



KS3 Science

Microorganisms

Question Paper

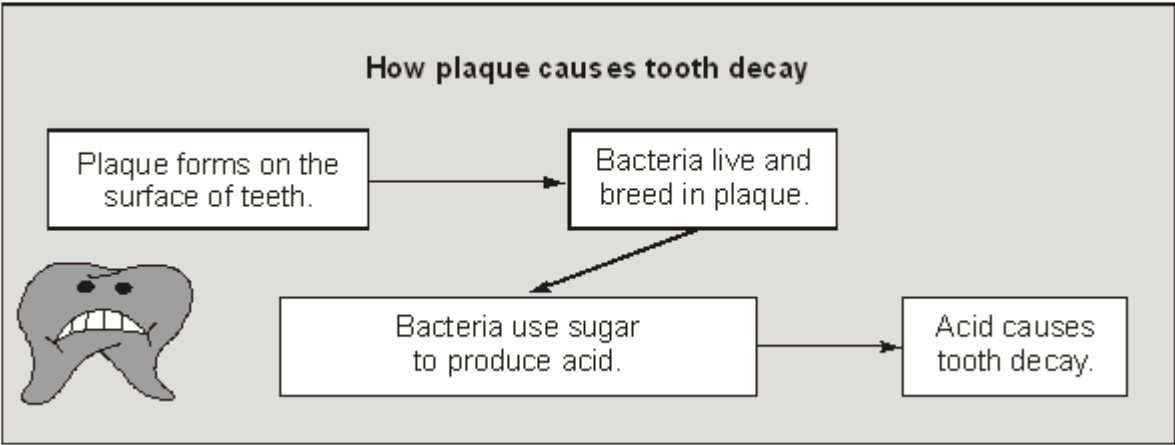
Time available: 43 minutes

Marks available: 62 marks

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1.

The dentist's leaflet below shows how plaque causes tooth decay.



(a) (i) Explain how reducing the amount of plaque can reduce tooth decay. Use the leaflet to help you.

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.....
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2 marks

(ii) Using an alkaline toothpaste also reduces tooth decay. Give the reason for this.

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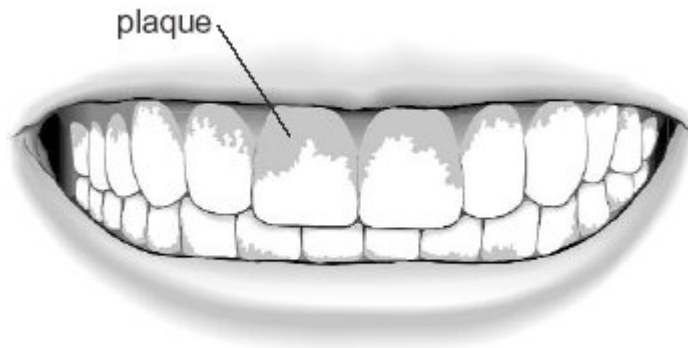
1 mark

(b) A group of boys wanted to find out how well plaque is removed by brushing teeth. Every day, before they brushed their teeth, the boys chewed a tablet that stains plaque red. Explain why the boys looked at their teeth **before and after** brushing.

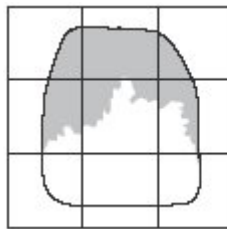
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1 mark

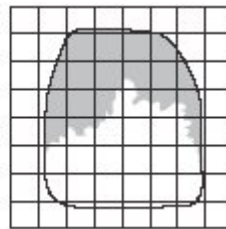
(c) The diagram below shows teeth with the plaque stained.



The boys used a grid drawn on clear plastic to measure the area of the plaque on their teeth.



A



B

(i) Grid B is better than grid A for measuring the area of plaque.

Why is a grid with smaller squares better for measuring the area of plaque?

.....
.....

1 mark

(ii) The squares on grid B represent 1 mm^2 .

Use grid B to estimate the area of the tooth covered by plaque.

..... mm^2

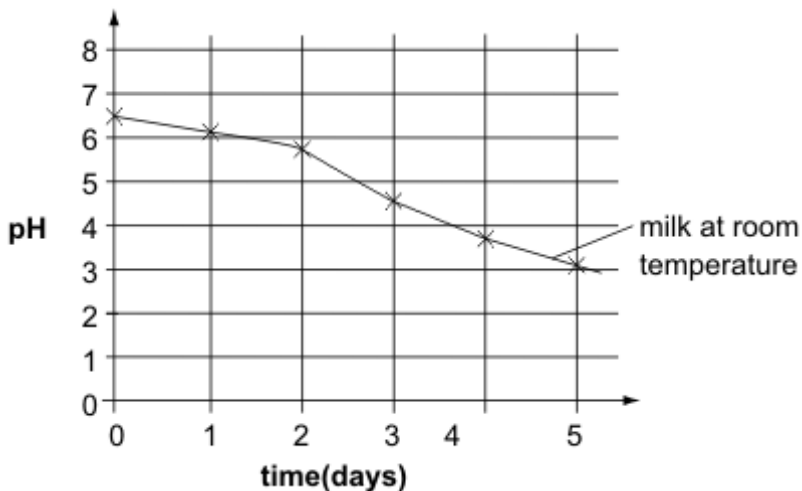
1 mark
maximum 6 marks

2.

Jane stored some milk at room temperature for five days in a sealed container. She used a pH sensor and data logger to record the pH of the milk for 5 days.

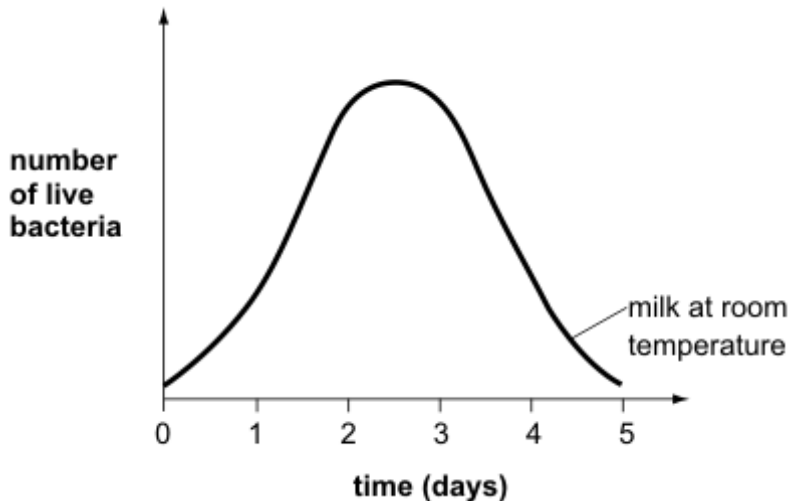
Her results are shown below.

graph 1



(a) Jane predicted that the number of live bacteria in the milk would change as shown below.

graph 2



(i) Suggest one reason why the number of live bacteria would start to decrease after 3 days.

.....
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1 mark

- (ii) What evidence from **graph 1** suggests that there were still some live bacteria in the milk on day 5?

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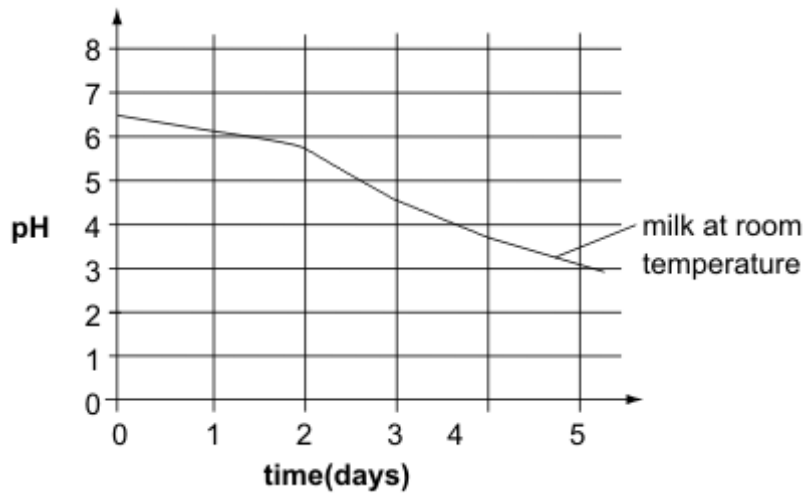
.....

1 mark

- (b) Jane put some fresh milk in a sealed container in the fridge. She measured the pH of the milk every day for five days.

- (i) On **graph 3** below, draw a line to show the pH of the **refrigerated milk** for five days.

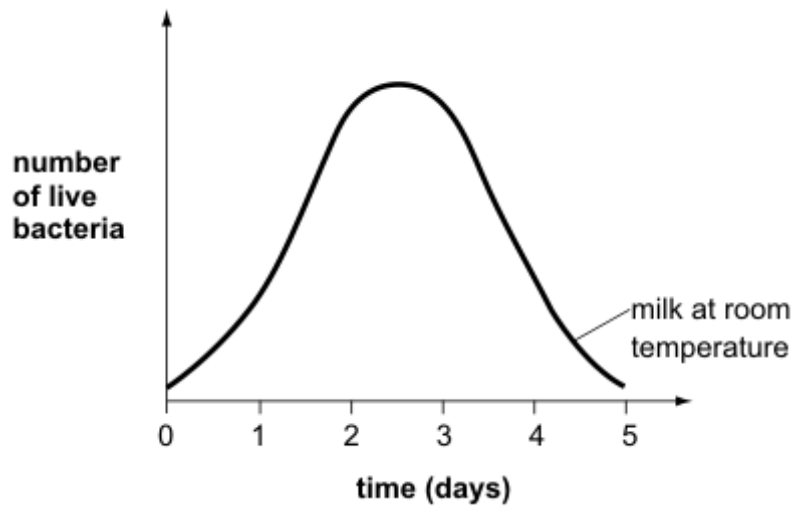
graph 3



2 marks

- (ii) On **graph 4** below, draw a line to predict how the number of live bacteria in **refrigerated milk** will change over five days.

graph 4



1 mark
maximum 5 marks

3. Sara investigated making bread. She described what she did below.

I mixed flour, water, sugar and yeast to make bread dough.

I put 50 cm³ of dough into a measuring cylinder.

I put the measuring cylinder into a water bath at 30°C.

I measured the volume of the dough after 30 minutes.

at the start **after 30 minutes**

Sara repeated the experiment with the water bath at different temperatures. Her results are shown below.

temperature of water bath (°C)	volume of dough (cm ³)	
	at the start	after 30 minutes
30	50	66
45	50	73
60	50	77
75	50	71
90	50	60

(a) Use the table of results. What question did Sara investigate?

.....

1 mark

(b) At each temperature Sara used dough from the same mixture.

(i) Give **one** other way Sara made her experiment fair.

.....

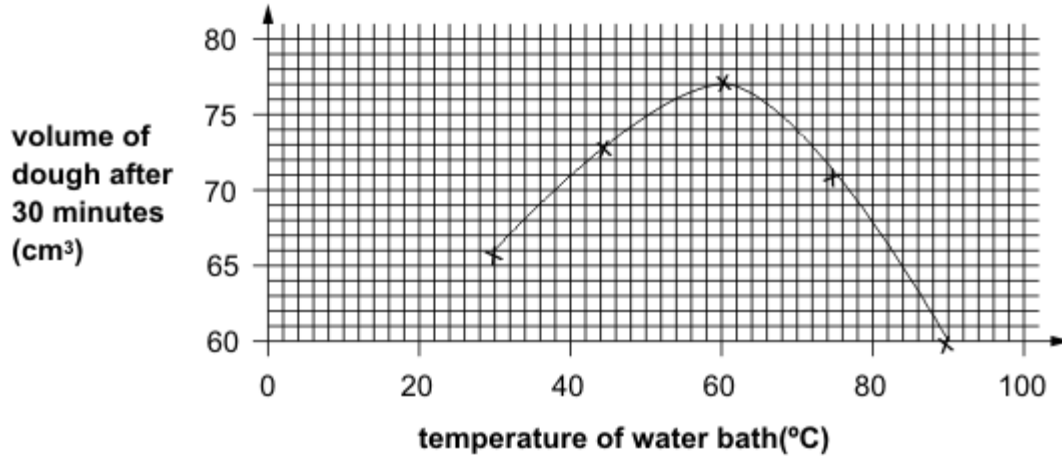
1 mark

(ii) Why would using dough from a different mixture make Sara's experiment **unfair**?

.....
.....

1 mark

(c) Sara plotted her results on the graph below.

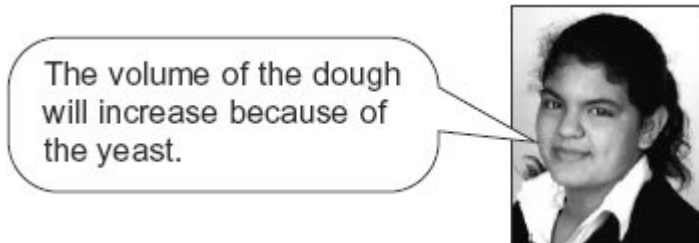


Describe the relationship between the variables on the graph from 30°C to 90°C.

.....
.....
.....

2 marks

(d) Sara made a prediction.



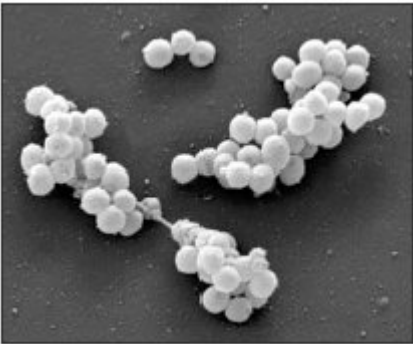
What could she do to test her prediction?

.....
.....

1 mark
maximum 6 marks

4.

The photograph below shows bacteria that have developed resistance to antibiotics. They are called MRSA bacteria.



(a) When MRSA bacteria reproduce, they pass on their resistance to antibiotics to the next generation.

What part of a cell passes on information?

.....

1 mark

(b) MRSA bacteria can cause serious infections in people who are ill in hospital. The bacteria can live on a healthy person's **skin** or in their **lungs** without causing any harm.

Use this information to fill in the table below.
Suggest **two** ways MRSA bacteria can be spread from person to person.
Suggest how the spread of the bacteria can be prevented for each method.

	method of spread	method of prevention
1		
2		

2 marks

(c) People can be vaccinated against some diseases caused by bacteria or viruses.

Describe how vaccination prevents a person getting a disease.

.....

.....

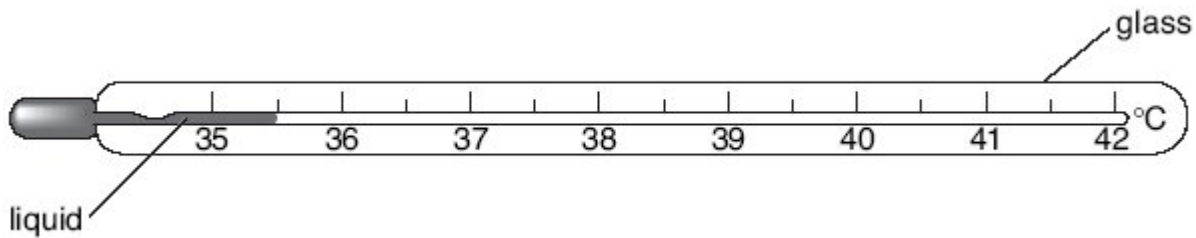
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3 marks
maximum 6 marks

5. The thermometer drawn below can be used to measure the temperature of the human body.



(a) (i) What is the lowest temperature **this** thermometer can measure?

.....°C

1 mark

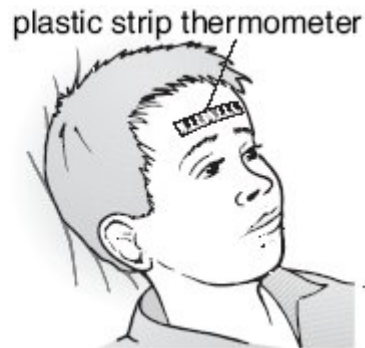
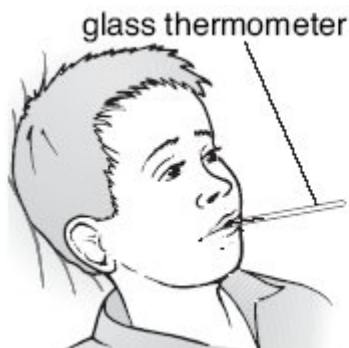
(ii) What is the normal temperature of the human body?
Tick the correct box.

37°C 39°C 41°C

1 mark

(iii) When we are ill our temperature may go up.

A nurse can measure a child's temperature with two different thermometers as shown below.



Give **one** reason why it is safer to use a plastic strip thermometer than a glass thermometer.

.....
.....

1 mark

(b) Viruses are micro-organisms that can make us ill.

Give the name of **one** other type of micro-organism that can make us ill.

.....

1 mark

(c) Alcohol and mercury are two liquids that can be used in glass thermometers. The table gives information about these liquids.

liquid	boiling point (°C)	colour
alcohol	78	colourless
mercury	357	shiny grey

(i) A red dye is added to the colourless alcohol used in thermometers. Suggest a reason for this.

.....
.....

1 mark

(ii) Choose words from the list below to fill the gaps in the sentences.

gas liquid solid

When alcohol and mercury boil they both change from a liquid to a

1 mark

A thermometer containing mercury can be used to measure the temperature of an oven at 150°C because mercury is a at 150°C.

1 mark
maximum 7 marks

6.

Cholera is a disease caused by bacteria. These bacteria produce a poison. The poison prevents the large intestine from absorbing water from the food passing through it. People with cholera can lose more than a litre of water per hour.

(a) Give **one** function of water in the body.

.....
.....

1 mark

(b) People can be injected with a vaccine against cholera. The vaccine contains a tiny amount of the cholera poison and **not** the cholera bacteria. As a result, people become immune to cholera.

Describe how vaccination makes a person immune to cholera.

.....
.....
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.....

2 marks

(c) The cholera poison makes the skin permeable. A new method of vaccinating against cholera is to put a small amount of the poison, mixed with other vaccines, on a plaster. The plaster is left on the skin for a day. The vaccines pass through the skin and the person becomes immune to cholera and to other diseases.

(i) Why should only a tiny amount of the poison be used?

.....
.....

1 mark

(ii) Suggest **one** advantage of vaccinating people in this way.

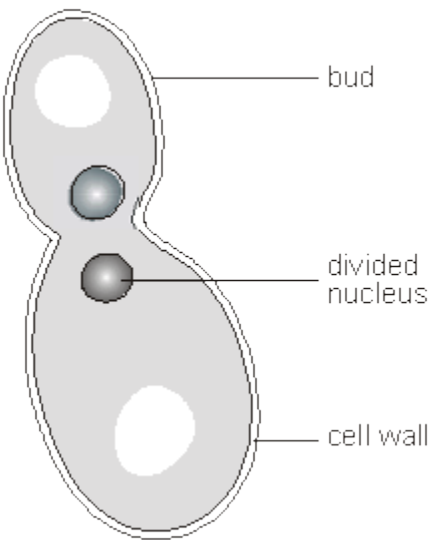
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1 mark

Maximum 5 marks

7.

The diagram shows a yeast cell reproducing asexually, by budding.



(a) The nucleus of the yeast cell contained 16 chromosomes before it divided. How many chromosomes will there be in the nucleus of the bud?

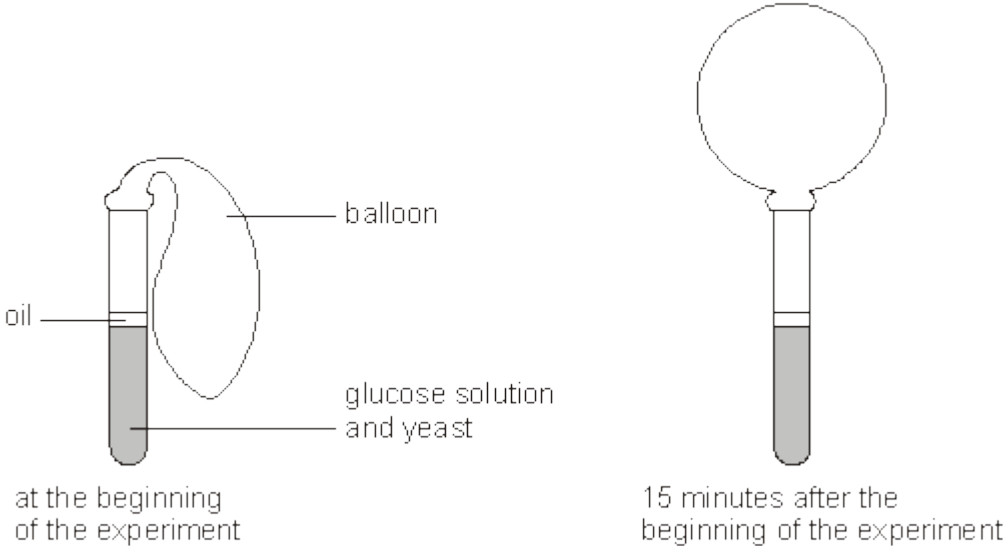
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1 mark

(b) A solution of glucose was boiled and then cooled to room temperature. Some yeast was added to the glucose solution in a test-tube. A balloon was attached tightly around the mouth of the test-tube, which was kept at room temperature.

A gas was produced which caused the balloon to inflate.

The diagrams below show the apparatus at the beginning of the experiment and 15 minutes later.



(i) Name the process which caused the gas to be given off.

.....

1 mark

(ii) Write a word equation for this reaction.

.....

1 mark

(c) In a second experiment, instead of yeast, the liquid from crushed yeast cells was added to glucose solution. The balloon became inflated again

In a third experiment, the liquid from crushed yeast cells was boiled, cooled to room temperature and then added to glucose solution. This time no gas was given off and the balloon did **not** inflate.

Explain why gas was **not** given off in the third experiment.

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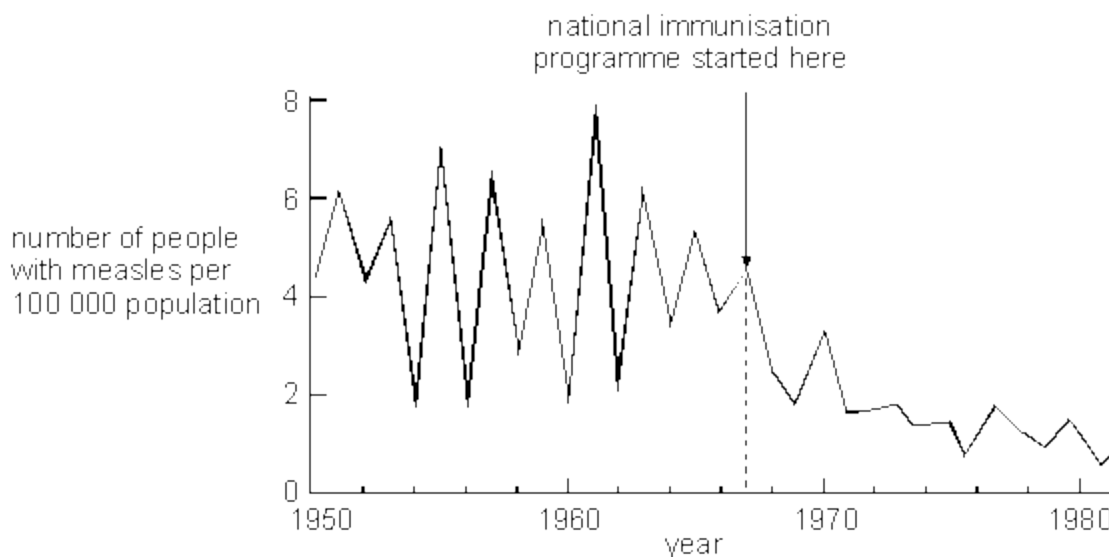
1 mark

Maximum 4 marks

8.

(a) In 1967 a national immunisation programme against measles began. Children were injected with a measles vaccine to make them immune to the disease.

The graph shows how the number of people with measles varied between 1950 and 1980.



(Data obtained from New Scientist, 18 November 1982)

(i) What does 'immune' mean?

.....
.....

1 mark

(ii) Complete the following sentence.

When a person is vaccinated, white blood cells produce

..... which kill micro-organisms.

1 mark

(iii) What is present in a vaccine to cause white blood cells to respond in this way?

.....

1 mark

(b) Explain how a new born baby can have immunity to measles for a short time without being vaccinated.

.....
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1 mark

(c) The national immunisation programme worked well.
Explain how the graph shows this.

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.....

1 mark

(d) An increasing number of children are not being immunised.
Predict what is likely to happen to the number of cases of measles as a result of this.

.....
.....

1 mark

Maximum 6 marks

9. Michael cut his knee while he was playing football.



A first-aider put a bandage over the cut.

- (a) A bandage helps to stop a cut getting dirty or infected.
Give the name of **one** type of micro-organism which can infect a cut.

.....

1 mark

- (b) While he was cleaning Michael's knee, the first-aider wore rubber gloves.

- (i) Give **one** reason why wearing rubber gloves is important for the first-aider's health.

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1 mark

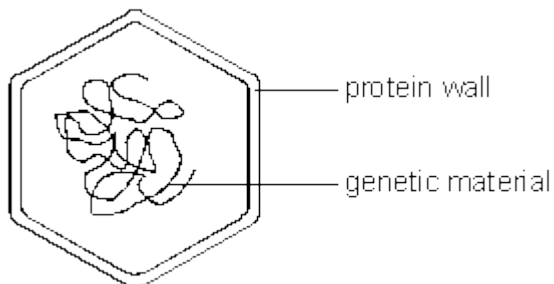
- (ii) Give **one** reason why it is important for Michael's health that the first-aider wears rubber gloves.

.....
.....

1 mark

Maximum 3 marks

10. Viruses have a very simple structure as shown below. They have no nucleus.



Viruses only reproduce inside living cells. Unlike bacteria, viruses are **not** affected by medicines called antibiotics.

(a) Describe how vaccines can help the body's natural defences against viruses.

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.....
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2 marks

(b) Some viruses are able to change their genetic material frequently. Each change produces a virus with different protein molecules in the protein wall. Explain why a vaccine which worked against the old virus may **not** work against the new types.

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.....

1 mark
Maximum 3 marks

11.

Spots may be caused by bacteria in the skin. A researcher investigated the effect of spot-lotion on bacteria.

(a) He grew bacteria on the surface of jelly in a Petri dish.

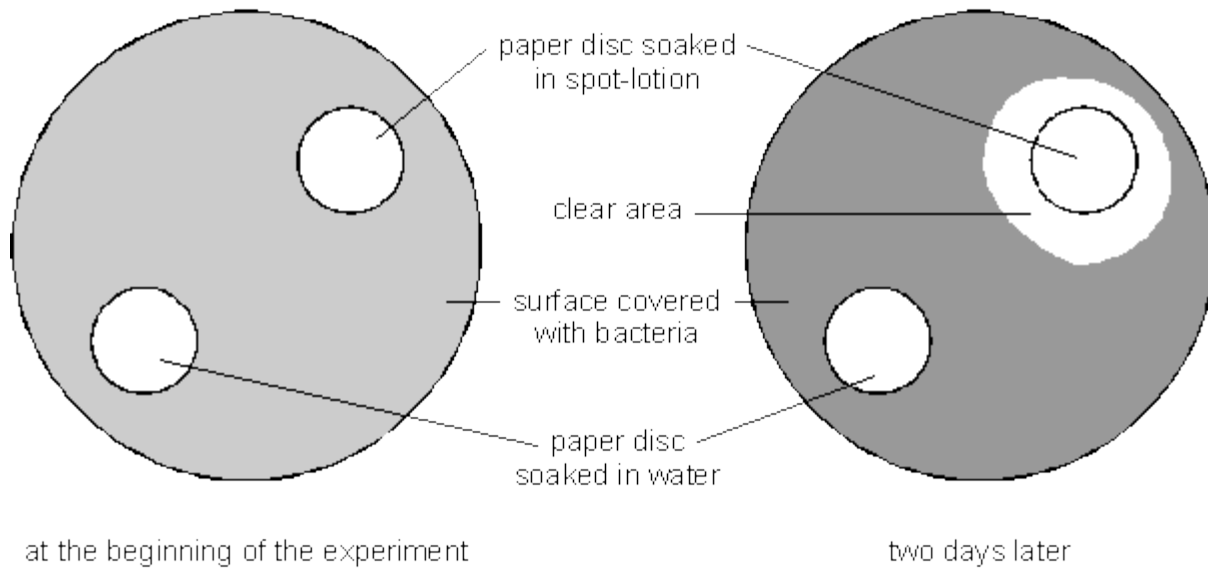
At what temperature would the bacteria reproduce quickly?

Tick the correct box.

100°C	<input type="checkbox"/>	4°C	<input type="checkbox"/>
37°C	<input type="checkbox"/>	-15°C	<input type="checkbox"/>

1 mark

- (b) The researcher placed two small paper discs onto the surface of the jelly. One disc had been soaked in spot-lotion. The other disc had been soaked in water. The diagrams below show the jelly at the beginning of the experiment and two days later.



Suggest what had happened to the bacteria in the clear area around the paper disc soaked in spot-lotion.

.....

1 mark

- (c) What was the control in this experiment?

.....

1 mark

- (d) Give **two** safety precautions the researcher should take to avoid contact with the bacteria.

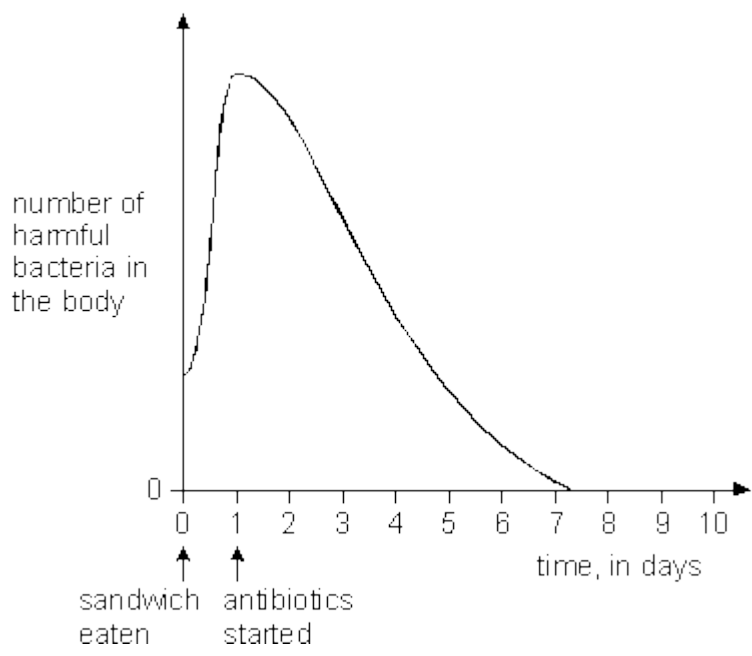
1
 2

2 marks
 Maximum 5 marks

12.

One evening Jenny and Leah ate chicken sandwiches which had been in their school bags all day. There were harmful bacteria in the food. The next day both girls became very ill. Their doctor gave them antibiotics to take for eight days.

The graph represents how antibiotics affect the number of bacteria in the body.



(a) Use the graph to explain why the girls did **not** become ill until the day after eating the sandwiches.

.....
.....

1 mark

(b) After taking the antibiotics for eight days Jenny was completely better. Explain why she got better.

.....
.....

1 mark

(c) Leah should have taken the antibiotics for eight days. She felt much better after five days and stopped taking the antibiotics. Two days later she felt very ill again. Use the graph to help you explain why Leah became ill again.

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.....
.....

2 marks

- (d) Food will keep longer if it is placed in a refrigerator at 2°C.
Refrigeration does **not** kill bacteria.
What effect does the low temperature have on bacteria?

.....
.....

1 mark
Maximum 5 marks