WJEC (Wales) Biology GCSE

Topic 2.7 Micro-organisms and their Applications
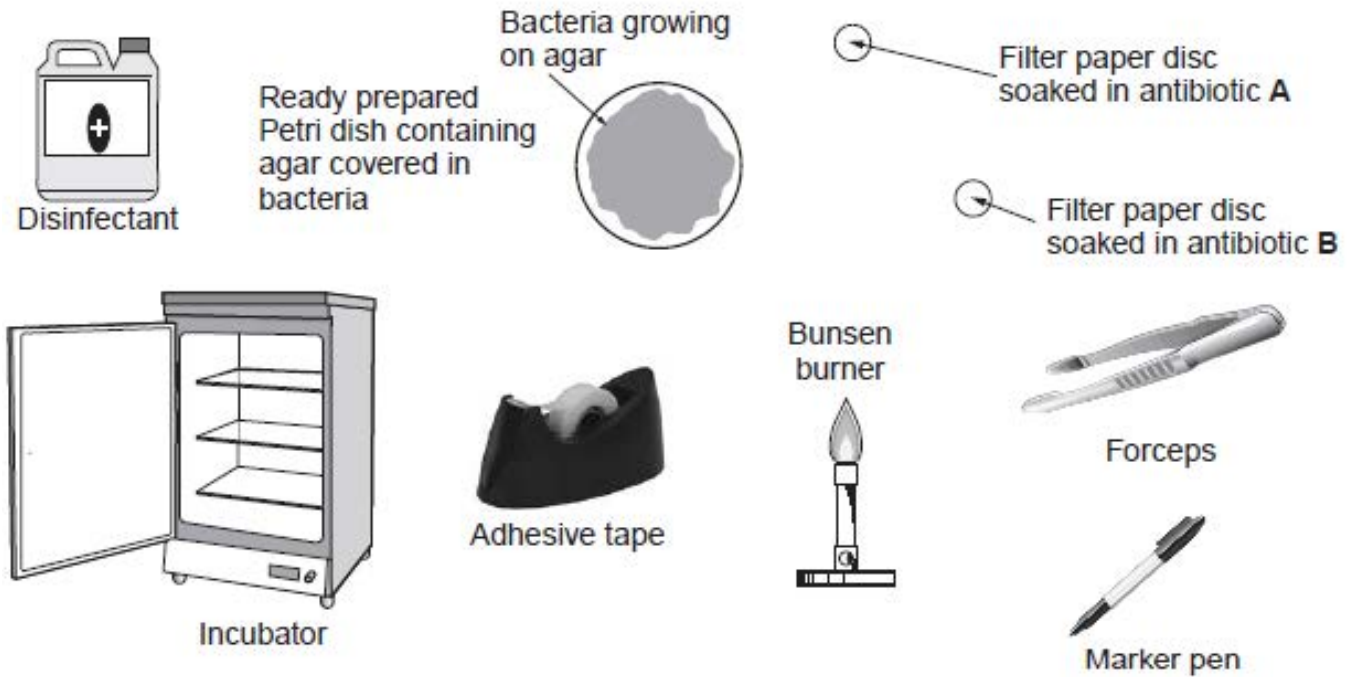
Questions by Topic

1.

Describe how you would carry out an investigation into the number of bacteria present in boiled milk **and** milk that had been left at room temperature for five days using a basic aseptic technique and agar plates. In your description, state the expected results. [6 QWC]

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2. (a) Describe how you would investigate the effects of two different antibiotics **A** and **B**, on the growth of bacteria. Include examples of aseptic technique in your answer. [6 QER]

You are provided with the following apparatus.

Disinfectant

Ready prepared Petri dish containing agar covered in bacteria

Bacteria growing on agar

Filter paper disc soaked in antibiotic **A**

Filter paper disc soaked in antibiotic **B**

Incubator

Adhesive tape

Bunsen burner

Forceps

Marker pen

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(b) The bacterium MRSA is resistant to most antibiotics. State **two** ways in which the spread of MRSA can be reduced. [2]
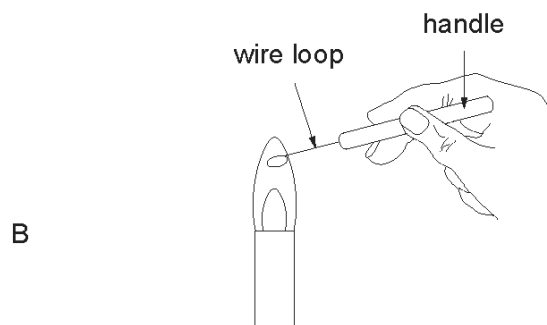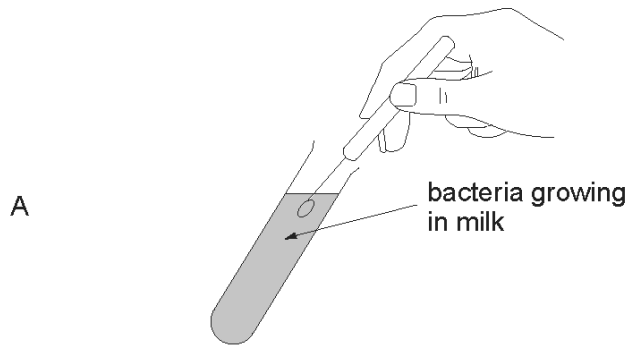
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3.

(a) The series of diagrams below, labelled A – D, show stages in the aseptic techniques involved in inoculating and plating bacteria from milk samples. The stages shown are not in the correct order.

Stage

A

bacteria growing in milk

B

handle

wire loop

C

tape

Petri dish is placed in an incubator

D

Petri dish

nutrient agar
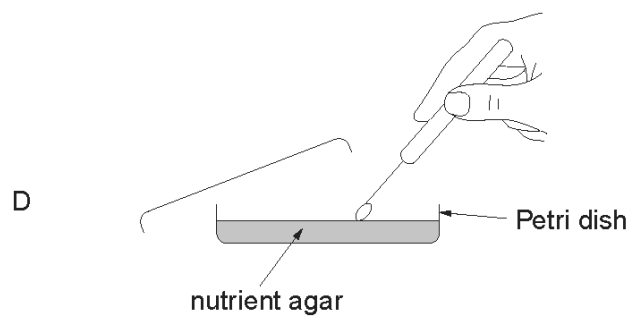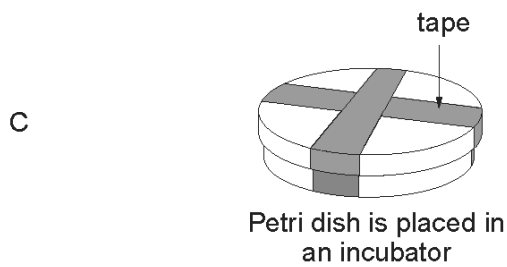
(i)   Place the stages in order by <u>underlining</u> the correct sequence of events.   [1]

A   C   D   B

B   A   D   C

B   C   D   A

D   A   B   C

(ii)   Give a reason why the Petri dish is sealed in stage **C**.   [1]

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(b)   Students kept fresh pasteurised milk at three **different** temperatures for five days.
At the end of this time they spread milk samples onto sterile agar plates, which were then
incubated at 25 °C. After three days incubation the agar plates were examined.
The results obtained are shown below.

PLATE 1 Temperature .... °C	
PLATE 2 Temperature .... °C	Colonies of bacteria
PLATE 3 Temperature .... °C	
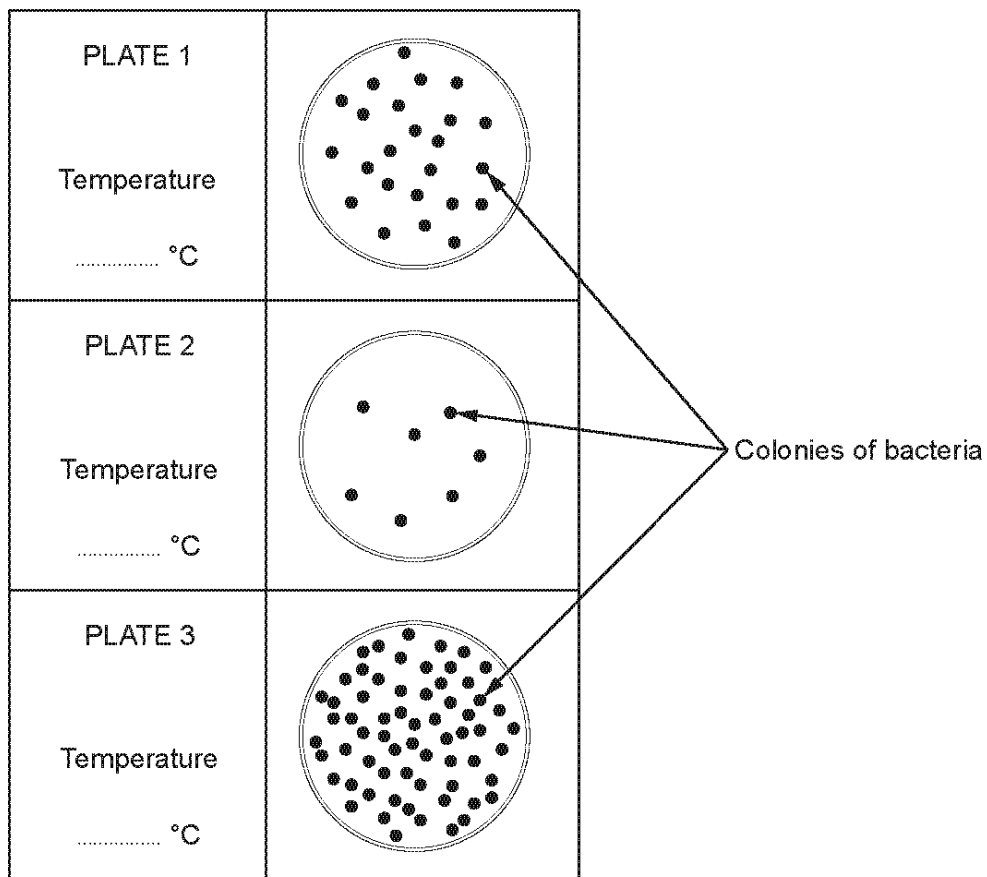
(i)   Using temperatures from the list below. Complete the table above by inserting the
most likely temperature at which the milk was kept for the five days **before** the milk
samples were spread onto the agar.   [3]

10 °C   −10 °C   35 °C   4 °C   150 °C

(ii)   Each of the colonies of bacteria on the agar plates on page 17 is made up of many thousands of bacteria. How many bacteria were in the original milk sample spread onto plate **2**? [1]

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(iii) Explain the possible consequences to this investigation if Stage **B** shown in part *(a)* of this question had not been carried out. [2]

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4. The flow diagram below shows how a student tested milk to find how many bacteria were present.
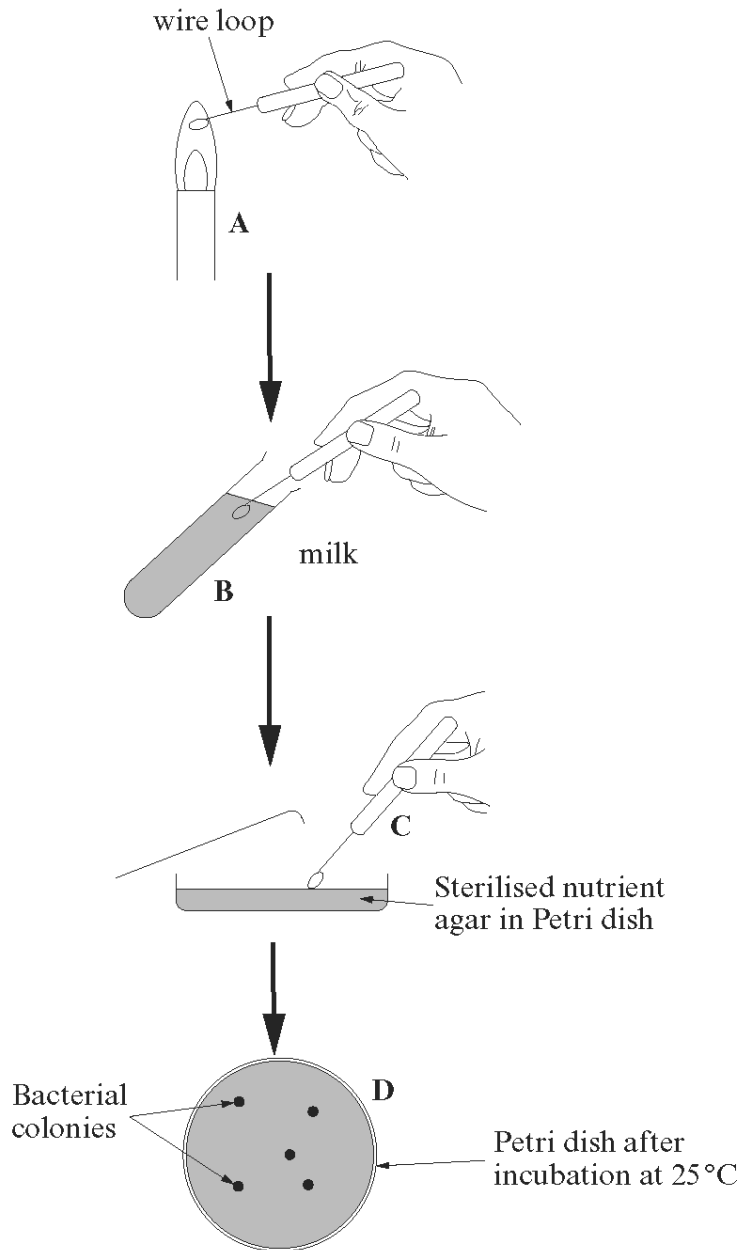

Use the flow diagram and your own knowledge to answer the following questions.

(a) (i) How did the student know when to stop heating the wire loop in **A** above? [1]

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(ii) Why was the agar in **C** sterilised? [1]

....

(iii) How would the student know how many bacteria were put onto the nutrient agar in **C**? [1]

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(b) Scientists investigated the number of bacterial colonies in samples of milk which had been treated differently. The results are shown in the diagrams and table below.

Agar plates with bacterial colonies from 0.1 cm³ milk samples

Raw   Traditional Pasteurised   Flash Pasteurised   UHT
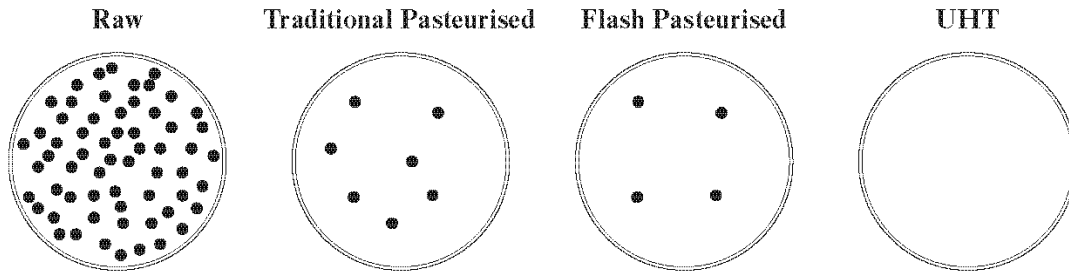
type of milk	heat treatment	number of bacterial colonies in a 0.1 cm³ sample	number of bacterial colonies in a 30 cm³ serving
raw	none	60	18 000
traditional pasteurised	63°C for 30 min	....	....
flash pasteurised	77°C for 35 seconds	4	1 200
UHT	135°C for 2 seconds	0	0

(i) Use the diagrams above to complete the table by adding the results for traditional pasteurised milk. [2]

(ii) State the type of milk treated [1]

I. at the highest temperature, ...

II. for the longest time. ....

(iii) Which type of milk has the greatest number of bacteria in a given volume? [1]

5. A scientist investigated the growth of the bacterium *E.coli* at different temperatures. The results are shown in the graph below.
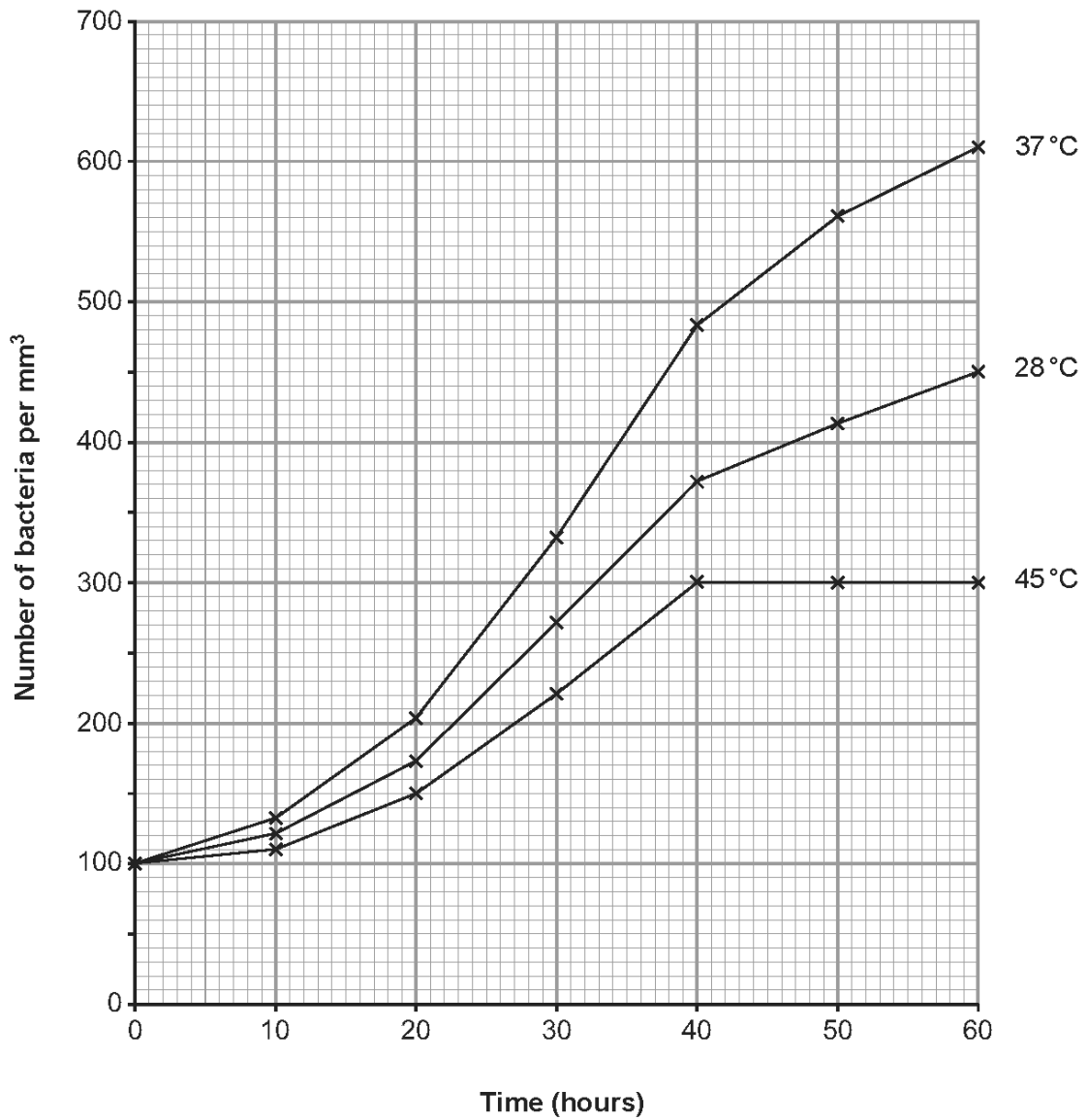
(a) From the graph

(i) Describe the change in numbers of bacteria from 20 – 60 hours at 45°C. [2]

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(ii) Calculate the difference in numbers of bacteria between 28°C and 37°C at 25 hours.
Show your working. [2]

.... per mm³

(iii) How did increasing the **temperature** affect the numbers of bacteria present? [2]

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(b) After the investigation, another scientist was asked to carry out the same investigation using exactly the same methods and apparatus as the first scientist. Why was this necessary? [1]
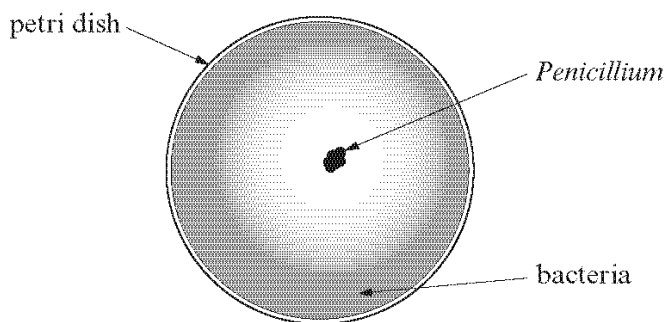
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(c) *E.coli* in food can cause illness in humans. State why meat must be kept in a refrigerator. [1]

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6.

In 1928, Alexander Fleming found a fungus called *Penicillium* in a petri dish containing a culture of bacteria growing on agar jelly.
The diagram shows what he observed.

Fleming made two conclusions.

1. A chemical released from *Penicillium* was harming the bacteria.
2. The chemical was diffusing through the jelly.

(a) What is the evidence in the diagram for each conclusion?   [2]

Conclusion **1**

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Conclusion **2**

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(b) The chemical found in *Penicillium* was extracted and is known as penicillin.

    (i) What name is given to types of drugs such as penicillin?   [1]

    ....

(c) MRSA has become a serious problem in hospitals.
    Describe **one** effective control measure used in hospital against MRSA.   [1]

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