AQA GCSE Biology | 8461

SPECIFICATION POINT 4.3.1.8

Antibiotics and painkillers

Past-paper questions

Tier	**Foundation**
Question groups	**40**
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.

4.3.1.8 Antibiotics and painkillers

Question 01

January 2007 | BLY1F | Original Q4 | Legacy

4 (a) Use words from the box to complete the sentences about curing disease.

antibiotics	**antibodies**	**antitoxins**	**painkillers**	**statins**

The substances made by white blood cells to kill pathogens are called ..... .

The substances made by white blood cells to counteract poisons produced by pathogens are called ..... .

Medicines which kill bacteria are called ..... .

(3 marks)

(b) The MMR vaccine protects people against three diseases.

Write down the names of **two** of these diseases.

1 .....

2 .....

(2 marks)

(c) All vaccinations involve some risk.

The table shows the risk of developing harmful effects:

- from the disease if a child is **not** given the MMR vaccine;
- if a child **is** given the MMR vaccine.

Harmful effect	**Risk of getting the harmful effect from the disease (if not vaccinated)**	**Risk of getting the harmful effect from MMR vaccine**
Convulsions	1 in 200	1 in 1000
Meningitis	1 in 3000	Less than 1 in 1 000 000
Brain damage	1 in 8000	0

4.3.1.8 Antibiotics and painkillers

Question 01 · continued

BLANK

A mother is considering if she should have her child vaccinated with the MMR vaccine.

Use information from the table to persuade the mother that she should have her child vaccinated.

.....

.....

.....

.....

(2 marks)

(d) The vaccine used to protect us from the Hepatitis B virus is produced by genetic engineering.

Yeast cells are used to produce the vaccine.

Use words from the box to complete the sentence.

chromosomes	**drugs**	**enzymes**	**genes**	**hormones**

To produce the vaccine ..... are used to cut out .....

from the Hepatitis B virus which are then inserted into the yeast cells.

(2 marks)

9

4.3.1.8 Antibiotics and painkillers

Question 02

March 2007 | BLY1A | Original Q5 | Legacy

QUESTION FIVE

This question is about substances containing drugs.

Match statements, **A**, **B**, **C** and **D**, with the numbers **1–4** on the drawings.

A can be used to treat the symptoms of some diseases

B can lead to addiction to hard drugs

C contains carbon monoxide

D often leads to lack of self-control



1
Alcohol



2
Painkillers



3
Cannabis



4
Cigarette smoke

4.3.1.8 Antibiotics and painkillers

Question 03

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.

4.3.1.8 Antibiotics and painkillers

Question 04

June 2007 | BLY1F | Original Q2 | Legacy

2 (a) We control many conditions inside our bodies.

Name **three** conditions which are controlled inside our bodies.

1 .....

2 .....

3 .....

(3 marks)

(b) Hormones are used to control fertility in women.

Use words from the box to complete the sentences.

antibiotic	**contraceptive drug**	**fertility drug**	**vaccine**

A woman can prevent pregnancy by taking a ..... .

A woman can be helped to become pregnant by taking a ..... .

(2 marks)

(c) Some drugs are addictive.

(i) Name **one** addictive drug.

.....

(1 mark)

(ii) Explain why it is very difficult to give up using an addictive drug.

.....

.....

.....

.....

(2 marks)

8

4.3.1.8 Antibiotics and painkillers

Question 05

January 2008 | BLY1F | Original Q6 | Legacy

6 Polio is a disease caused by a virus. In the UK, children are given polio vaccine to protect them against the disease.

(a) In the sentences below, draw a ring around the correct words in each box.

(i) It is difficult to kill the polio virus inside the body

because the virus

is not affected by drugs
lives inside cells
produces antitoxins

.

(1 mark)

(ii) The vaccine contains an

active
infective
inactive

form of the polio virus.

(1 mark)

(iii) The vaccine stimulates the white blood cells to

produce

antibiotics
antibodies
drugs

which destroy the virus.

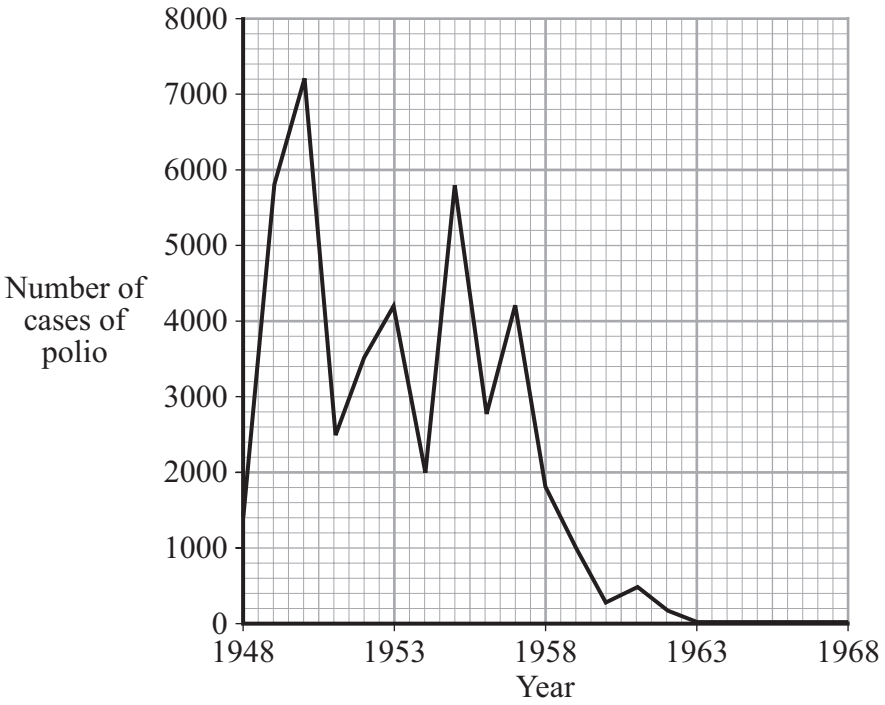
(1 mark)

4.3.1.8 Antibiotics and painkillers

Question 05 · continued

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(b) The graph shows the number of cases of polio in the UK between 1948 and 1968.



(i) In which year was the number of cases of polio highest?

.....

(1 mark)

(ii) Polio vaccination was first used in the UK in 1955.

How many years did it take for the number of cases of polio to fall to zero?

.....

(1 mark)

(iii) There have been no cases of polio in the UK for many years. But children are still vaccinated against the disease.

Suggest **one** reason for this.

.....

.....

(1 mark)

6

4.3.1.8 Antibiotics and painkillers

Question 06

March 2008 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

This question is about drugs.

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

A cannabis

B painkiller

C antibiotic

D statin

	Information
1	kills bacteria in the body
2	may lead to addiction to hard drugs
3	lowers the level of cholesterol in the blood
4	relieves some of the symptoms of the disease

4.3.1.8 Antibiotics and painkillers

Question 07

June 2008 | BLY1AP | Original Q6 | Legacy

QUESTION SIX

Our bodies defend themselves naturally against infections. We also use other methods to protect ourselves against infections and to relieve the symptoms of disease.

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

A antibiotics

B painkillers

C antibodies

D vaccines

1	given to people to provide immunity
2	medicines that kill bacteria
3	produced by white blood cells
4	relieve symptoms of disease

4.3.1.8 Antibiotics and painkillers

Question 08

June 2008 | BLY3F | Original Q5 | Legacy

5 (a) Microorganisms can be grown in Petri dishes containing nutrient agar.
The Petri dish and nutrient agar must be sterilised before use.

Which method is used to sterilise the Petri dish and nutrient agar?

Tick (✓) **one** box.

- Heat at 120 °C for 30 minutes ☐
- Pass through a Bunsen burner flame ☐
- Place in an incubator at 25 °C for one day ☐

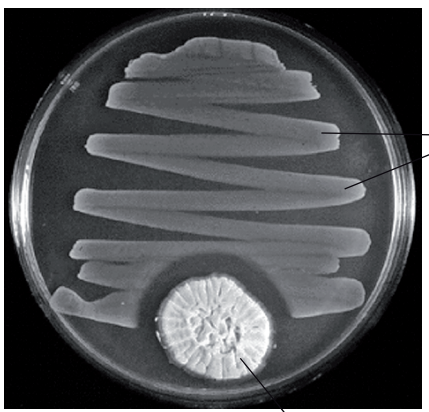
(1 mark)

Question 5 continues on the next page

Question 08 · continued

for mark

5 (b) The photograph shows *Penicillium* mould and one species of bacterium growing together on nutrient agar in a Petri dish.



The *Penicillium* mould produces an antibiotic.

How can you tell this from the photograph?

.....

.....

(1 mark)

5 (c) A student investigated the effect of pH on the growth of *Penicillium*.

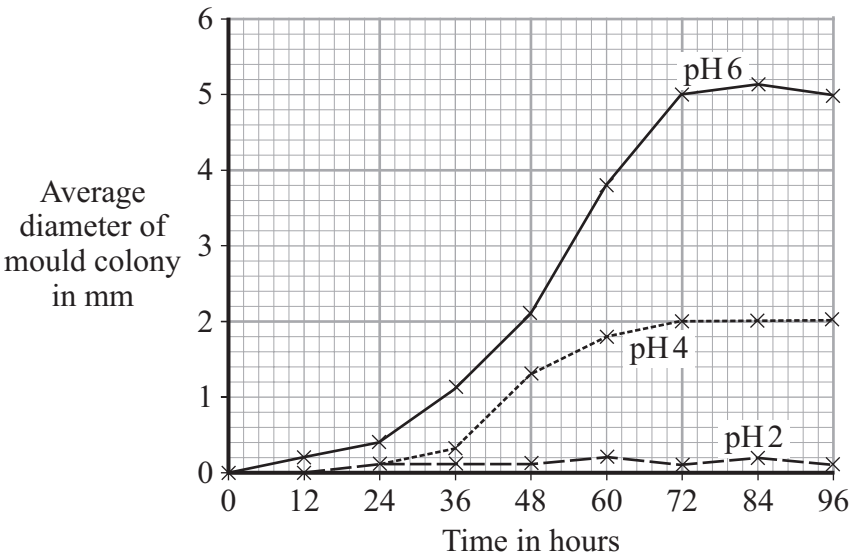
- He used three Petri dishes containing nutrient agar.
- The pH of the nutrient agar in the three Petri dishes was 2, 4 and 6 respectively.
- He inoculated each Petri dish with the same amount of *Penicillium* mould.
- Every 12 hours, he measured the diameter of five *Penicillium* colonies in each dish.
- From these measurements, he calculated the average diameter of the five colonies in each dish.

The graph on the opposite page shows the results.

4.3.1.8 Antibiotics and painkillers

Question 08 · continued

for mark



5 (c) (i) Complete the sentence.

Calculating the average diameter of five colonies from each dish made the results more ..... .

(1 mark)

5 (c) (ii) At which pH did the mould grow best? .....

(1 mark)

5 (c) (iii) What was the maximum average diameter of the mould colony at pH 4?

..... mm

(1 mark)

5 (c) (iv) During which 12-hour period was growth fastest at pH 6?

From ..... to ..... hours.

(1 mark)

5 (d) pH is only one factor which affects the growth of *Penicillium* mould.

When *Penicillium* is grown in an industrial fermenter, other factors also need to be controlled.

Give **two** of these other factors.

1 .....

2 .....

(2 marks)

8

4.3.1.8 Antibiotics and painkillers

Question 09

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**.

4.3.1.8 Antibiotics and painkillers

Question 09 · continued

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.

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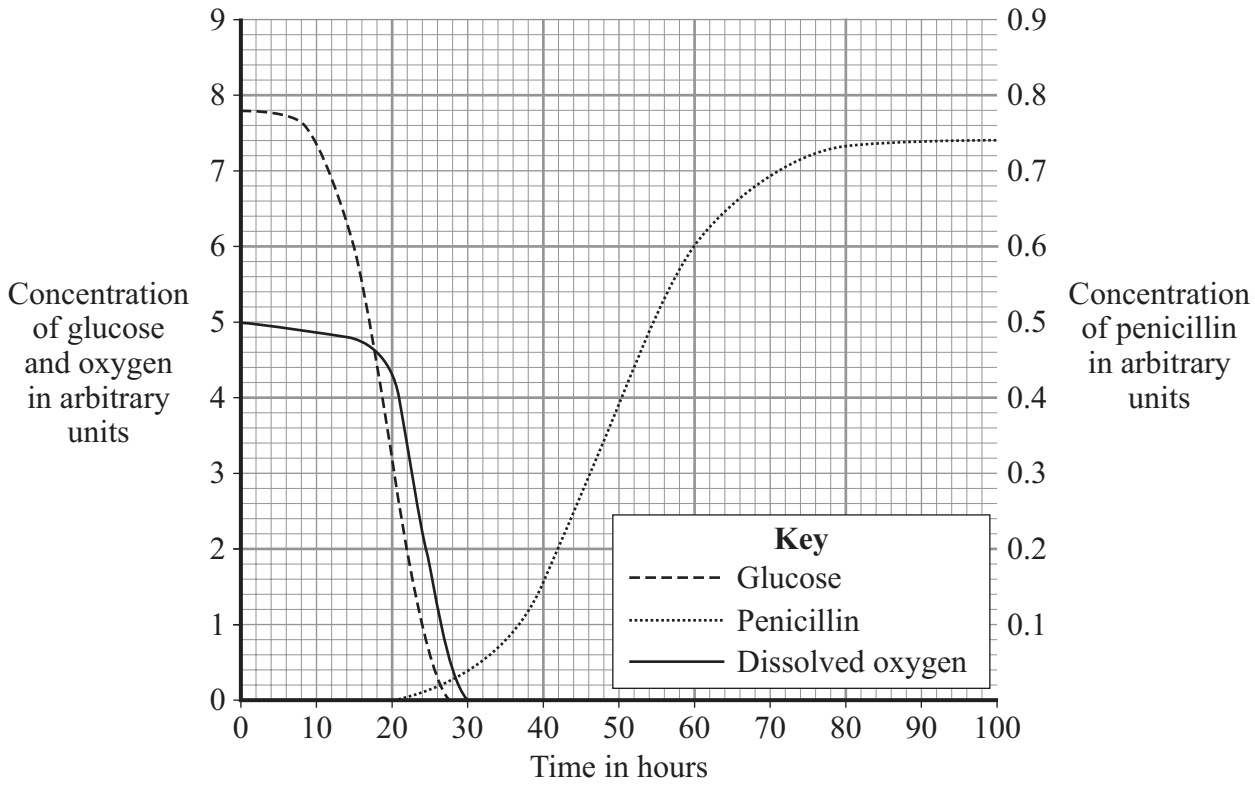
4.3.1.8 Antibiotics and painkillers

Question 10

January 2009 | BLY3F | Original Q5 | Legacy

5 The mould *Penicillium* can be grown in a fermenter. It produces the antibiotic penicillin.

The graph shows changes that occurred in the fermenter during the production of penicillin.



5 (a) During which time period was penicillin produced most quickly?

Draw a ring around **one** answer.

0 – 20 hours **40 – 60 hours** **80 – 100 hours**

(1 mark)

5 (b) (i) Describe how the concentration of glucose in the fermenter changes between 0 and 30 hours.

.....

.....

.....

.....

(2 marks)

4.3.1.8 Antibiotics and painkillers

Question 10 · continued

for mark

5 (b) (ii) How does the change in the concentration of oxygen in the fermenter compare with that of glucose between 0 and 30 hours?

Put a tick (✓) in **two** boxes next to your choices.

The oxygen concentration changes after the glucose concentration. ☐

The oxygen concentration changes before the glucose concentration. ☐

The oxygen concentration changes less than the glucose concentration. ☐

The oxygen concentration changes more than the glucose concentration. ☐

(2 marks)

5 (b) (iii) What is the name of the process that uses both glucose and oxygen?

Draw a ring around **one** answer.

aerobic respiration **distillation** **filtration**

(1 mark)

6

4.3.1.8 Antibiotics and painkillers

Question 11

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?

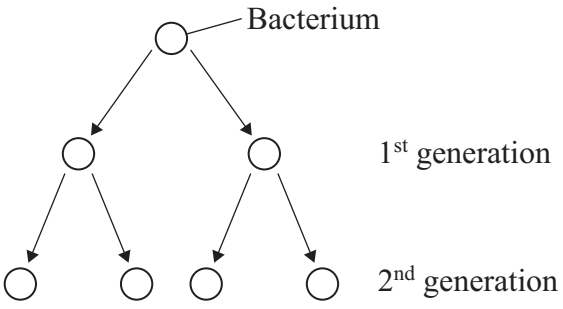
1 immunity

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

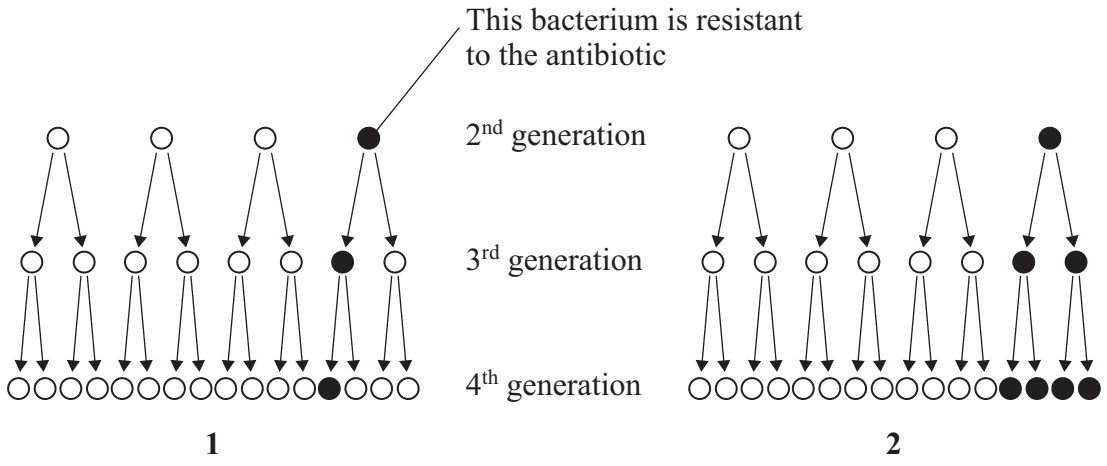
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4.3.1.8 Antibiotics and painkillers

Question 11 · continued March 2009 | BLY1AP | Original Q8 | Legacy

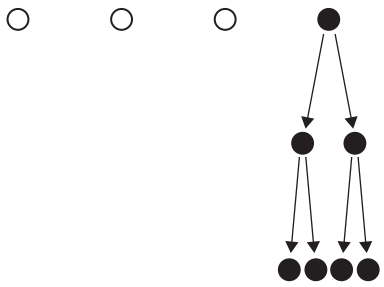
8C One of the second generation of bacteria changes so that it is resistant to an antibiotic.

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

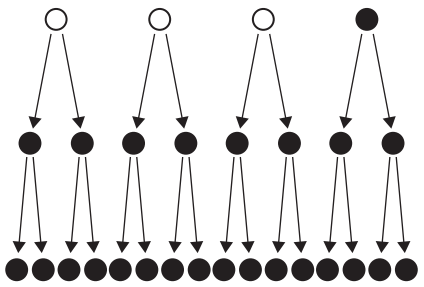


1

2



3



4

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.

4.3.1.8 Antibiotics and painkillers

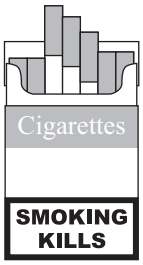
Question 12

June 2009 | BLY1AP | Original Q1 | Legacy

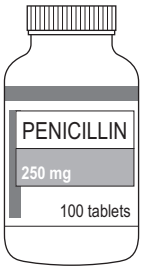
QUESTION ONE

The diagrams show four different drugs.

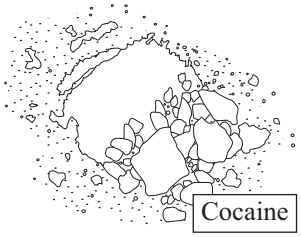
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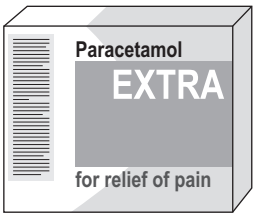
2



3



4



Match statements, **A**, **B**, **C** and **D**, with the drugs **1–4** in the diagram.

A kills bacteria

B linked to lung disease

C an addictive, illegal drug

D relieves some disease symptoms

4.3.1.8 Antibiotics and painkillers

Question 13

January 2010 | BLY1F | Original Q3 | Legacy

3 Vaccines protect us against diseases.

3 (a) Against which **three** diseases does the MMR vaccine protect us?

Tick (✓) **three** boxes.

- Malaria ☐
- Measles ☐
- Meningitis ☐
- Mumps ☐
- Rabies ☐
- Rubella ☐

(3 marks)

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

Vaccines cause white blood cells to produce

antibodies.
cholesterol.
penicillin.

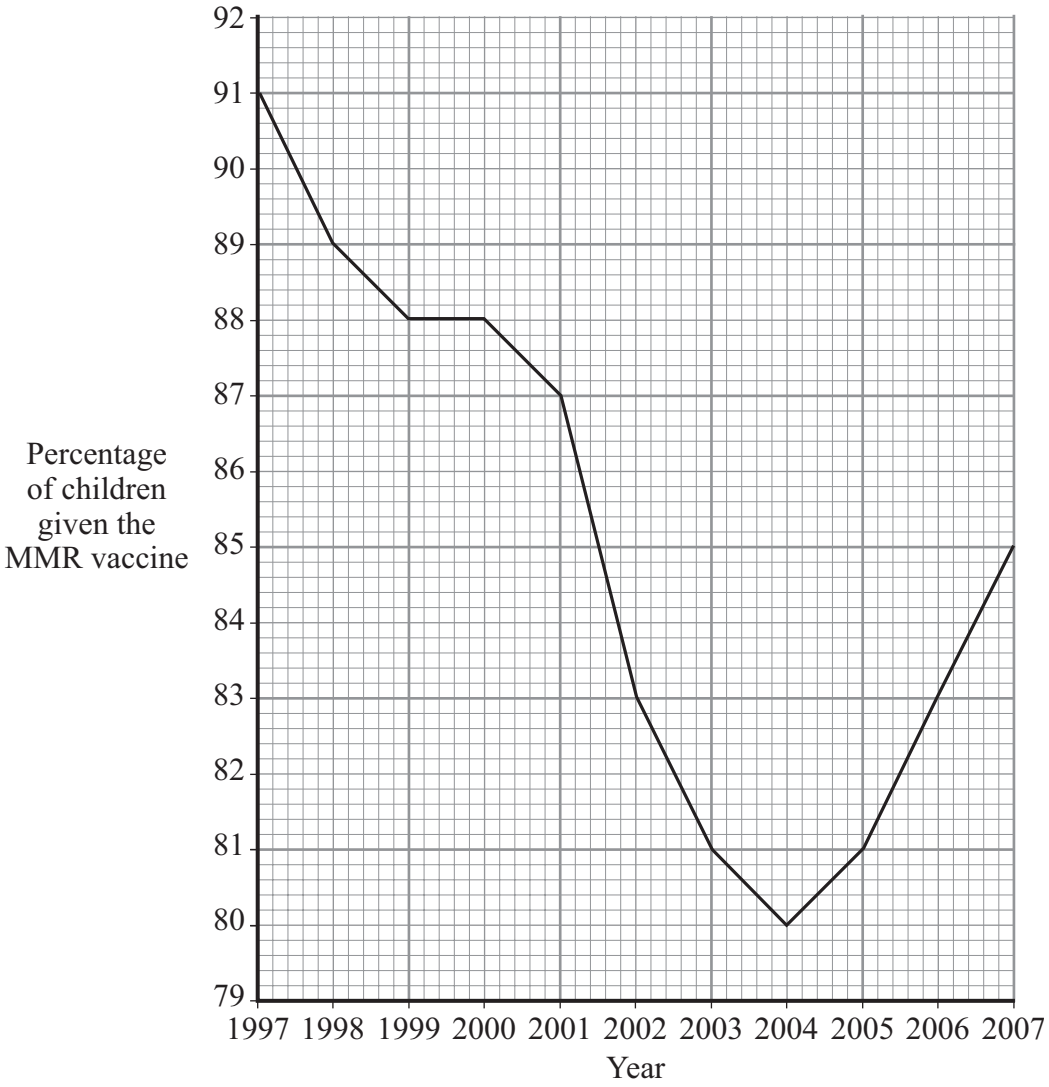
(1 mark)

4.3.1.8 Antibiotics and painkillers

Question 13 · continued

for mark

The graph shows the percentage of children given the MMR vaccine in the UK between 1997 and 2007.



3 (c) (i) Describe the pattern shown by the data on the graph.

.....

.....

.....

.....

(2 marks)

3 (c) (ii) Suggest **one** explanation for the change in the percentage of children given the MMR vaccine between 1997 and 2004.

.....

.....

(1 mark)

7

4.3.1.8 Antibiotics and painkillers

Question 14

5 Medicinal drugs are used to treat diseases.

5 (a) Draw **one** line from each drug to its correct use.

Drug	Use
Painkiller	Used as a fertility drug
Statin	Used to relieve disease symptoms
Thalidomide	Used to treat leprosy
	Used to lower blood cholesterol

(3 marks)

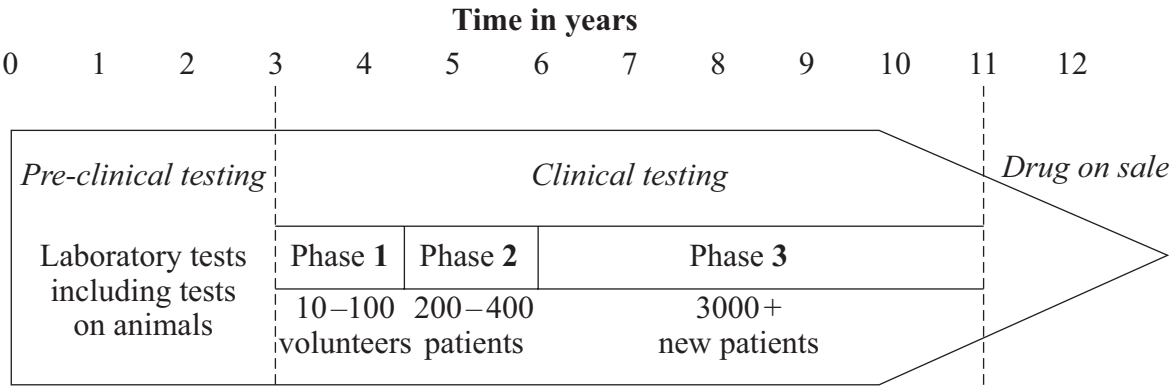
4.3.1.8 Antibiotics and painkillers

Question 14 · continued

for mark

5 (b) New drugs need to be tested before going on sale.

The diagram shows a time line for the testing of a new drug.



5 (b) (i) How long do trials on humans take? ..... years

(1 mark)

5 (b) (ii) What is the minimum number of humans the drug is tested on throughout *clinical testing*?

.....

(1 mark)

5 (c) Draw a ring around the correct answer to complete each sentence.

5 (c) (i) A new drug is first tested in the laboratory to find

if it is toxic.

if it is cost effective.

the optimum dose.

(1 mark)

5 (c) (ii) The drug is then tested on a few volunteers to find

if it is cost effective.

if it has side effects.

the optimum dose.

(1 mark)

7

4.3.1.8 Antibiotics and painkillers

Question 15

January 2010 | BLY3F | Original Q4 | Legacy

4 (a) Give **two** advantages of having the biogas generator underground.

Tick (✓) **two** boxes.

It allows the digested slurry to soak into the soil. ☐

The biogas produced will be at a lower pressure. ☐

Very little of the biogas generator will be seen. ☐

It prevents unpleasant smells escaping. ☐

The temperature inside will not change much. ☐

(2 marks)

4.3.1.8 Antibiotics and painkillers

Question 15 · continued

for mark

4 (b) The table shows the percentages of the different gases found in this biogas.

Gas	Percentage
Carbon dioxide	35.0
Hydrogen sulfide	1.5
Ammonia	1.5
Water vapour	2.0
Gas **X**	

Gas **X** is the main fuel gas found in biogas.

4 (b) (i) What is the name of gas **X**?

Draw a ring around **one** answer.

hydrogen **methane** **oxygen**

(1 mark)

4 (b) (ii) What is the percentage of gas **X** in the biogas?

Show clearly how you work out your answer.

.....

.....

.....

Percentage of gas **X** = ...

(2 marks)

5

4.3.1.8 Antibiotics and painkillers

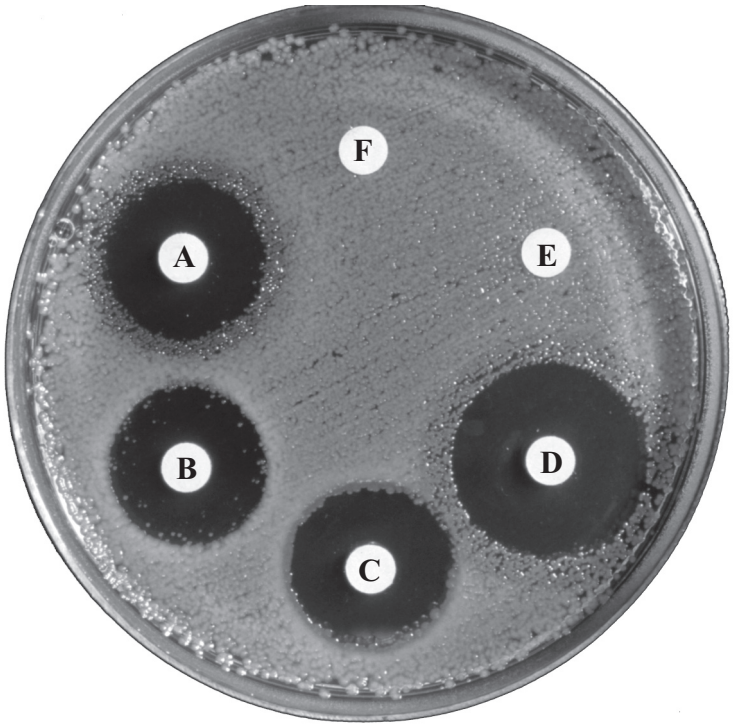
Question 15 · continued

for mark

5 Some scientists tested the effectiveness of six new antibiotics, **A**, **B**, **C**, **D**, **E** and **F**.

- They mixed a culture of one species of bacterium with nutrient agar in a Petri dish.
- They then prepared separate discs of filter paper, each soaked in a different antibiotic.
- They placed the filter paper discs on the surface of the agar.
- The Petri dish was kept at 35 °C for 2 days.

The results are shown in the photograph.



4.3.1.8 Antibiotics and painkillers

Question 16

January 2010 | BLY3F | Original Q5 | Legacy

5 (a) (i) Which **two** antibiotics from **A**, **B**, **C**, **D**, **E** and **F**, did **not** kill this species of bacterium?

☐ and ☐

(1 mark)

5 (a) (ii) Which would be the best antibiotic, **A**, **B**, **C**, **D**, **E** or **F**, to treat an infection caused by this species of bacterium? ☐

(1 mark)

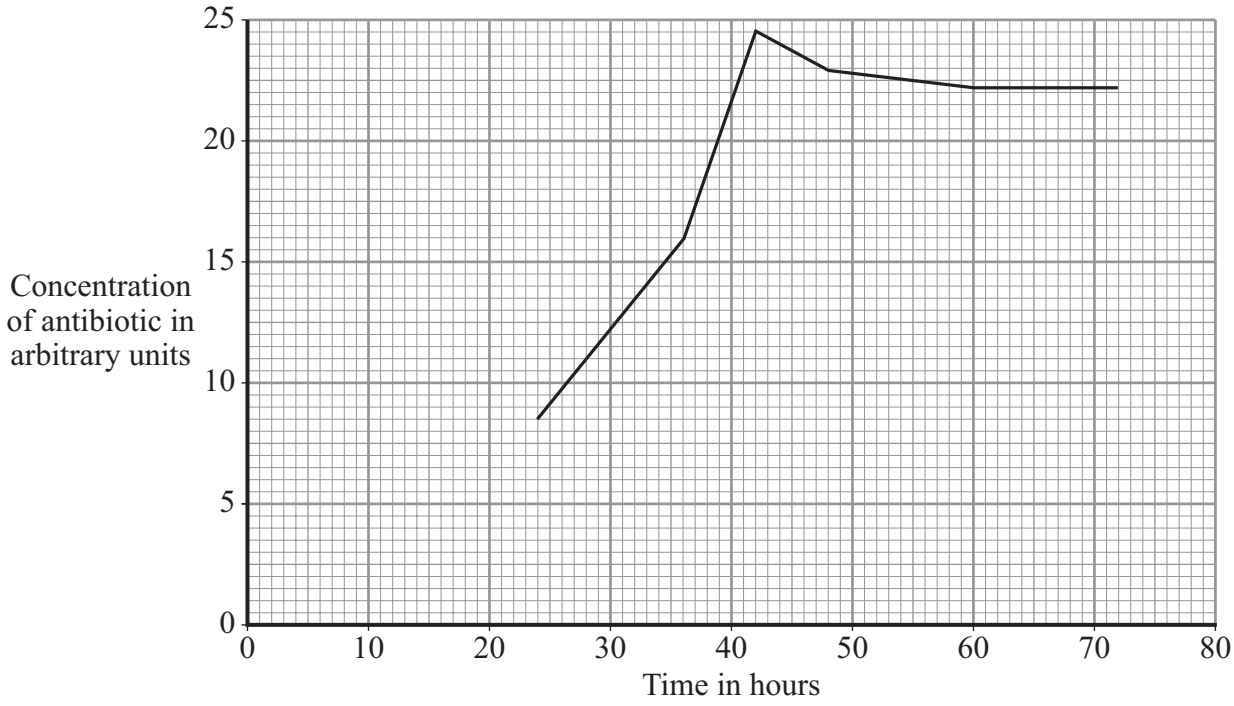
4.3.1.8 Antibiotics and painkillers

Question 16 · continued

for mark

5 (b) The scientists measured the production of an antibiotic by a mould.

The graph shows their results.



5 (b) (i) Describe what happened to the concentration of antibiotic between 24 and 72 hours.

.....

.....

.....

.....

(2 marks)

5 (b) (ii) The scientists decided to grow the mould for 42 hours in future.

Why did they choose this time?

.....

.....

(1 mark)

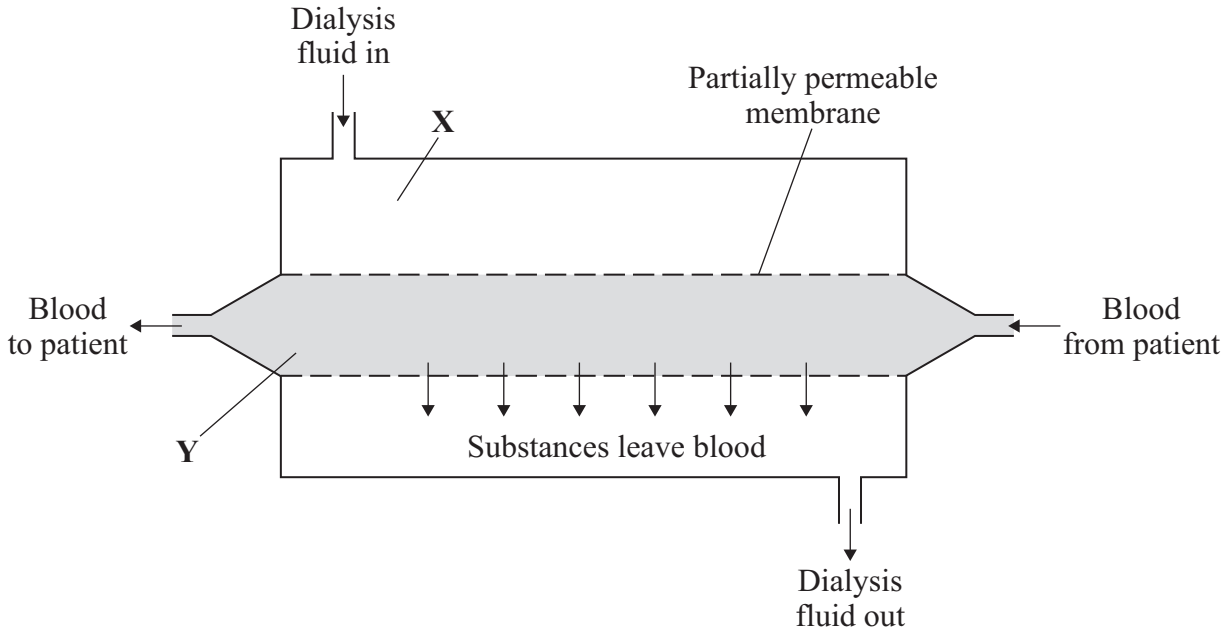
5

4.3.1.8 Antibiotics and painkillers

Question 16 · continued

for mark

6 People with kidney disease may be treated by dialysis.
The diagram shows a dialysis machine.



4.3.1.8 Antibiotics and painkillers

Question 17

March 2010 | BLY1AP | Original Q7 | Legacy

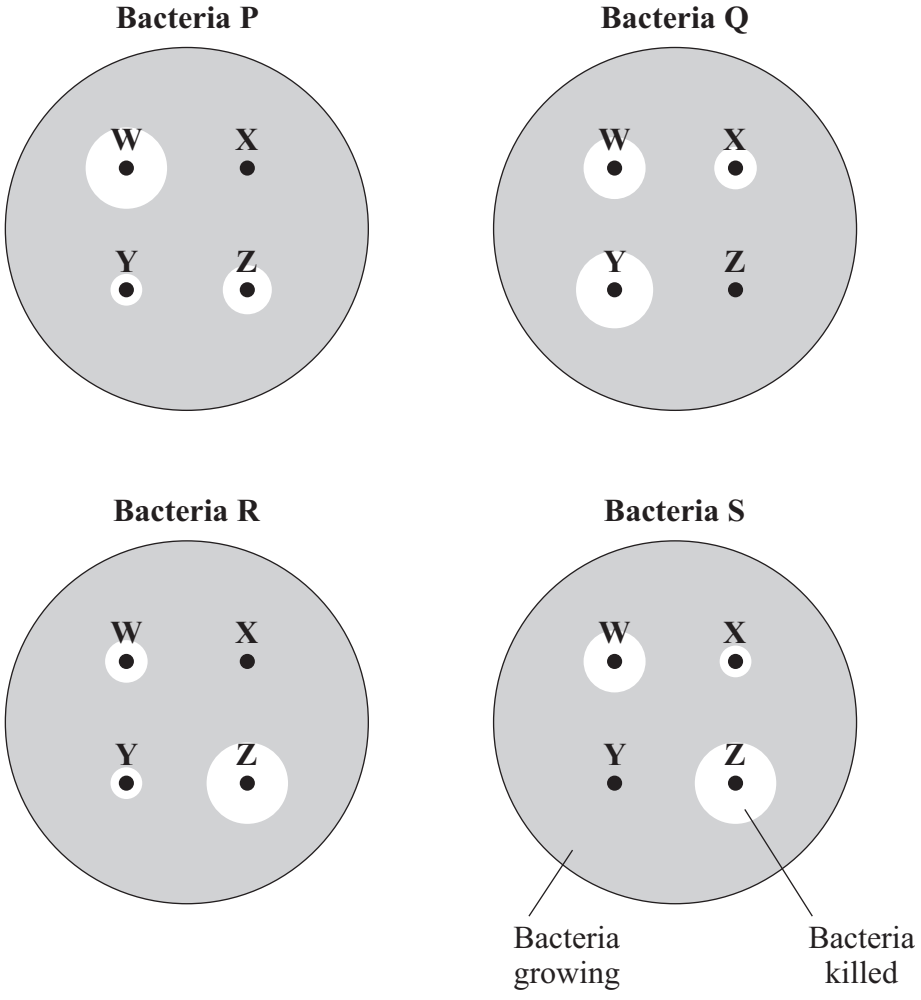
QUESTION SEVEN

A group of students investigated how effective four different antibiotics were at killing four different bacteria.

In this investigation:

- the four bacteria, **P**, **Q**, **R** and **S**, were spread on separate dishes containing nutrient agar
- paper discs were dipped into the four different antibiotics, **W**, **X**, **Y** and **Z**
- one of each disc was placed onto the agar in each of the four dishes.

The diagram shows the appearance of the dishes after three days. If the antibiotic kills the bacteria there is a clear space around the disc. The larger the clear space, the more effective the antibiotic is.



7A Which of the following is **not** an important control variable in this investigation?

1 the diameter of the dishes

2 the temperature at which the dishes were kept

3 the concentration of the antibiotics

4 the volume of antibiotic on each disc

4.3.1.8 Antibiotics and painkillers

Question 17 · continued

7B How could the students improve the reliability of their investigation?

1 calculating the mean clear area for all the antibiotics in one dish

2 repeating the investigation using different antibiotics and different bacteria

3 repeating the investigation and calculating the mean clear area for each antibiotic

4 ignoring all the results where bacteria were **not** killed

7C Using the information in the diagrams, which antibiotic could be used to kill any of the bacteria?

1 antibiotic **W**

2 antibiotic **X**

3 antibiotic **Y**

4 antibiotic **Z**

7D Using the information in the diagrams, which antibiotic worked equally well in killing bacteria **R** and **S**?

1 antibiotic **W**

2 antibiotic **X**

3 antibiotic **Y**

4 antibiotic **Z**

4.3.1.8 Antibiotics and painkillers

Question 18

March 2010 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

Read the passage about the discovery of thalidomide.

> A small German drugs company first made thalidomide in 1953. The company scientists could not find any beneficial effects of thalidomide, including antibiotic activity, in mice and rats. However, the new chemical seemed to be harmless. Very high doses did not kill rodents, rabbits, cats or dogs. In addition, the animals showed no other side effects.
>
> In further testing, the animals did not appear to become sleepy or calmer when given thalidomide. However, the company thought that selling thalidomide as a sleeping drug would make them lots of money.
>
> Soon the drug was being sold in 46 countries without any additional independent testing. Thalidomide became the drug of choice for pregnant women with morning sickness.

9A Nowadays, all drugs are thoroughly tested before being marketed.

Which stage of drug testing was not done by the company scientists?

1 tests on animals

2 toxicity tests

3 tests on humans

4 antibiotic activity

9B The company marketed thalidomide quickly because . . .

1 they thought that they could make a big profit.

2 they wanted to cure morning sickness in women.

3 it was a good sleeping drug.

4 it was a good antibiotic.

4.3.1.8 Antibiotics and painkillers

Question 18 · continued

9C When clinical trials of a new drug are carried out, half the volunteers are given a placebo.

A placebo contains . . .

1 only inactive substances.

2 a small quantity of the drug.

3 an antibiotic.

4 a painkiller.

9D Thalidomide was banned when its side effects became known.

It has recently been approved for the treatment of . . .

1 morning sickness.

2 leprosy.

3 limb abnormalities.

4 mental illness.

END OF TEST

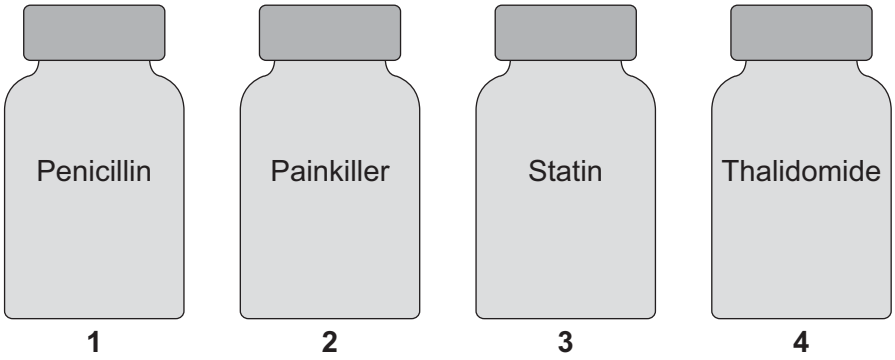
4.3.1.8 Antibiotics and painkillers

Question 19

June 2010 | BLY1AP | Original Q1 | Legacy

QUESTION ONE

Drugs are used to treat sick people.



Match treatments, **A**, **B**, **C** and **D**, with the drugs **1–4** in the diagram.

A used to treat a headache

B used to treat infections

C used to treat leprosy

D used to treat high cholesterol

4.3.1.8 Antibiotics and painkillers

Question 20

June 2010 | BLY1AP | Original Q8 | Legacy

QUESTION EIGHT

Our bodies defend themselves against attack by pathogens.

8A Our white cells produce antibodies which destroy . . .

1 all types of bacteria and all types of viruses.

2 all types of bacteria but no viruses.

3 all types of viruses but no bacteria.

4 some types of bacteria and some types of viruses.

8B Our white cells also produce antitoxins which . . .

1 counteract poisons produced by pathogens.

2 destroy both bacteria and viruses.

3 destroy bacteria but not viruses.

4 ingest pathogens.

8C Antibiotics destroy . . .

1 all types of bacteria and all types of viruses.

2 some types of bacteria and some types of viruses.

3 some types of bacteria but no viruses.

4 some types of viruses but no bacteria.

8D Vaccines . . .

1 can be made from dead pathogens.

2 can give protection against bacteria but not viruses.

3 can give protection against viruses but not bacteria.

4 destroy pathogens.

4.3.1.8 Antibiotics and painkillers

Question 21

November 2010 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

We use substances to prevent diseases and to cure diseases.

Match substances, **A**, **B**, **C** and **D**, with the statements **1–4** in the table.

A painkiller

B penicillin

C thalidomide

D vaccine

	Information
1	used to cure an infection caused by bacteria
2	used to prevent disease
3	used to help in the treatment of leprosy
4	used to treat symptoms, eg headache

4.3.1.8 Antibiotics and painkillers

Question 22

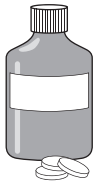
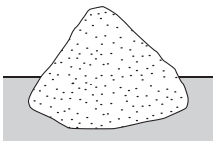
January 2011 | BLY1F | Original Q3 | Legacy

3 Drugs affect our bodies.

3 (a) **List A** gives the names of four different substances.

List B gives information about different substances.

Draw **one** line from each substance in **List A** to the correct information about the substance in **List B**.

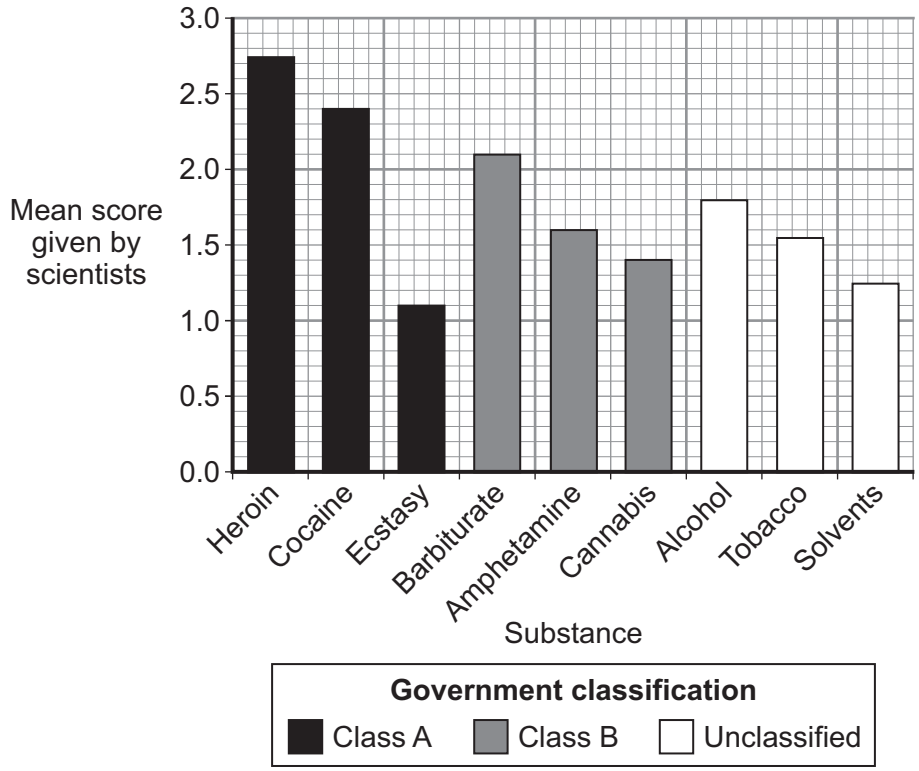
List A Substance	**List B Information**
Alcohol 	Used to treat bacterial diseases
Antibiotic 	A very addictive drug
Heroin 	May cause lung cancer
Cigarette smoke 	May cause babies to be born with abnormal limbs
	May cause liver disease

(4 marks)

4.3.1.8 Antibiotics and painkillers

Question 22 · continued

3 (b) A group of scientists was asked to say how much harm recreational drugs cause.
The scientists used a scale of 1–3, with 3 being the most harmful.
Their results are shown on the graph.
The government classifies drugs into three groups.
The groups are shown in the key below the graph.



3 (b) (i) Name the drug which **scientists** think is least harmful.

.....

(1 mark)

3 (b) (ii) In the government classification, class A drugs are the most harmful and unclassified drugs are the least harmful.

Does the government classification agree with the scientists' classification for **all** the drugs?

Draw a ring around your answer. **Yes / No**

Give **one** piece of evidence from the graph to support your answer.

.....

.....

(1 mark)

Question 3 continues on the next page

4.3.1.8 Antibiotics and painkillers

Question 22 · continued

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

People use recreational drugs

- to cure disease.
- to prevent diseases.
- for pleasure.

(1 mark)

7

4.3.1.8 Antibiotics and painkillers

Question 23

June 2011 | BLY1AP | Original Q1 | Legacy

QUESTION ONE

Drugs have different uses.

Match drugs, **A**, **B**, **C** and **D**, with the statements **1**–**4** in the table.

A statins

B painkillers

C heroin and cocaine

D tobacco and alcohol

1	legal and recreational drugs
2	very addictive drugs
3	used to lower blood cholesterol levels
4	used to relieve disease symptoms

4.3.1.8 Antibiotics and painkillers

Question 24

November 2011 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

Infectious diseases make us feel ill.

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

A antibodies

B antibiotics

C toxins

D painkillers

Bacteria make us feel ill because bacteria produce . . . **1** . . . .

To kill bacteria, a doctor might give a patient . . . **2** . . . .

To kill bacteria, our white blood cells produce . . . **3** . . . .

To relieve disease symptoms quickly, a doctor might give a patient . . . **4** . . . .

Turn over for the next question

4.3.1.8 Antibiotics and painkillers

Question 25

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.

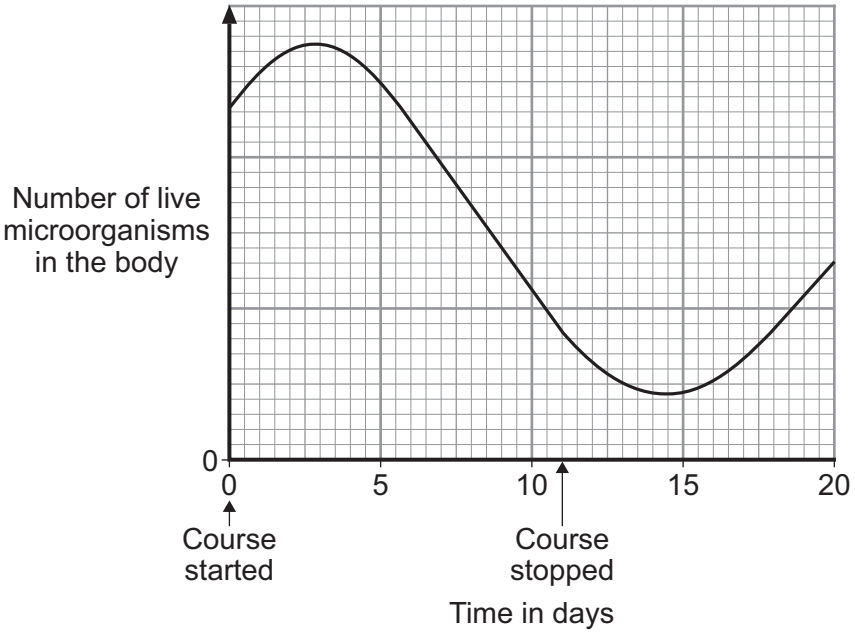
2 viruses are too small.

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

4.3.1.8 Antibiotics and painkillers

Question 25 · continued

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

4.3.1.8 Antibiotics and painkillers

Question 26

June 2012 | BL1FP | Original Q7 | Legacy

7 Scientists at a drug company developed a new pain-killing drug, drug **X**.

7 (a) Painkillers do **not** cure infectious diseases.

Why?

.....

(1 mark)

7 (b) The scientists compared drug **X** with two other pain-killing drugs, drug **A** and drug **B**. In their investigation the scientists:

- chose 600 volunteers. The volunteers were all in pain
- gave 200 of the volunteers a standard dose of drug **A**
- gave 200 of the volunteers a standard dose of drug **B**
- gave 200 of the volunteers a standard dose of drug **X**.

Over the next seven hours the volunteers recorded how much pain they felt.

To get valid results the three groups of volunteers should be matched for as many factors as possible.

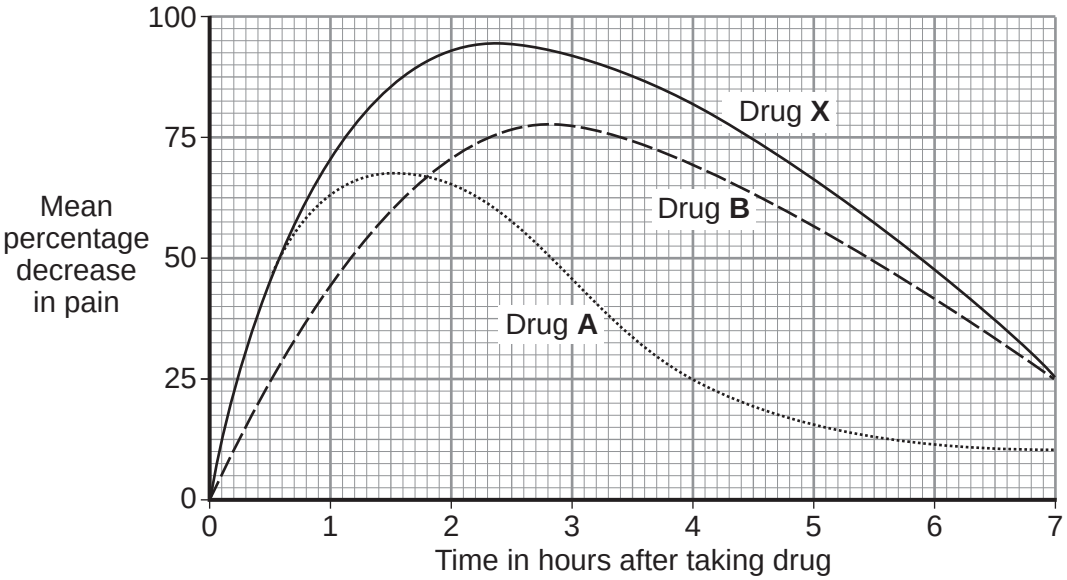
Suggest **two** of the factors that should be matched.

.....

.....

(2 marks)

7 (c) The graph shows the results of the investigation.



4.3.1.8 Antibiotics and painkillers

Question 26 · continued

7 (c) (i) How much pain did the volunteers still feel, four hours after taking drug **A**?

..... percent
(1 mark)

7 (c) (ii) Give **one** advantage of taking drug **A** and **not** drug **B**.

.....

.....
(1 mark)

7 (c) (iii) Give **two** advantages of taking drug **B** and **not** drug **A**.

.....

.....

.....

.....
(2 marks)

7 (d) Drug **X** is much more expensive than both drug **A** and drug **B**.

A pharmacist advised a customer that it would be just as good to take drug **A** and drug **B** together instead of drug **X**.

Do you agree with the pharmacist's advice?

Give reasons for your answer.

.....

.....

.....

.....

.....

.....

.....
(3 marks)

10

4.3.1.8 Antibiotics and painkillers

Question 27

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)

4.3.1.8 Antibiotics and painkillers

Question 27 · 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

4.3.1.8 Antibiotics and painkillers

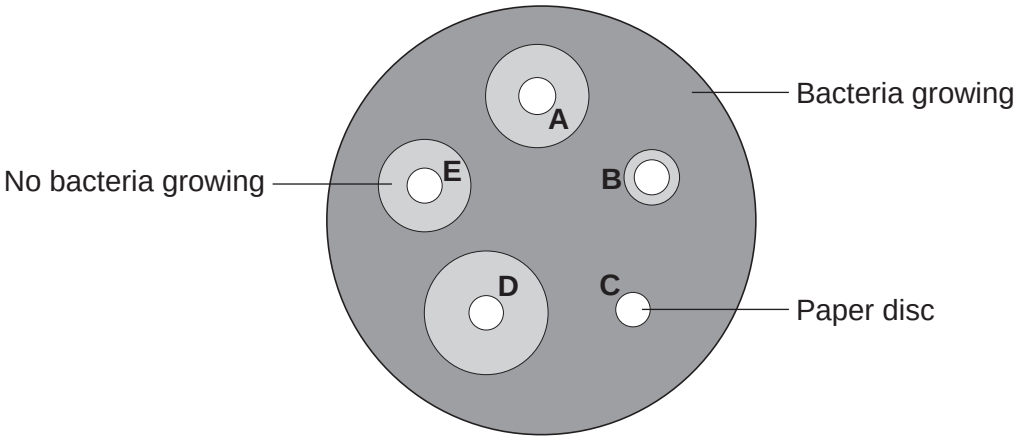
Question 28

June 2013 | BL1FP | Original Q3 | Legacy

3 Students in a school investigated the effect of five different antibiotics, **A**, **B**, **C**, **D** and **E**, on one type of bacterium.

The students:
- grew the bacteria on agar jelly in a Petri dish
- soaked separate paper discs in each of the antibiotics
- put the paper discs onto the bacteria in the Petri dish
- put the Petri dish into an incubator.

The diagram shows what the Petri dish looked like after 3 days.



3 (a) (i) What is the maximum temperature the incubator should be set at in the school?

Draw a ring around your answer.

10°C **25°C** **50°C**

(1 mark)

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

The incubator should **not** be set at a higher temperature because the higher

temperature might help the growth of

pathogens.
toxins.
viruses.

(1 mark)

4.3.1.8 Antibiotics and painkillers

Question 28 · continued

3 (b) Which antibiotic, **A**, **B**, **C**, **D** or **E**, would be best to treat a disease caused by this type of bacterium?

Write your answer in the box. ☐

Give the reason for your answer.

.....

.....

(2 marks)

3 (c) Antibiotics **cannot** be used to treat diseases caused by viruses.

Why?

Tick (✓) **one** box.

Viruses are not pathogens ☐

There are too many different types of virus ☐

Viruses live inside cells ☐

(1 mark)

5

4.3.1.8 Antibiotics and painkillers

Question 29

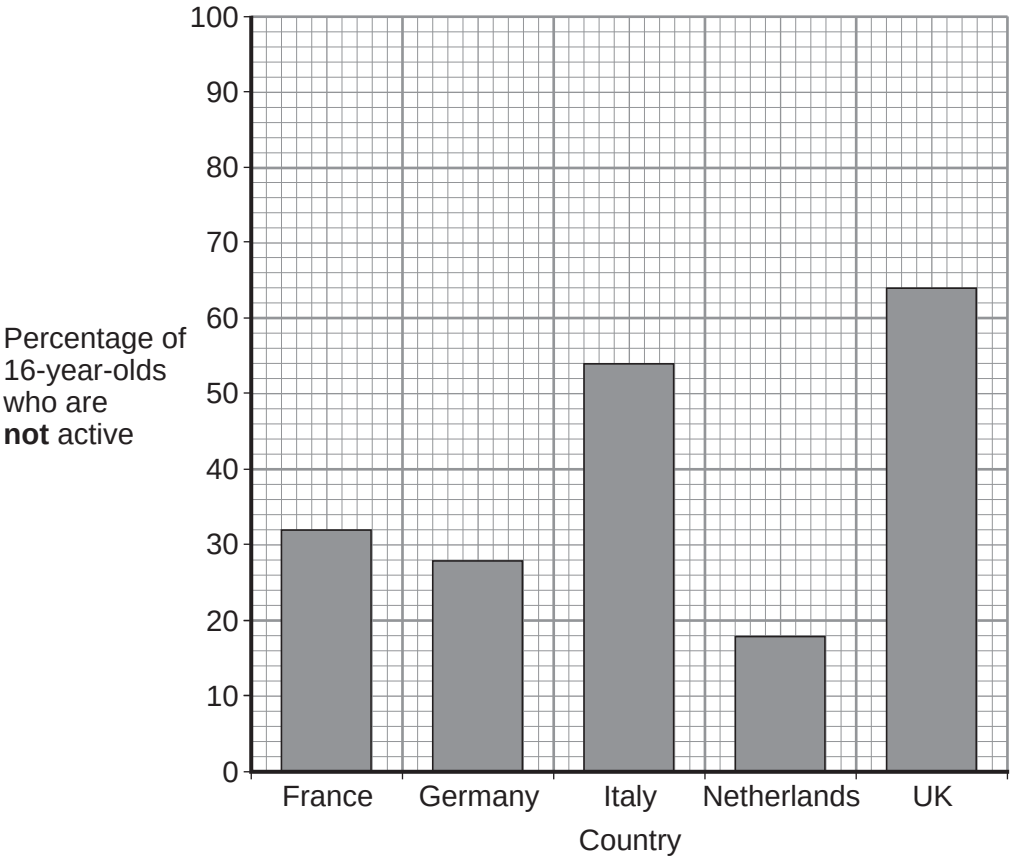
June 2015 | BL1FP | Original Q2 | Legacy

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]

..... %

4.3.1.8 Antibiotics and painkillers

Question 29 · 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

4.3.1.8 Antibiotics and painkillers

Question 29 · 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

4.3.1.8 Antibiotics and painkillers

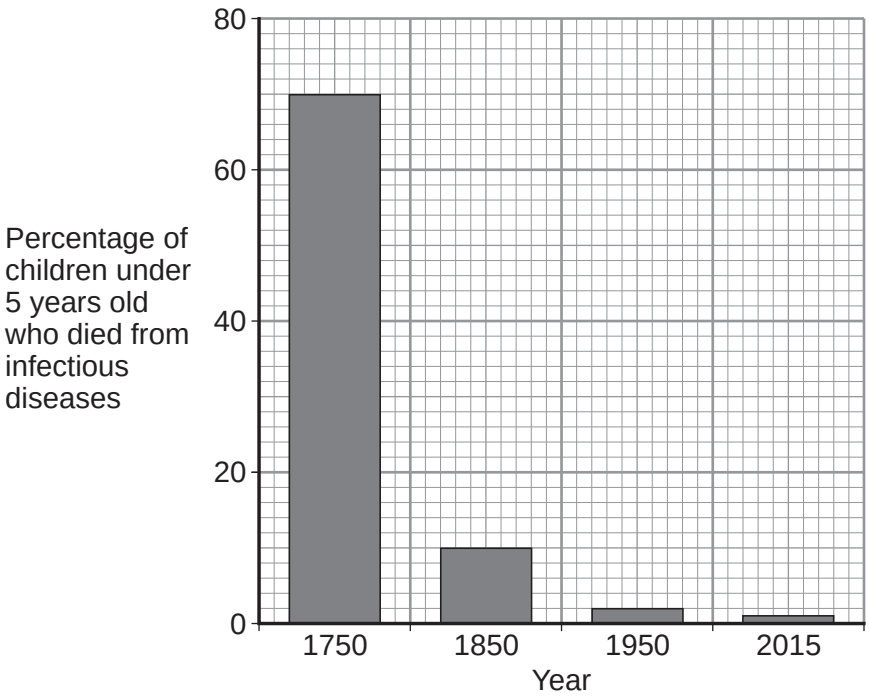
Question 30

June 2016 | BL1FP | Original Q5 | Legacy

5 Pathogens are microorganisms that cause infectious diseases.

5 (a) **Figure 7** shows the percentage of children under 5 years old who died from infectious diseases, in the UK, in four different years.

Figure 7



5 (a) (i) In the 1840s Dr Semmelweis introduced a new idea into hospitals.
What was this idea?

[1 mark]

Tick (✓) **one** box.

- hand-washing ☐
- immunisation ☐
- painkillers ☐

5 (a) (ii) Between 1750 and 1850 vaccinations were also developed.
What is in a vaccine?

[1 mark]

Tick (✓) **one** box.

- large amounts of dead pathogens ☐
- large amounts of live pathogens ☐
- small amounts of dead pathogens ☐

4.3.1.8 Antibiotics and painkillers

Question 30 · continued

5 (a) (iii) The advances in medicine had an effect on death rate.

Describe the effect these advances had between 1750 and 1850.

To gain full marks you should include data from **Figure 7**.

[2 marks]

5 (b) Antibiotics were developed in the 1940s. Antibiotics kill bacteria.

5 (b) (i) Which **one** of the following is an antibiotic?

[1 mark]

Draw a ring around the correct answer.

cholesterol **penicillin** **thalidomide**

5 (b) (ii) The use of antibiotics has **not** reduced the death rate due to all diseases to zero.

Suggest **two** reasons why.

[2 marks]

1

2

5 (c) In school laboratories, bacteria should be grown at a maximum temperature of 25 °C.

Give **one** reason why companies testing new antibiotics grow bacteria at 37 °C.

[1 mark]

8

4.3.1.8 Antibiotics and painkillers

Question 31

June 2017 | BL1FP | Original Q5 | Legacy

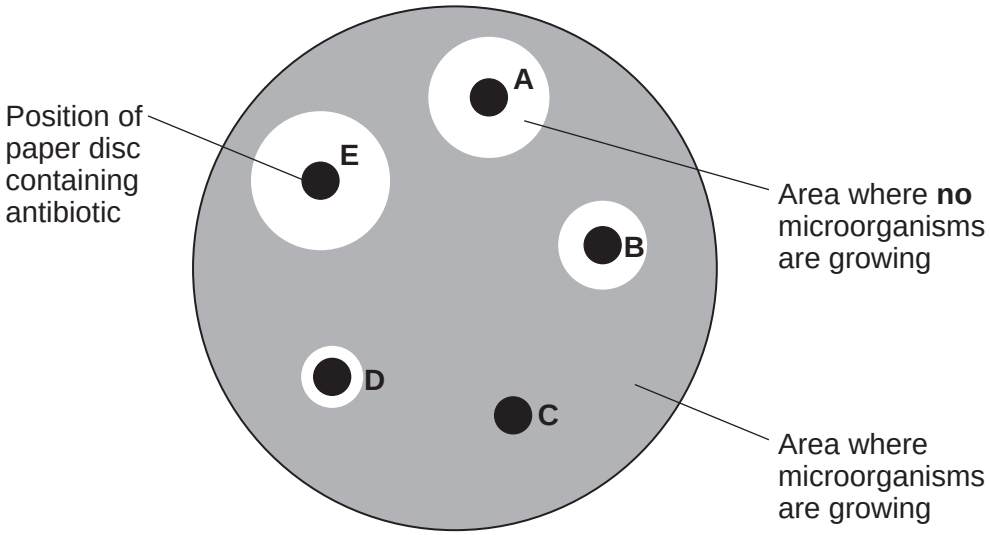
5 Some students investigated antibiotics.

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 _____

_____

4.3.1.8 Antibiotics and painkillers

Question 31 · continued

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

4.3.1.8 Antibiotics and painkillers

Question 31 · 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.

4.3.1.8 Antibiotics and painkillers

Question 31 · 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

4.3.1.8 Antibiotics and painkillers

Question 32

June 2019 | 8461/1F | Original Q5

0 5 A man has the following symptoms:

- yellow discharge from his penis
- pain when urinating.

0 5 . 1 The man has a bacterial infection.

What is the most likely cause of the man's symptoms?

[1 mark]

Tick (✓) **one** box.

- Gonorrhoea ☐
- HIV ☐
- Measles ☐
- Salmonella poisoning ☐

0 5 . 2 The man took a full course of antibiotics.

The man's symptoms did **not** improve.

Why did the antibiotics **not** cure the symptoms?

[1 mark]

Tick (✓) **one** box.

- The bacteria are immune to the antibiotics. ☐
- The bacteria are resistant to the antibiotics. ☐
- The man is immune to the antibiotics. ☐
- The man is resistant to the antibiotics. ☐

4.3.1.8 Antibiotics and painkillers

Question 32 · continued

0 5 . 3 Using a condom can stop the bacteria being passed to another person during sexual intercourse.

Suggest a different way the man could avoid passing the bacteria on to someone else.

[1 mark]

Question 5 continues on the next page

4.3.1.8 Antibiotics and painkillers

Question 32 · continued

A scientist investigated the effect of three different antibiotics on three different types of bacteria, **A**, **B** and **C**.

This is the method used.

1. Grow bacteria **A** on an agar plate.

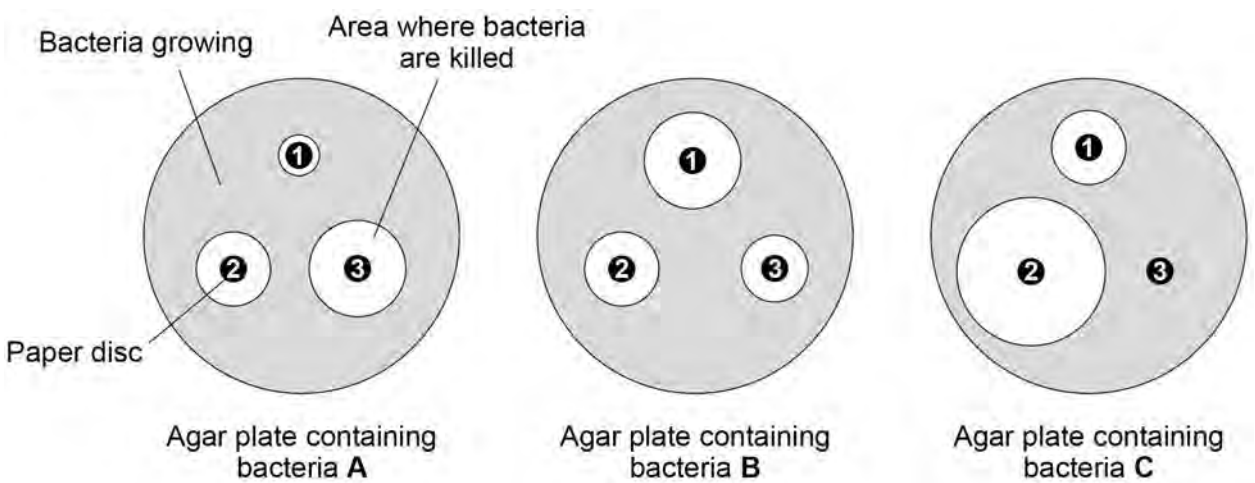
2. Put three separate paper discs each containing one of the antibiotics (**1**, **2** and **3**) onto the agar plate.

3. Put the agar plate into an incubator for 48 hours.

4. Repeat steps 1–3 for bacteria **B** and for bacteria **C**.

Figure 9 shows the scientist's results.

Figure 9



4.3.1.8 Antibiotics and painkillers

Question 32 · continued

0 5 . 4 Compare the effectiveness of the three antibiotics at killing the different types of bacteria.

[6 marks]

Question 5 continues on the next page

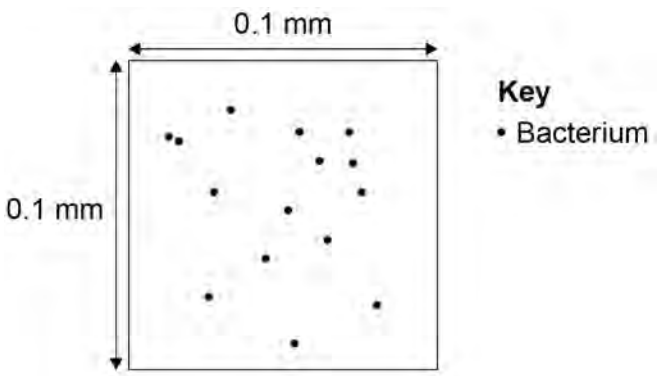
Question 32 · continued

Milk contains bacteria.

A small volume of raw milk was placed in a counting chamber in a special type of microscope slide.

Figure 10 shows what the counting chamber looked like when viewed using a microscope.

Figure 10



A scientist counted the number of bacteria in four samples of raw milk.

Table 4 shows the results.

Table 4

Milk sample	Number of bacteria in counting chamber
E	15
F	12
G	13
H	16

0 5 . 5 Which milk sample is shown in **Figure 10**?

[1 mark]

Tick (✓) **one** box.

Sample **E** ☐

Sample **F** ☐

Sample **G** ☐

Sample **H** ☐

4.3.1.8 Antibiotics and painkillers

Question 32 · continued

0 5 . 6 Calculate the mean number of bacteria in the four samples in **Table 4**.

[2 marks]

Mean number of bacteria = _____

0 5 . 7 Calculate the mean number of bacteria per mm^3 of milk in the samples.

Complete the following steps.

[3 marks]

Calculate the total area of the counting chamber in **Figure 10**.

Total area of counting chamber = _____ mm^2

The depth of the counting chamber is 0.01 mm

Calculate the volume of the counting chamber in **Figure 10**.

Use the equation:

volume = area × depth

Volume of counting chamber = _____ mm^3

Calculate the mean number of bacteria per mm^3 of milk in the samples.

Use the equation:

$$\text{mean number of bacteria per mm}^3\text{ of milk} = \frac{\text{mean number of bacteria from Question 05.6}}{\text{volume of counting chamber}}$$

Mean number of bacteria per mm^3 of milk = _____

Question 32 · continued

Milk is heated to reduce the number of bacteria it contains before it is sold for humans to drink.

Milk with more than 20 000 bacteria per cm^3 cannot be sold for humans to drink.

Table 5 shows the number of bacteria per cm^3 in four different samples of milk.

Table 5

Milk sample	Number of bacteria per cm^3 of milk
P	1.8×10^4
Q	2.2×10^4
R	2.2×10^{-5}
S	1.8×10^3

0 5 . 8 Which of the milk samples could **not** be sold for humans to drink?

[1 mark]

Tick (✓) **one** box.

P ☐ **Q** ☐ **R** ☐ **S** ☐

0 5 . 9 Why should milk sold for humans to drink **not** contain large numbers of bacteria?

[1 mark]

17

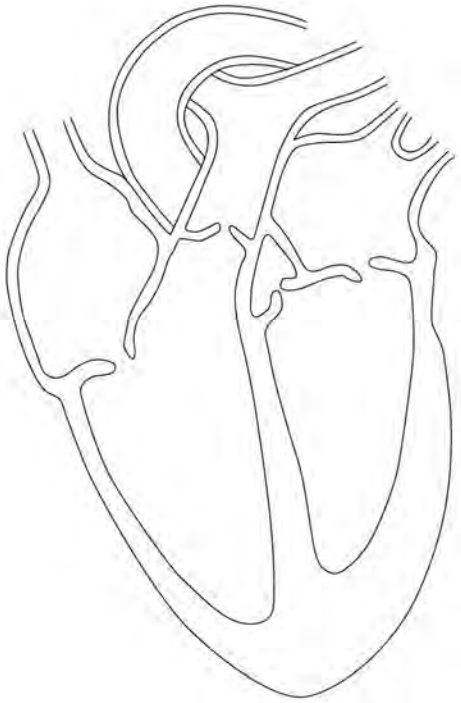
4.3.1.8 Antibiotics and painkillers

Question 33

June 2019 | 8461/1F | Original Q6

0 6 **Figure 11** shows the internal structure of the human heart.

Figure 11



0 6 . 1 Which organ system is the heart a part of?

[1 mark]

0 6 . 2 Draw a ring around **one** valve on **Figure 11**.

[1 mark]

0 6 . 3 What is the function of the valves in the heart?

[1 mark]

Question 6 continues on the next page

Question 33 · continued

0 6 . 4 Valves are also found inside some blood vessels.

Which type of blood vessel contains valves?

[1 mark]

Sometimes a valve in the heart can begin to leak.

A leaking heart valve may be replaced with either:

- a mechanical valve
- a biological valve from a pig.

Table 6 shows information about the replacement valves.

Table 6

Mechanical valve	Biological valve from a pig
Made of plastic or metal	Made from living tissue
Can cause the blood to clot around the valve	No risk of blood clotting around the valve
No need for another replacement valve after 5 years	Sometimes another replacement valve is needed after 5 years

0 6 . 5 Suggest **two** reasons why a patient may choose a mechanical valve and **not** a biological valve from a pig.

[2 marks]

1

2

4.3.1.8 Antibiotics and painkillers

Question 33 · continued

0 6 . 6 Suggest **one** reason why a patient may choose a biological valve from a pig and **not** a mechanical valve.

[1 mark]

0 6 . 7 A person may develop other medical conditions.

Draw **one** line from each medical condition to the correct treatment.

[2 marks]

Medical condition	Treatment
High blood cholesterol	Antibiotics
	Artificial pacemaker
Irregular heart rate	Insulin
	Statins

9

4.3.1.8 Antibiotics and painkillers

Question 34

November 2020 | 8461/1F | Original Q3

0 3 The human body can defend itself against microorganisms that cause disease.

Viruses are one type of microorganism that cause disease.

0 3 . 1 Name **one** type of microorganism that causes disease in humans.

Do **not** refer to viruses in your answer.

[1 mark]

---

0 3 . 2 Which **two** defence systems prevent microorganisms infecting the human body?

[2 marks]

Tick (✓) **two** boxes.

- Air is warmed as it is breathed into the lungs. ☐
- Hairs on the skin trap microorganisms. ☐
- Hydrochloric acid is produced by the stomach. ☐
- Teeth in the mouth crush and kill microorganisms. ☐
- The skin is a barrier covering the whole body. ☐

0 3 . 3 If microorganisms enter the human body the immune system can destroy the microorganisms.

How does the immune system destroy microorganisms?

[1 mark]

Tick (✓) **one** box.

- Platelets kill the microorganisms. ☐
- Red blood cells stick to the microorganisms. ☐
- White blood cells engulf the microorganisms. ☐

4.3.1.8 Antibiotics and painkillers

Question 34 · continued

0 3 . 4 Vaccinations prevent people becoming ill with diseases such as measles.

Complete the sentences.

[2 marks]

Choose answers from the box.

active	**fast**	**resistant**	**slow**	**weakened**

In a vaccine the measles virus is _____.

If the measles virus enters the body after vaccination the immune system reaction will be _____.

0 3 . 5 How is the measles virus spread from one person to another?

[1 mark]

_____

_____

Question 3 continues on the next page

4.3.1.8 Antibiotics and painkillers

Question 34 · continued

Doctors investigated the spread of the virus that causes chickenpox.

The first symptom of chickenpox after exposure to the virus is spots on the body.

23 children were playing together at a party.

On the day of the party one of the children developed chickenpox spots.

Every two days after the party, the doctors recorded when the other 22 children first showed chickenpox spots.

Table 1 shows the results.

Table 1

Day when chickenpox spots first showed	Number of children
2	0
4	0
6	0
8	0
10	1
12	1
14	6
16	4
18	2
20	0
Total	**14**

0 3 . 6 What was the range for the days on which children first showed chickenpox spots?

Use **Table 1**.

[1 mark]

From day _____ to day _____

0 3 . 7 Incubation time is the usual time from exposure to a pathogen until the first symptoms appear.

Suggest the most likely incubation time for chickenpox.

[1 mark]

Incubation time = _____ days

4.3.1.8 Antibiotics and painkillers

Question 34 · continued

0 3 . 8 Suggest **one** reason why some of the children did **not** develop chickenpox.

[1 mark]

0 3 . 9 One mother gave antibiotics to her child who had chickenpox.

Suggest why this child did **not** recover more quickly than the other children who had chickenpox.

[1 mark]

11

Turn over for the next question

4.3.1.8 Antibiotics and painkillers

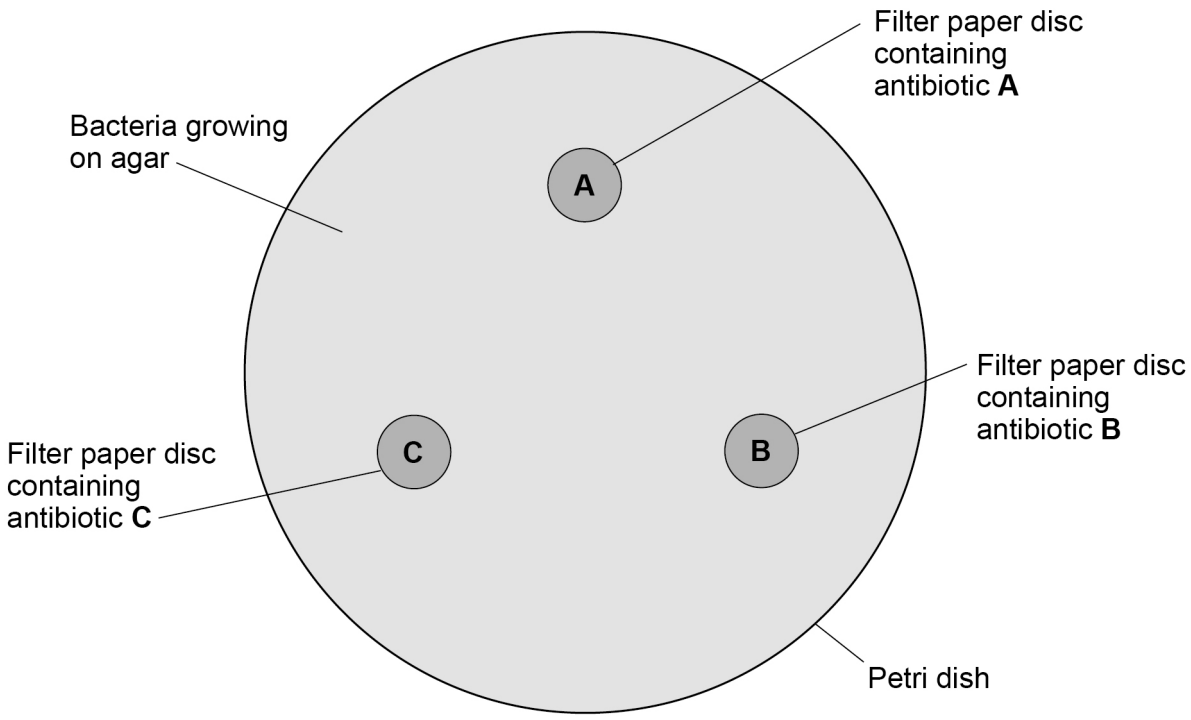
Question 35

November 2021 | 8461/1F | Original Q8

0 8 A student investigated the effectiveness of three different antibiotics.

Figure 16 shows how the student set up an agar plate.

Figure 16



The student used aseptic techniques to make sure that only one type of bacterium was growing on the agar.

0 8 . 1 Describe **two** aseptic techniques the student should have used.

[2 marks]

1 _____

_____

_____

2 _____

_____

_____

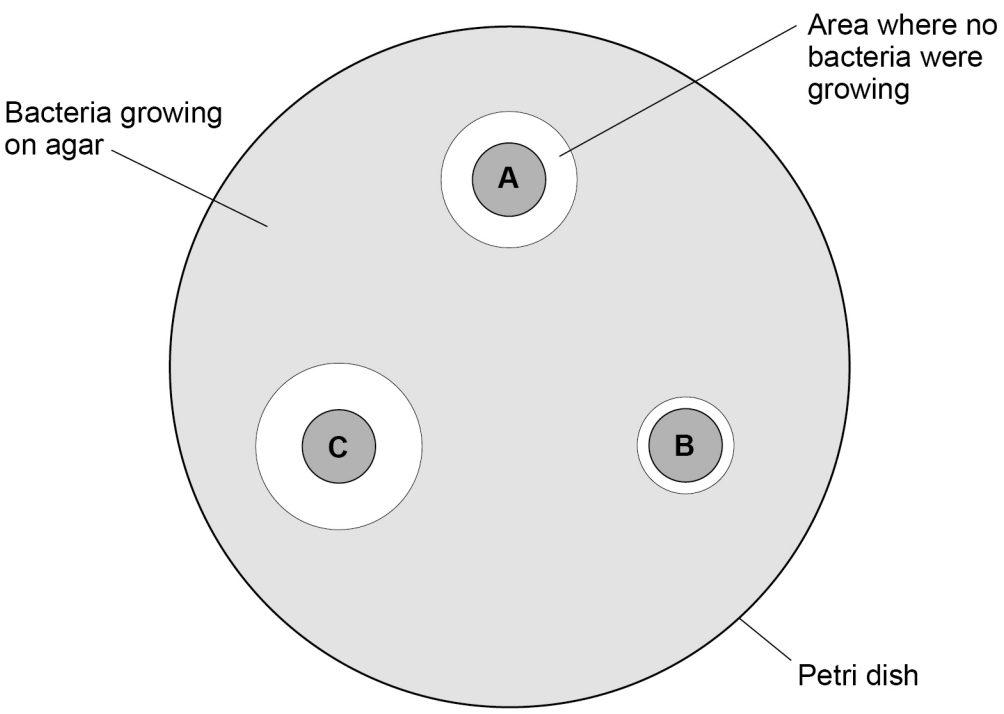
Question 8 continues on the next page

Question 35 · continued

The student placed the agar plate in an incubator at 25 °C for 48 hours.

Figure 17 shows the agar plate after 48 hours.

Figure 17



0 8 . 2 Which antibiotic is the **least** effective?

Give a reason for your answer.

[1 mark]

Least effective antibiotic _____

Reason _____

_____

_____

4.3.1.8 Antibiotics and painkillers

Question 35 · continued

0 8 . 3 Calculate the area where no bacteria were growing for antibiotic **C**.

Use $\pi = 3.14$

Give the unit.

[5 marks]

Area = _____ Unit _____

0 8 . 4 Suggest **one** way the student could improve the investigation.

[1 mark]

_____

_____

9

4.3.1.8 Antibiotics and painkillers

Question 36

June 2023 | 8461/1F | Original Q6

0 6 A root is a plant organ.

Plant roots contain many different types of tissue.

0 6 . 1 What is a tissue?

[1 mark]

0 6 . 2 Tissue in the tip of a plant root contains stem cells.

Stem cells can differentiate into any type of cell.

Name the type of tissue in plants that contains stem cells.

[1 mark]

In the past many drugs were extracted from plants.

0 6 . 3 Aspirin is a painkiller.

Which plant does aspirin originate from?

[1 mark]

Question 6 continues on the next page

4.3.1.8 Antibiotics and painkillers

Question 36 · continued

Scientists have extracted chemical **A** from the deadly nightshade plant.

Chemical **A** can be used as a painkiller.

Table 5 shows information about where chemical **A** is found.

Table 5

Part of deadly nightshade plant	Mass of chemical A in 100 g of plant tissue in grams
Roots	1.3
Leaves	1.2
Berries	0.7

0 6 . 4 The scientists usually extract chemical **A** from the berries of the deadly nightshade plant.

Suggest **one** reason why berries are used instead of leaves or roots.

[1 mark]

4.3.1.8 Antibiotics and painkillers

Question 36 · continued

A deadly nightshade plant has chlorosis (yellow leaves).

The mass of chemical **A** found in the **leaves** of the plant is 60% of the mass shown in **Table 5**.

0 6 . 5 Calculate the mass of chemical **A** in 200 g of the **leaves** with chlorosis.

Give your answer in mg.

[4 marks]

Mass of chemical **A** = _____ mg

0 6 . 6 Suggest **one** reason why the leaves of the deadly nightshade plant have chlorosis.

[1 mark]

Question 6 continues on the next page

4.3.1.8 Antibiotics and painkillers

Question 36 · continued

Chemical **A** has **not** been tested in large-scale clinical trials in the UK.

0 6 . 7 It is important for drugs to be tested in clinical trials before the drugs are approved for use by the public.

Give **two** reasons why.

[2 marks]

1 _____

_____

2 _____

_____

There are many online reports making claims about the effects of chemical **A**.

Some of these reports are biased.

0 6 . 8 Suggest **one** reason why a report making claims about the effects of chemical **A** may be biased.

[1 mark]

_____

_____

4.3.1.8 Antibiotics and painkillers

Question 36 · continued

0 6 . 9 How can scientists be sure that claims about new drugs are valid?

[1 mark]

Tick (✓) **one** box.

- Advertise the claims on social media. ☐
- Ask an international company to produce the drug. ☐
- Have the claims peer reviewed. ☐
- Publish the claims in a newspaper. ☐

13

Turn over for the next question

4.3.1.8 Antibiotics and painkillers

Question 37

June 2023 | 8461/2F | Original Q4

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

4.3.1.8 Antibiotics and painkillers

Question 37 · 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]

Question 37 · continued

One species of bacterium causes a disease in cows.

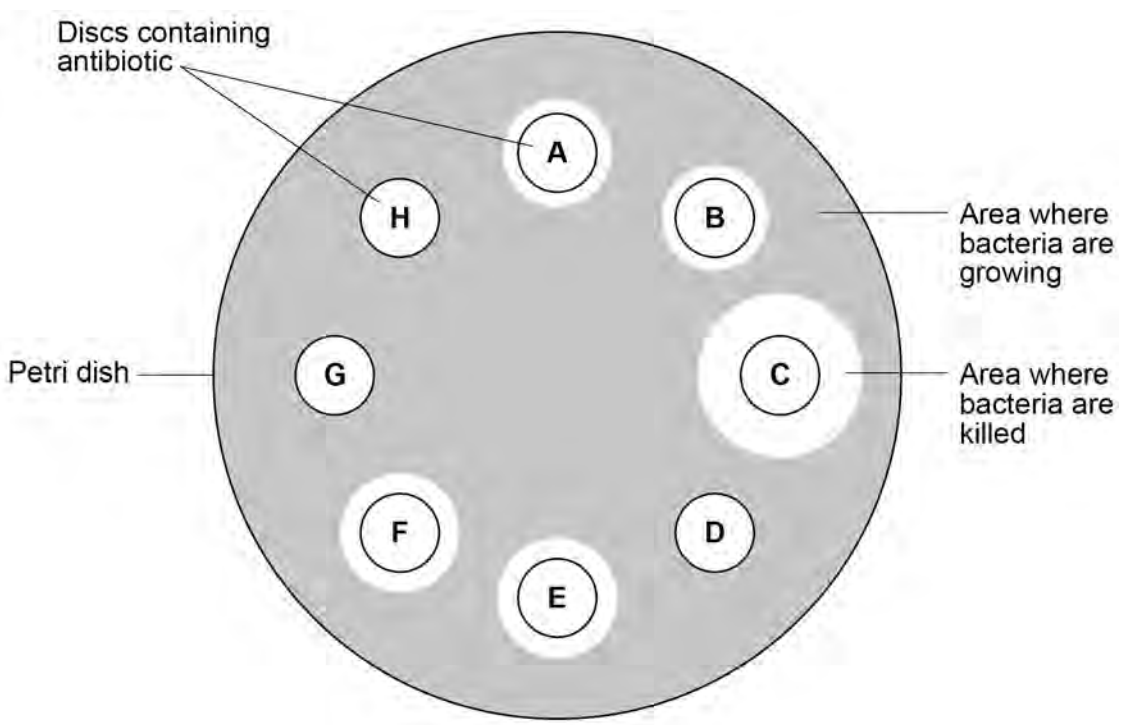
Scientists investigated the effect of eight different antibiotics on the growth of this species of bacterium.

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]

_____

4.3.1.8 Antibiotics and painkillers

Question 37 · 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

4.3.1.8 Antibiotics and painkillers

Question 38

June 2025 | 8461/1F | Original Q3

0 3 Blood contains different types of cell.

0 3 . 1 Complete the sentences.

Choose answers from the box.

[2 marks]

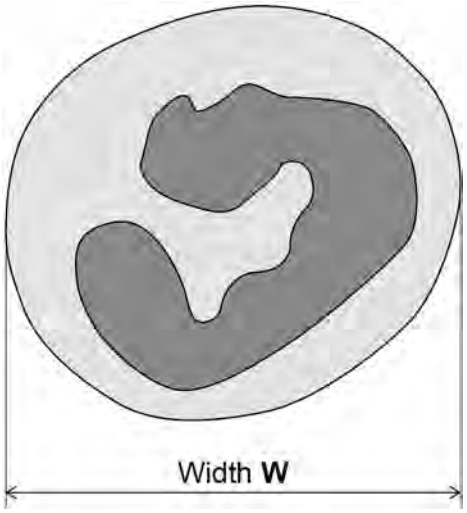
antibiotics	**antitoxins**	**painkillers**	**pathogens**

White blood cells defend the body against _____.

Some white blood cells release chemicals that neutralise toxins. These chemicals are called _____.

0 3 . 2 **Figure 3** shows a white blood cell.

Figure 3



The image of the white blood cell in **Figure 3** is magnified 4000 times.

4.3.1.8 Antibiotics and painkillers

Question 38 · continued

Calculate the real width of the white blood cell.

[4 marks]

Complete the following steps.

Measure width **W** in millimetres (mm).

Width **W** = _____ mm

Convert your measurement to micrometres (µm).

1 millimetre (mm) = 1000 micrometres (µm).

_____

_____

Width **W** in micrometres = _____ µm

Calculate the real width of the white blood cell.

Use the equation:

$$\text{real width} = \frac{\text{width } \mathbf{W} \text{ (µm)}}{\text{magnification}}$$

_____

_____

_____

_____

Real width = _____ µm

Question 38 · continued

Table 3 shows information about different types of blood vessel.

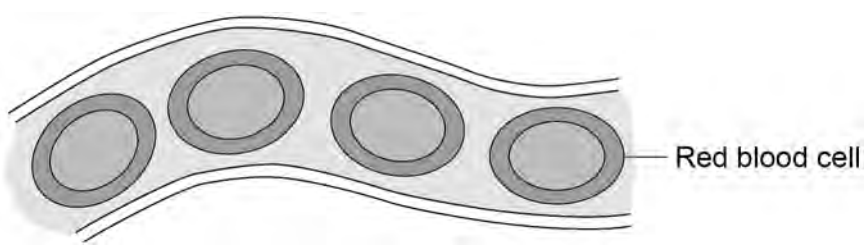
Table 3

Blood vessel	Width of blood vessel in micrometres (µm)	Pressure of blood travelling through the blood vessel
Artery	10 000	High
Capillary	10	Low
Vein	20 000	Very low

0 3 . 3 The width of a red blood cell is 8 µm.

Figure 4 shows red blood cells in one type of blood vessel.

Figure 4



Which type of blood vessel is shown in **Figure 4**?

Use **Table 3**.

[1 mark]

Tick (✓) **one** box.

Artery ☐

Capillary ☐

Vein ☐

4.3.1.8 Antibiotics and painkillers

Question 38 · continued

0 3 . 4 Explain why arteries need to have thick walls.

Use **Table 3**.

[2 marks]

Coronary arteries in the heart can become narrowed.

0 3 . 5 What happens inside coronary arteries to cause them to become narrowed?

[1 mark]

0 3 . 6 Explain why narrowed coronary arteries can be dangerous.

[2 marks]

Question 3 continues on the next page

4.3.1.8 Antibiotics and painkillers

Question 38 · continued

0 3 . 7 Treatments are available for some cardiovascular diseases.

Draw **one** line from each cardiovascular disease to a treatment for the disease.

[3 marks]

Cardiovascular disease	Treatment
A blocked coronary artery	Antibiotics
Heart failure	Heart transplant
High blood cholesterol	Statins
	Stent

0 3 . 8 Why is coronary heart disease described as a 'non-communicable disease'?

[1 mark]

_____

_____

16

4.3.1.8 Antibiotics and painkillers

Question 39

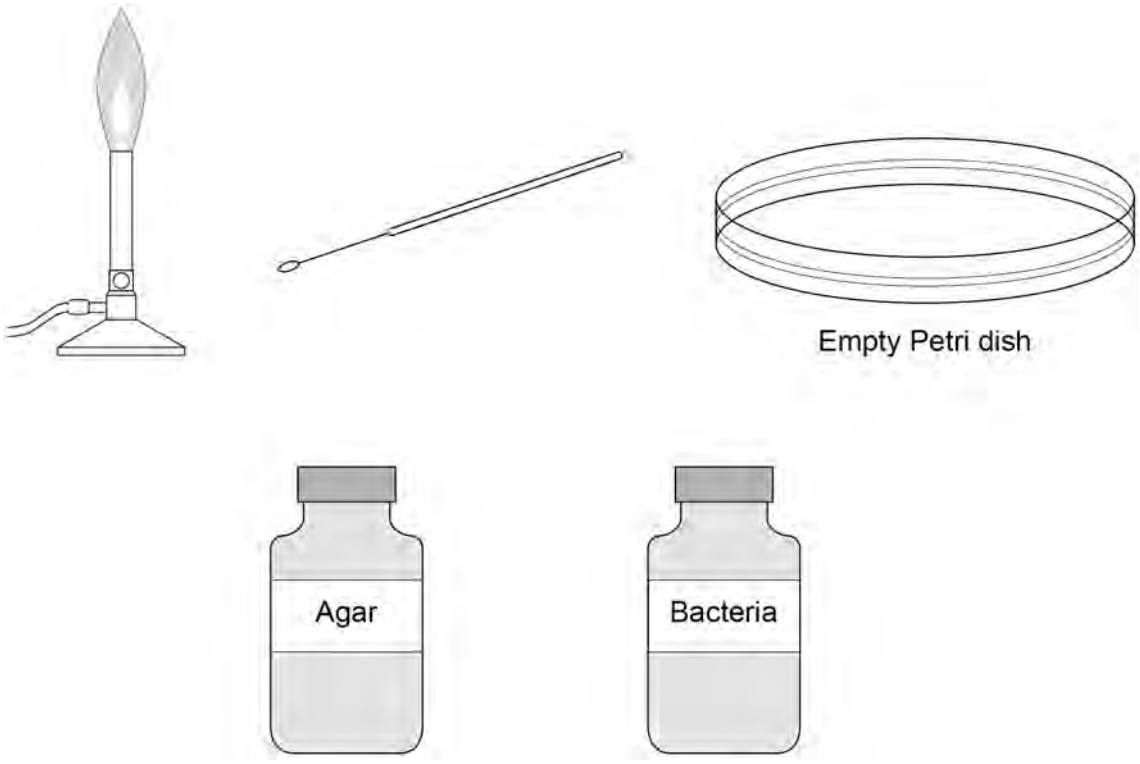
June 2025 | 8461/1F | Original Q4

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]

4.3.1.8 Antibiotics and painkillers

Question 39 · continued

Question 4 continues on the next page

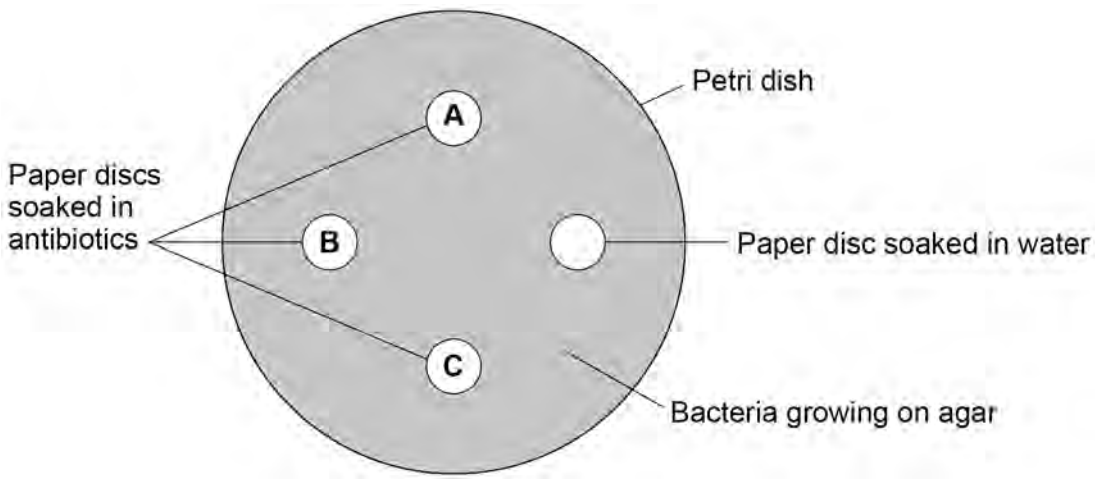
4.3.1.8 Antibiotics and painkillers

Question 39 · 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. ☐

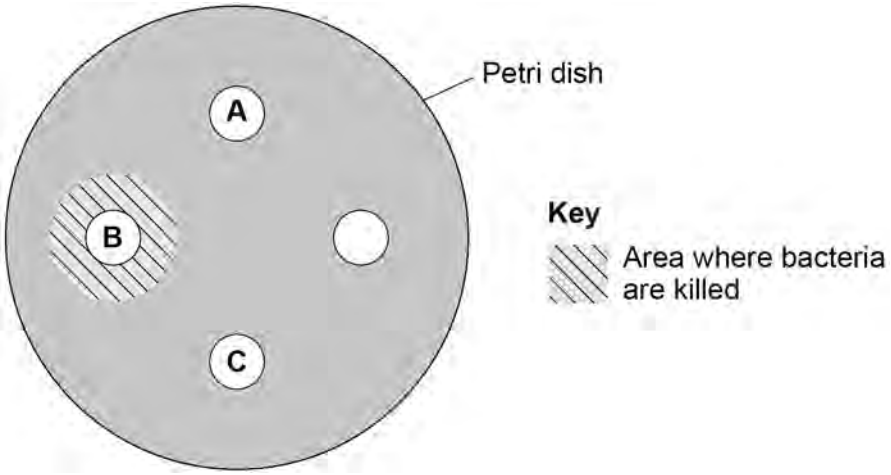
Question 39 · continued

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

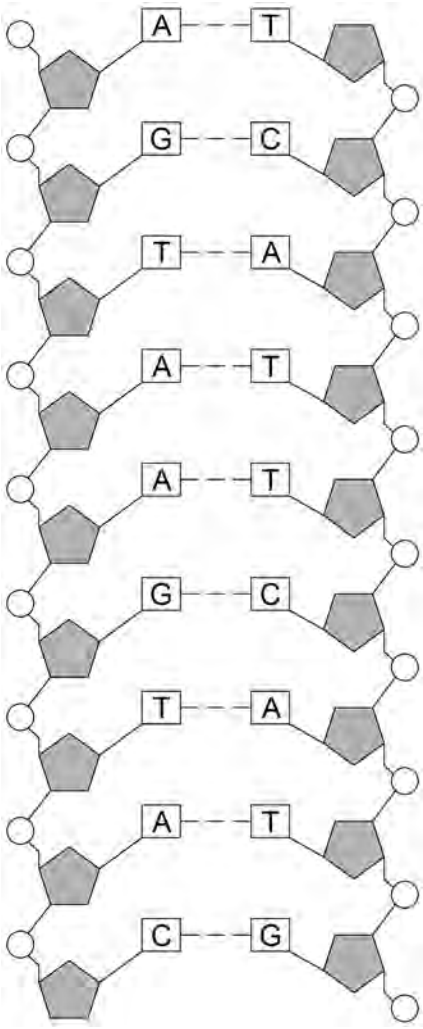
4.3.1.8 Antibiotics and painkillers

Question 40

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.

4.3.1.8 Antibiotics and painkillers

Question 40 · 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 ☐

4.3.1.8 Antibiotics and painkillers

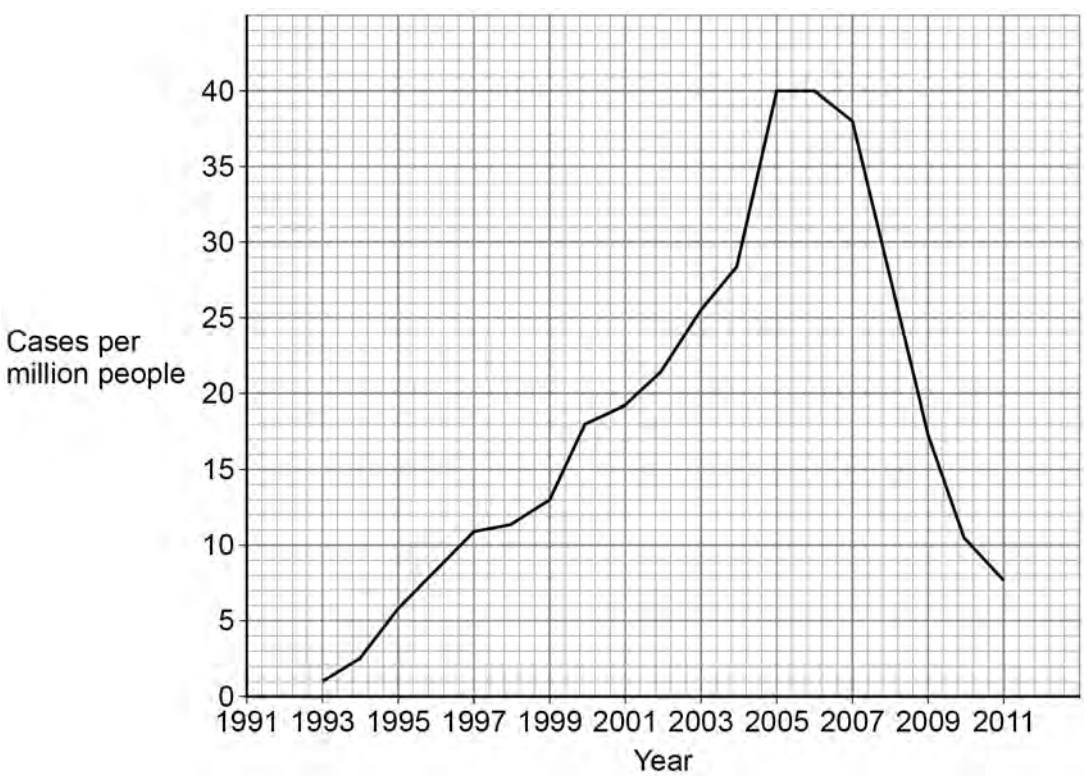
Question 40 · continued

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

4.3.1.8 Antibiotics and painkillers

Question 40 · 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