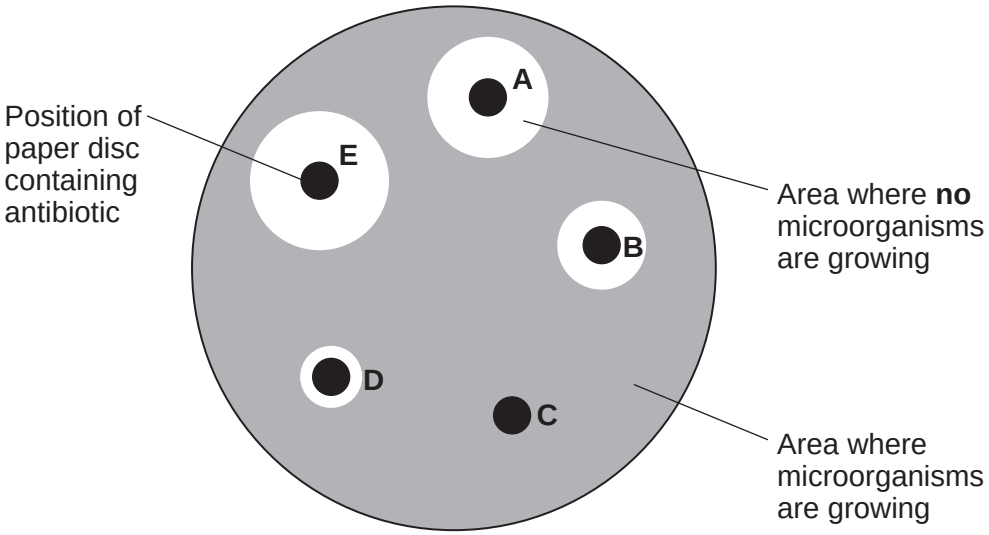
5 Some students investigated antibiotics.

The students:

- spread one type of microorganism on a sterile Petri dish containing an agar culture medium
- added five paper discs, each with one drop of a different antibiotic, **A**, **B**, **C**, **D** and **E**
- secured the lid on the dish with adhesive tape
- incubated the dish for 3 days at 25° C.

Figure 6 shows the Petri dish after the 3 days.

Figure 6



5 (a) Give **one** safety precaution that the students used in their investigation.

State why this safety precaution is needed.

[2 marks]

Safety precaution used _____

_____

Why the safety precaution is needed _____

_____

5 (b) One student made a conclusion:

'Doctors should always give antibiotic **E** to get rid of any disease.'

5 (b) (i) Describe the evidence from **Figure 6** which supports the student's conclusion.

[1 mark]

_____

_____

5 (b) (ii) Suggest **one** reason why the student's conclusion may **not** be correct.

[1 mark]

_____

_____

5 (c) Antibiotics can be given to farm animals as well as to humans.

Table 2 shows the mass of different antibiotics that have been given to farm animals and to humans.

Table 2

Antibiotic	Mass of antibiotic in kilograms	
	Given to farm animals	Given to humans
A	121 600	314 500
B	323 000	47 500
C	37 000	5 400
D	71 200	47 700
E	42 000	49 000

5 (c) (i) Write down **all** of the antibiotics, **A**, **B**, **C**, **D** or **E**, which have been used **more** for farm animals than for humans.

[1 mark]

_____

Question 5 continues on the next page

4.6.3.7 Resistant bacteria

Question 07 · continued

5 (c) (ii) Farmers in some countries use antibiotics to prevent disease in farm animals. This prevents the animals becoming ill or dying.

Suggest **one** other advantage to the farmer of giving antibiotics to farm animals.

[1 mark]

Tick (✓) **one** box.

The antibiotics will be passed to people who consume the animals. ☐

Healthy animals will produce a higher yield. ☐

The antibiotics will build up in the animals. ☐

5 (c) (iii) What is the possible effect of using too much antibiotic?

[1 mark]

Tick (✓) **one** box.

Animals become resistant to the antibiotic. ☐

Microorganisms become resistant to the antibiotic. ☐

People become immune to the antibiotic. ☐

People become resistant to the antibiotic. ☐

5 (d) The human body defends itself against pathogens using one type of blood cell.

5 (d) (i) Complete the sentence.

[1 mark]

Pathogens in the body can be killed by _____ blood cells.

4.6.3.7 Resistant bacteria

Question 07 · continued

5 (d) (ii) Give **two** ways in which the blood cells you have named in part **(d)(i)** protect the body from disease.

[2 marks]

Tick (✓) **two** boxes.

These blood cells produce antibiotics. ☐

These blood cells produce antibodies. ☐

These blood cells ingest pathogens. ☐

These blood cells reproduce pathogens. ☐

These blood cells produce toxins. ☐

10

4.6.3.7 Resistant bacteria

Question 08

0 4 Some farmers keep cows indoors in large sheds.

Other farmers keep cows outdoors in fields of grass.

Figure 6 shows cows being kept indoors and outdoors.

Figure 6



Table 3 shows the energy inputs and energy outputs for keeping cows.

Table 3

	Energy in kJ/m^2/year	
	Indoors	**Outdoors**
Input as food	10 000	5 950
Input as fossil fuel	6 000	50
Output as meat and milk	40	2

0 4 . 1 Calculate the total energy input for keeping cows **outdoors**.

Use data from **Table 3**.

[1 mark]

Total energy input = _____ kJ/m^2/year

Question 08 · continued

0 4 . 2 The total energy input for keeping cows **indoors** is 16 000 kJ/m^2/year.

Calculate the percentage efficiency of keeping cows **indoors**.

Use the equation:

$$\text{percentage efficiency} = \frac{\text{energy output}}{\text{total energy input}} \times 100$$

[2 marks]

Percentage efficiency = _____ %

0 4 . 3 The percentage efficiency of keeping cows outdoors is 0.03%.

Why is it more energy efficient to keep cows indoors than to keep cows outdoors?

[2 marks]

Tick (✓) **two** boxes.

- Cows are more stressed indoors. ☐
- Cows move less indoors. ☐
- It is noisier indoors. ☐
- It is warmer indoors. ☐
- There is less light indoors. ☐

Diseases in cows can cause problems for farmers.

0 4 . 4 Suggest why diseases spread more quickly when the cows are kept indoors.

[1 mark]

One species of bacterium causes a disease in cows.

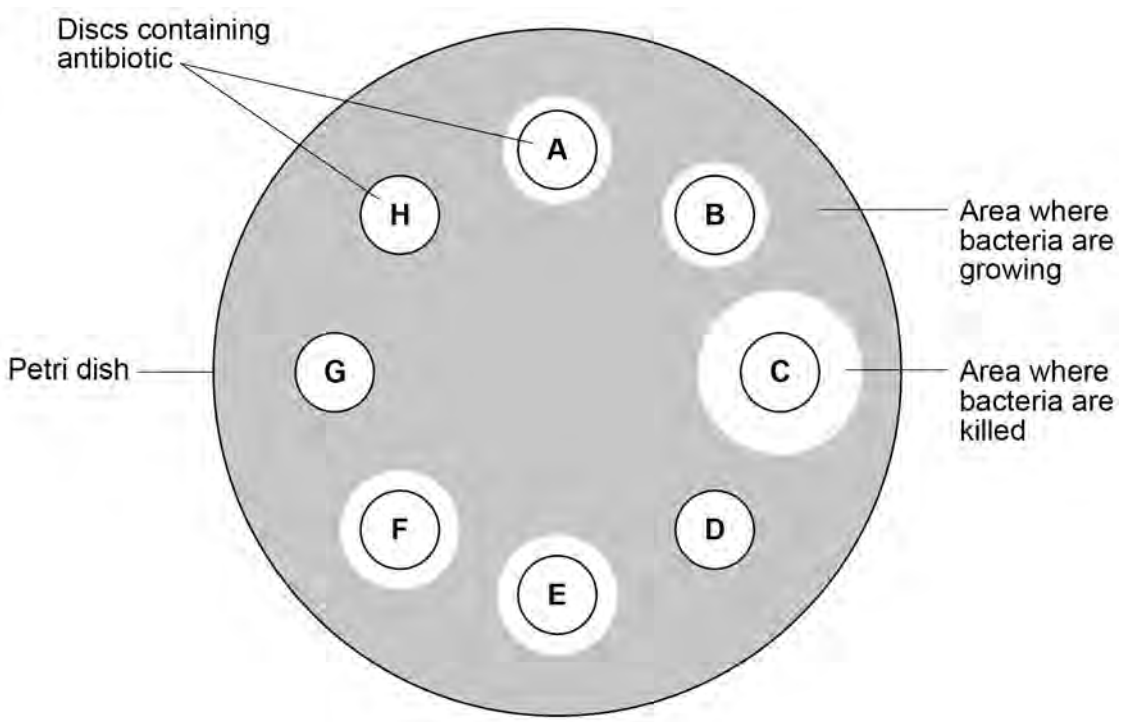
Scientists investigated the effect of eight different antibiotics on the growth of this species of bacterium.

The scientists put discs containing the different antibiotics onto a Petri dish containing the bacteria.

Antibiotics **A** to **H** were used in the investigation.

Figure 7 shows what the Petri dish looked like after 2 days.

Figure 7



0 4 . 5 This species of bacterium is resistant to some of the antibiotics.

Give the letter of **one** antibiotic the bacterium is resistant to.

[1 mark]

_____

4.6.3.7 Resistant bacteria

Question 08 · continued

0 4 . 6 Complete the sentence.

Choose the answer from the box.

[1 mark]

carbohydrate	DNA	lipid

Antibiotic resistance in a single bacterium is caused by a change in the bacterium's _____ .

0 4 . 7 Complete the sentence.

Choose the answer from the box.

[1 mark]

excretion	feeding	reproduction

A change in one bacterium can cause millions of bacteria to become resistant to the antibiotic.

This is because bacteria have a high rate of _____ .

0 4 . 8 Suggest why the production of millions of antibiotic-resistant bacteria is a problem for farmers.

[2 marks]

_____

_____

_____

_____

11

4.6.3.7 Resistant bacteria

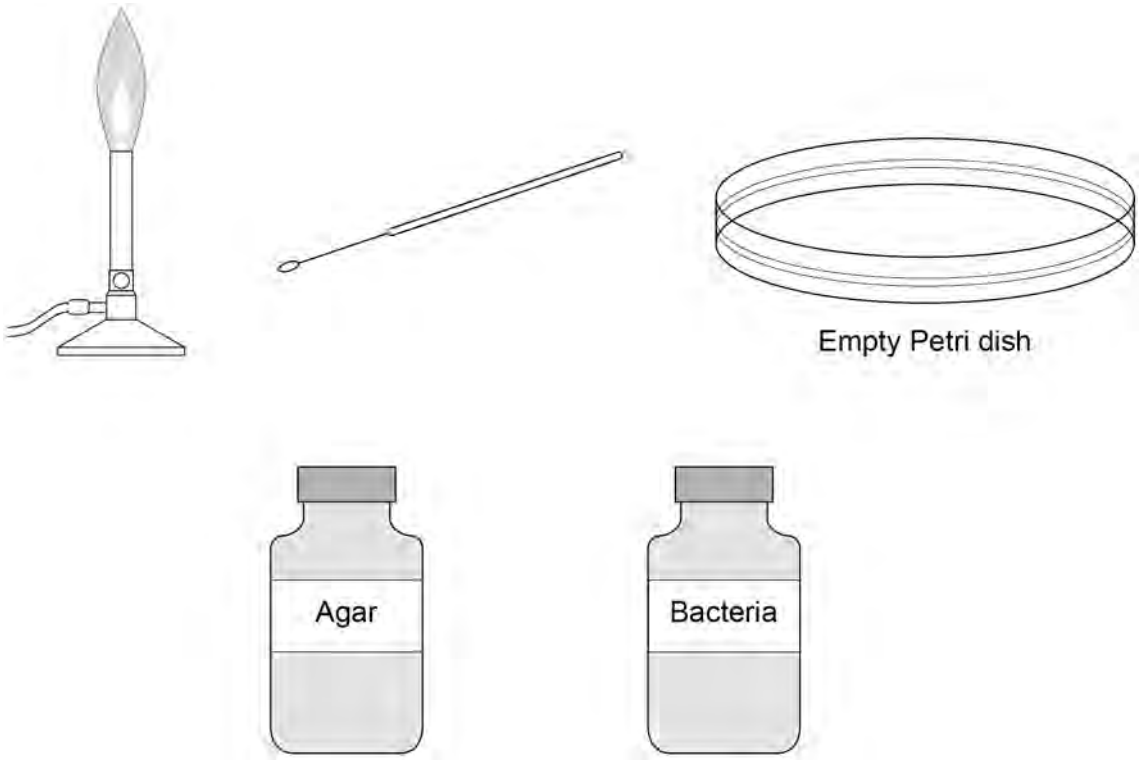
Question 09

0 4 A student investigated the effect of antibiotics on the growth of bacteria.

The student prepared an agar gel plate.

Figure 5 shows some of the equipment the student used.

Figure 5



0 4 . 1 Describe a method the student could use to:

- prepare a sterile agar gel plate
- grow an uncontaminated sample of bacteria on the agar gel plate.

Use the equipment in **Figure 5** in your answer.

[6 marks]

4.6.3.7 Resistant bacteria

Question 09 · continued

Question 4 continues on the next page

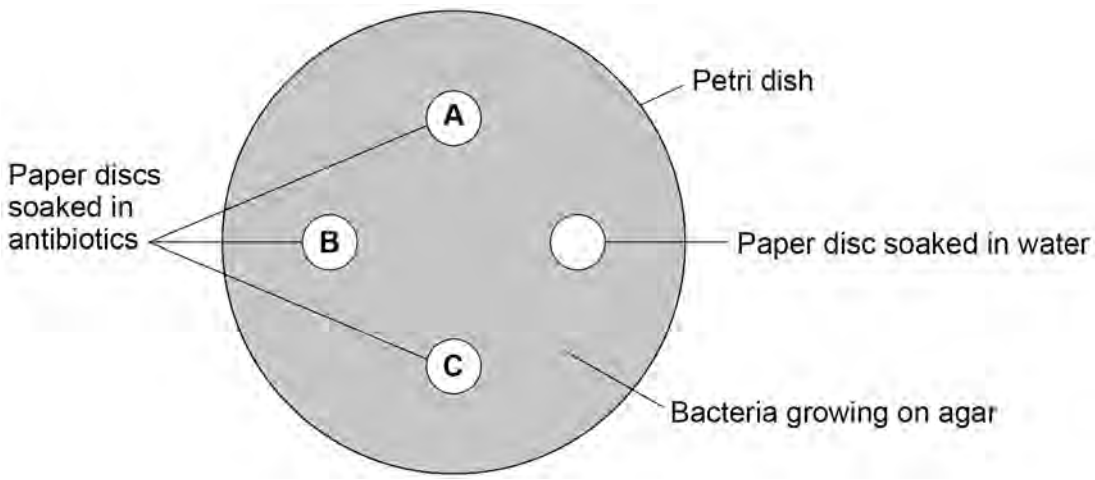
4.6.3.7 Resistant bacteria

Question 09 · continued

The student used an agar gel plate to test three antibiotics, **A**, **B** and **C**.

Figure 6 shows how the agar gel plate was set up.

Figure 6



0 4 . 2 The student incubated the agar gel plate at 25 °C.

Why should the temperature **not** be higher than 25 °C?

[1 mark]

0 4 . 3 What was the purpose of the paper disc soaked in water?

[1 mark]

Tick (✓) **one** box.

To check the bacteria were uncontaminated. ☐

To make the investigation more accurate. ☐

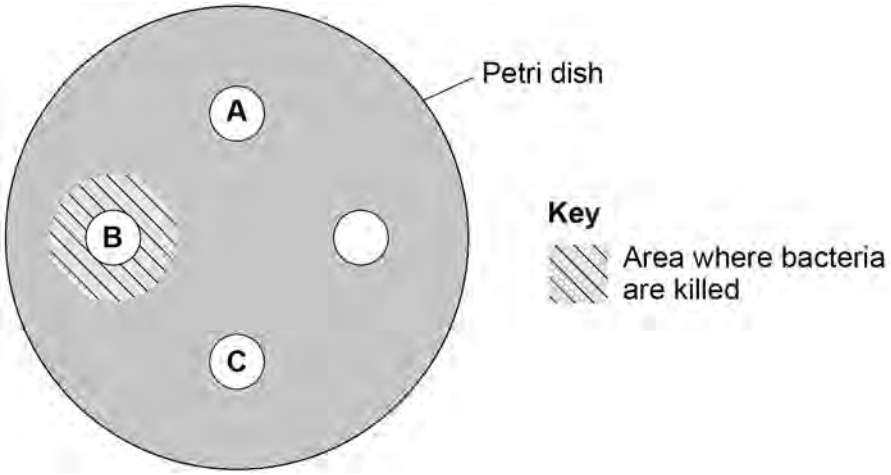
To show the effect of no antibiotics. ☐

0 4 . 4 The student removed the agar gel plate from the incubator after 48 hours.

Antibiotic **A** was the **most** effective at killing the bacteria.
Antibiotic **C** was the **least** effective at killing the bacteria.

Figure 7 shows the results for the disc soaked in antibiotic **B**.

Figure 7



Complete **Figure 7** to show the results you would expect.

You should:

- draw a ring around the disc soaked in antibiotic **A**
- draw a ring around the disc soaked in antibiotic **C**.

[2 marks]

0 4 . 5 The student repeated the investigation with antibiotic **D**.

The bacteria were resistant to antibiotic **D**.

What effect would antibiotic **D** have had on the bacteria?

[1 mark]

Tick (✓) **one** box.

All of the bacteria would have been killed. ☐

Some of the bacteria would have been killed. ☐

None of the bacteria would have been killed. ☐

11

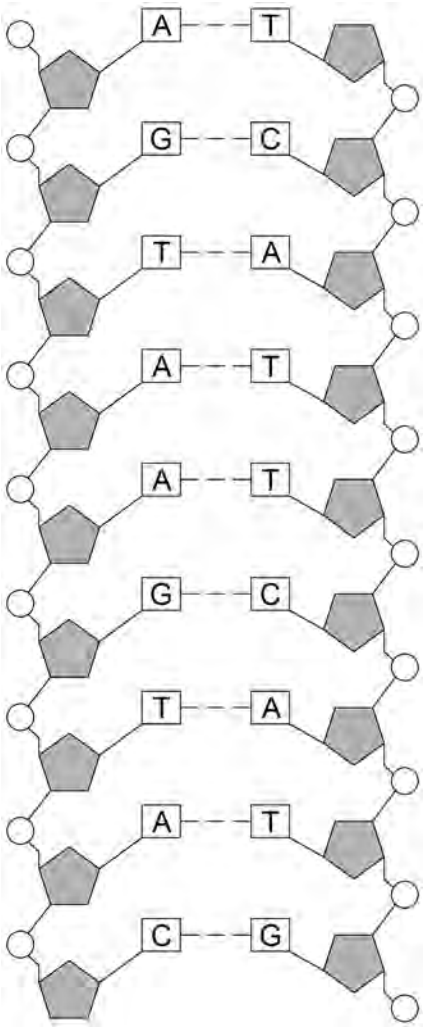
4.6.3.7 Resistant bacteria

Question 10

June 2025 | 8461/2F | Original Q5

0 5 **Figure 8** shows part of a DNA molecule.

Figure 8



The letters **A**, **C**, **G** and **T** in **Figure 8** represent four different compounds.

4.6.3.7 Resistant bacteria

Question 10 · continued

0 5 . 1 What are **A**, **C**, **G** and **T** called?

[1 mark]

Tick (✓) **one** box.

- Bases ☐
- Fatty acids ☐
- Sugars ☐

0 5 . 2 The section of DNA shown in **Figure 8** contains the following sequence of these compounds:

A G T A A G T A C

A sequence of three compounds codes for one amino acid.

How many amino acids would this section of DNA code for?

[1 mark]

0 5 . 3 Sometimes a change occurs in the sequence of the compounds **A**, **C**, **G** and **T** in the DNA.

What name is given to a change in DNA?

[1 mark]

Tick (✓) **one** box.

- Differentiation ☐
- Mutation ☐
- Natural selection ☐

4.6.3.7 Resistant bacteria

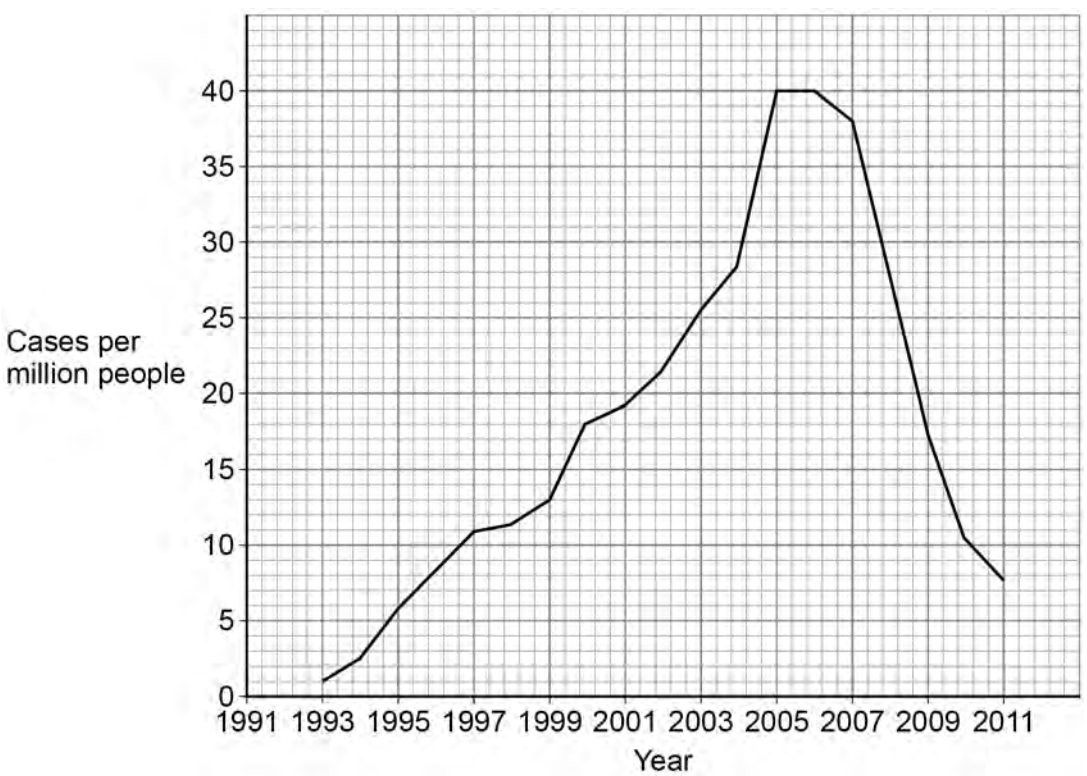
Question 10 · continued

Changes in the DNA of a bacterial pathogen can produce new strains of the pathogen.

Many people have been infected with a bacterial pathogen called MRSA.

Figure 9 shows how many cases of MRSA occurred in one country from 1993 to 2011.

Figure 9



0 5 . 4 Calculate the mean rate of increase in MRSA cases per year in the 12 years from 1993 to 2005.

[3 marks]

Mean rate of increase = _____ cases per million people per year

4.6.3.7 Resistant bacteria

Question 10 · continued

0 5 . 5 Most antibiotics will **not** kill MRSA bacteria.

Which word describes bacteria that are **not** killed by antibiotics?

[1 mark]

Tick (✓) **one** box.

Immune ☐

Powerful ☐

Resistant ☐

0 5 . 6 **Figure 9** shows that the number of cases of MRSA decreased after 2006.

Suggest **one** reason for this decrease.

[1 mark]

_____

_____

8