

Name:

Date:

B3 - Test 2
INFECTION & RESPONSE

GCSE
AQA
BIOLOGY

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

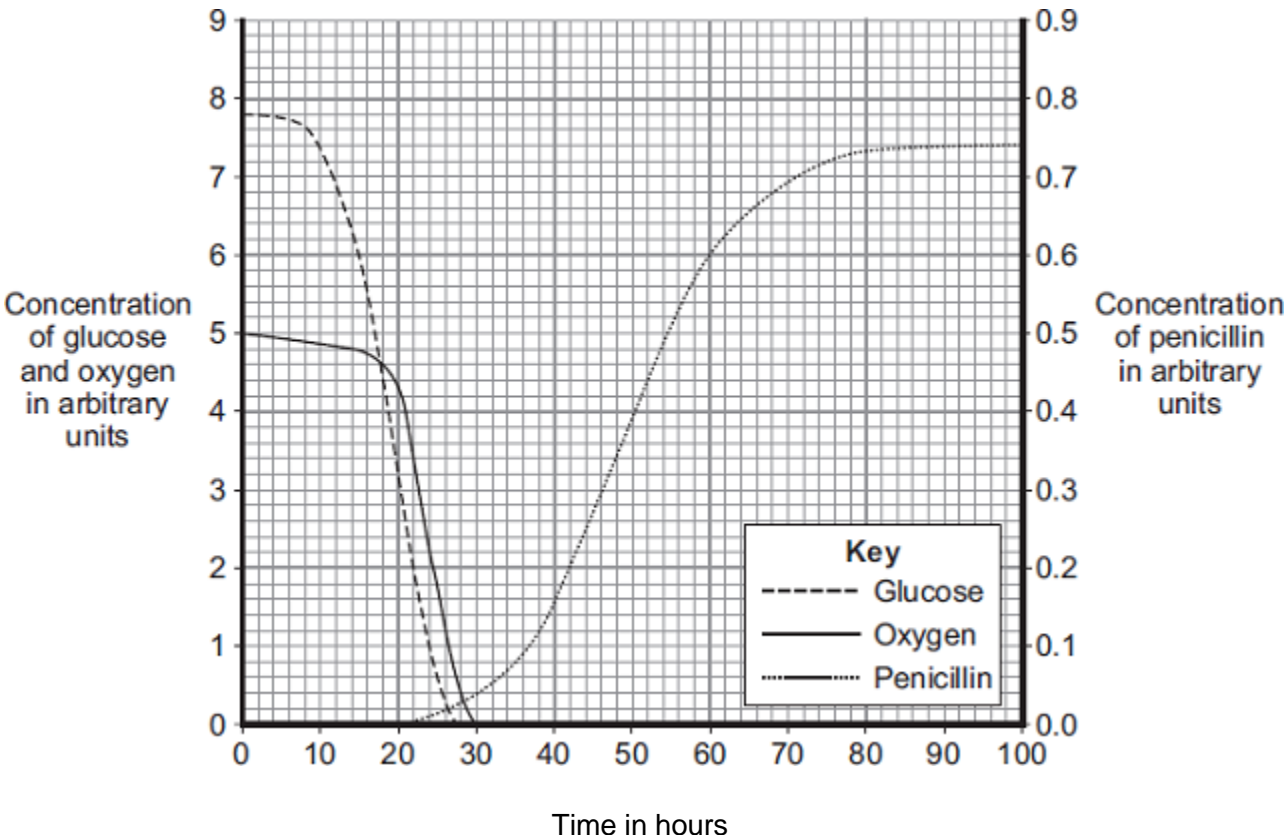
Information

- The marks for the questions are shown in brackets

1

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

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



(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)

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

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(2)

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

Tick (✓) **two** boxes.

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)

- (iii) What is the name of the process that uses glucose?

Draw a ring around **one** answer.

distillation

filtration

respiration

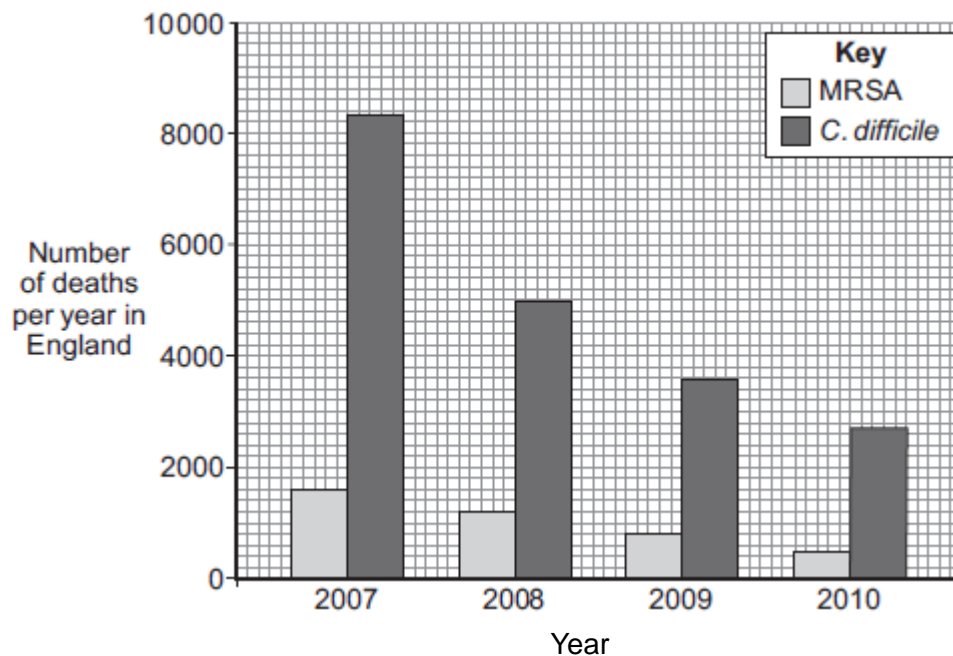
(1)

(Total 6 marks)

2

Infections by antibiotic resistant bacteria cause many deaths.

The bar chart below shows information about the number of deaths per year in England from *Methicillin-resistant Staphylococcus aureus* (MRSA) and from *Clostridium difficile* (*C.difficile*) over 4 years.



(a) (i) Describe the trend for deaths caused by *C.difficile*.

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(2)

(ii) Suggest a reason for the trend you have described in part (a)(i).

Explain your answer.

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(2)

(iii) Calculate the percentage change in deaths caused by MRSA from 2009 to 2010.

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Percentage change in deaths caused by MRSA = %

(2)

(iv) Numbers have not yet been published for 2011.

When the numbers are published, scientists do **not** expect to see such a large percentage change from 2010 to 2011 as the one you have calculated for 2009 to 2010.

Suggest **one** reason why.

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(1)

(b) Before 2007 there was a rapid increase in the number of deaths caused by MRSA.

Describe how the overuse of the antibiotic methicillin led to this increase.

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(3)
(Total 10 marks)

3

Drugs must be trialled before the drugs can be used on patients.

(a) (i) Before the clinical trials, drugs are tested in the laboratory.
The laboratory trials are **not** trials on people.

What is the drug tested on in these laboratory trials?

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(1)

(ii) Drugs must be trialled before the drugs can be used on patients.

Give **three** reasons why.

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(3)

(b) Read the information about cholesterol and ways of treating high cholesterol levels.

Diet and inherited factors affect the level of cholesterol in a person's blood.

Too much cholesterol may cause deposits of fat to build up in blood vessels and reduce the flow of blood. This may cause the person to have a heart attack.

Some drugs can lower the amount of cholesterol in the blood.

The body needs cholesterol. Cells use cholesterol to make new cell membranes and some hormones. The liver makes cholesterol for the body.

Some drugs can help people with high cholesterol levels.

Statins block the enzyme in the liver that is used to produce cholesterol.

People will normally have to take statins for the rest of their lives. Statins can lead to muscle damage and kidney problems. Using some statins for a long time has caused high numbers of deaths.

Cholesterol blockers reduce the absorption of cholesterol from the intestine into the blood.

Cholesterol blockers can sometimes cause problems if the person is using other drugs.

Evaluate the use of the two types of drug for a person with high cholesterol levels.

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(6)
(Total 10 marks)

4

Read the article.

Parents all over the world advise children to ‘wrap up warm or you’ll catch a cold’.

Scientists at Cardiff University recruited 180 volunteers to take part in an investigation to find out if the advice was true. The investigation took place during the city’s common cold season.

Half of the volunteers put their feet in bowls of ice cold water for 20 minutes. The other volunteers sat with their feet in empty bowls.

Over the next few days, almost a third of the volunteers who put their feet into cold water developed colds. Fewer than one in ten of the other volunteers developed colds.

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

The advice ‘wrap up warm or you’ll catch a cold’ is an example of

- hearsay.
- a hypothesis.
- a prediction.

(1)

(b) What was the experimental control in the investigation?

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(1)

(c) The scientists did **not** prove that the advice ‘wrap up warm or you’ll catch a cold’ is true.

Explain why.

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(3)

(Total 5 marks)

5

Scientists have discovered that curry spices affect sheep and cattle. Curry spices can reduce the amount of methane that grazing animals give off.

'Bad' bacteria in the animal's stomach produce methane. About 12% of the animal's food is changed into methane.

The curry spice coriander works like an antibiotic. Adding coriander to animal food reduces methane production by about 40%.

(a) (i) Why does adding coriander to an animal's food reduce methane production?

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(1)

(ii) Explain **one** advantage to a farmer of adding coriander to the animal's food.

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(2)

(b) Farm animals give off large amounts of methane.

Explain the effects of adding large amounts of methane to the atmosphere.

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(3)

(Total 6 marks)

6

(a) Explain how vaccination makes a person immune to a disease.

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(4)

(b) Scientists are trialling a 'nicotine vaccine' that might help **wean smokers off** the drug nicotine.
The trials so far have produced very mixed results.
Nicotine molecules are very small and can get through the protective layers around the brain.

(i) How does nicotine cause a person to become addicted?

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(1)

(ii) The 'nicotine vaccine' is made by attaching proteins to nicotine molecules. After 'vaccination' the body reacts to the nicotine in the same way as it reacts to pathogens.

Suggest how the 'nicotine vaccine' might help wean a smoker off nicotine.

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(2)

(Total 7 marks)

7

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

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

Why?

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(1)

(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.

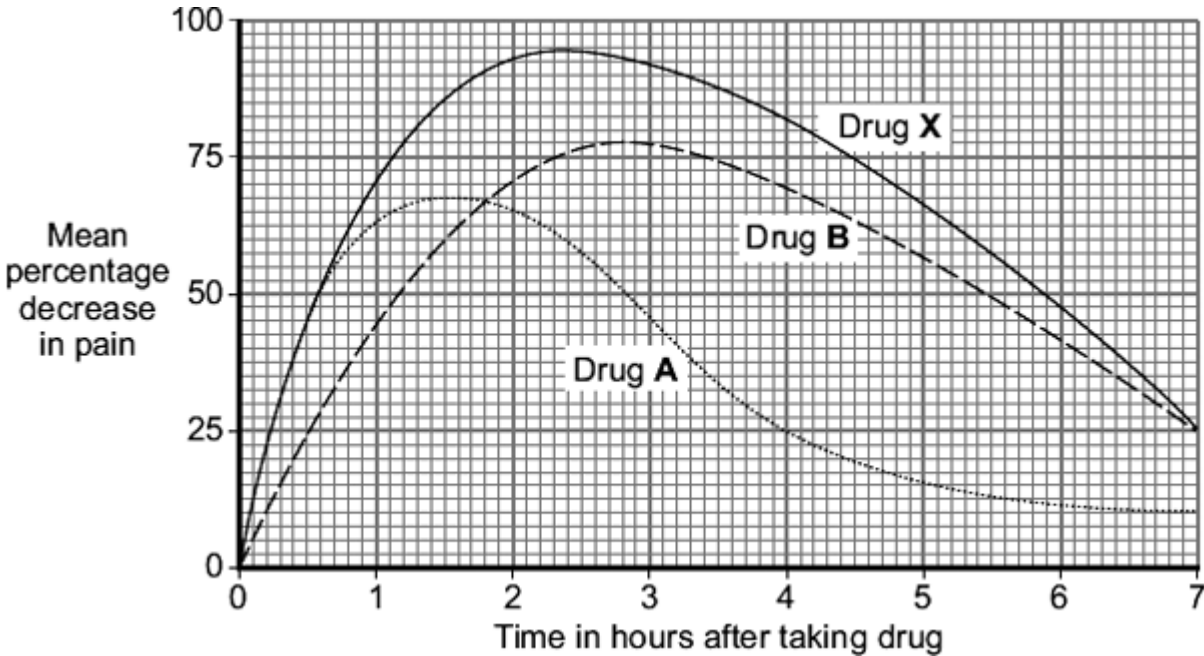
Suggest **two** of the factors that should be matched.

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(2)

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



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

..... percent

(1)

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

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(1)

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

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(2)

(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.

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(3)
(Total 10 marks)

8

People may be immunised against diseases using vaccines.

(a) (i) Which part of the vaccine stimulates the body's defence system?

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(2)

(ii) A person has been vaccinated against measles. The person comes in contact with the measles pathogen. The person does **not** catch measles.

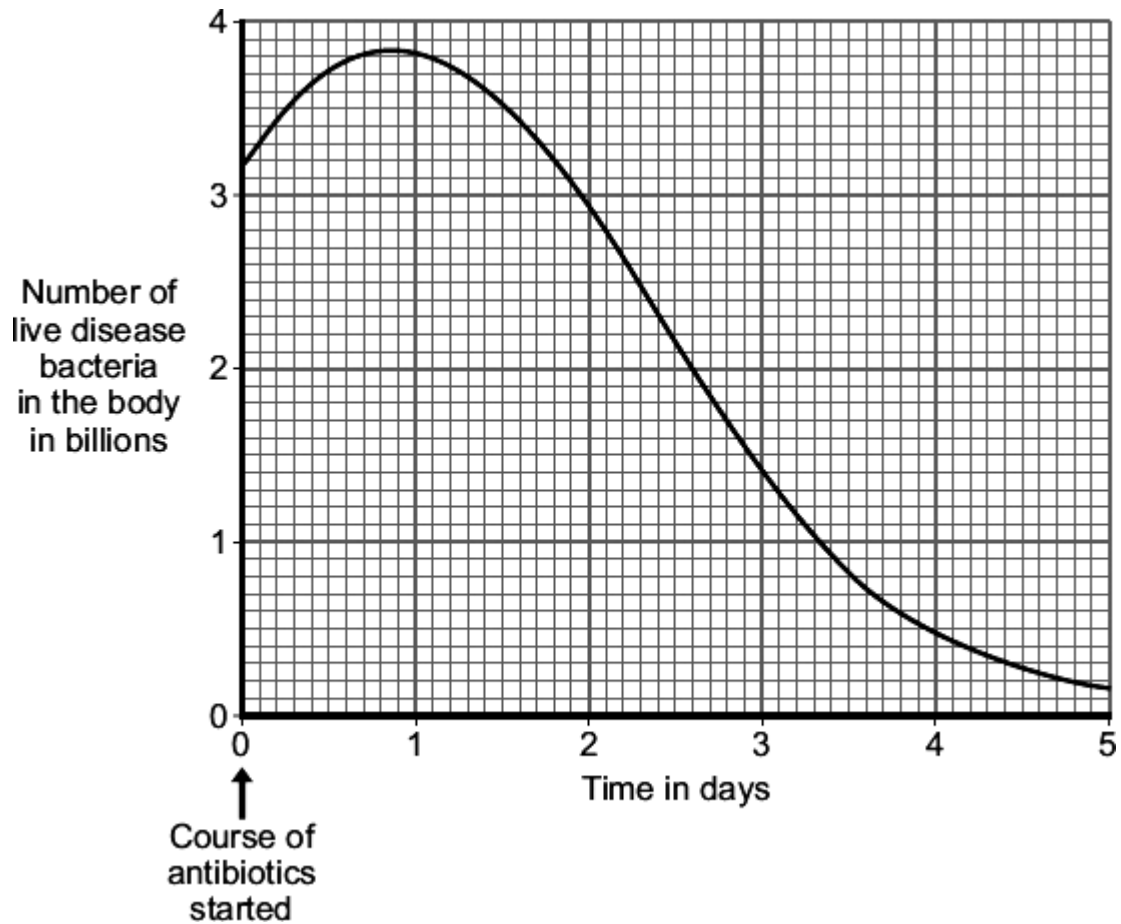
Explain why.

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(3)

- (b) A man catches a disease. The man has **not** been immunised against this disease. A doctor gives the man a course of antibiotics.

The graph shows how the number of live disease bacteria in the body changes when the man is taking the antibiotics.



- (i) Four days after starting the course of antibiotics the man feels well again. It is important that the man does **not** stop taking the antibiotics.

Explain why.

Use information from the graph.

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(2)

(ii) Occasionally a new, resistant strain of a pathogen appears.

The new strain may spread rapidly.

Explain why.

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(3)
(Total 10 marks)