The diagram shows a method used to grow pure cultures of a bacterium.

(a) Name apparatus A and apparatus B.

Apparatus A _______________________________
Apparatus B _______________________________

(2)
(b) (i) Why should apparatus A and apparatus B be sterilised before they are used?

______________________________________________________________

______________________________________________________________

(1)

(ii) How should apparatus A be sterilised?

Tick (√) one box.

Using enzymes

Using a flame

In an incubator

(1)

(iii) Adhesive tape is used to secure the lid on apparatus B.

Give one reason why the lid of apparatus B should be securely taped in place.

______________________________________________________________

______________________________________________________________

(1)

(c) What is the maximum temperature that should be used in schools to grow the bacteria in apparatus B?

Draw a ring around the correct answer.

10 °C 25 °C 50 °C

(1)

(Total 6 marks)
A student is given a tube containing a liquid nutrient medium. The medium contains one type of bacterium.

(a) In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

The student is told to grow some of the bacteria on agar jelly in a Petri dish.

Describe how the student should prepare an uncontaminated culture of the bacterium in the Petri dish.

You should explain the reasons for each of the steps you describe.
(b) After the culture had been prepared, the student added one drop of each of five disinfectants, A, B, C, D and E, onto the culture.

The diagram shows the appearance of the Petri dish 3 days later.

(i) There are areas on the agar jelly where no bacteria are growing.

Why?

________________________________________________________________________________________

________________________________________________________________________________________

(1)

(ii) The student concluded that disinfectant D would be the best for using around the home.

Give one reason why the student might be correct.

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

Give one reason why the student might not be correct.

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

(2)

(Total 9 marks)
The diagram shows how a student transferred some sour milk from a bottle to a Petri dish of nutrient agar.

List A gives four actions carried out by the student.
List B gives five possible effects of these actions.

Draw a straight line from each action in List A to its effect in List B.
Draw only one line from each action.

List A:
1. The student heated a wire loop in a flame
2. He placed the wire loop on the bench to cool
3. He removed a drop of sour milk from a bottle using the wire loop
4. He raised the lid a little from a Petri dish of sterilised nutrient agar
5. He spread the sample of sour milk across the nutrient agar
6. He replaced the lid and put the Petri dish in an incubator at 25°C for 2 days

List B:
A. The Petri dish starts to turn pink.
B. Both members of the group become excited and want to take the Petri dish back with them.
C. The teacher raises the temperature of the incubator to 37°C.
D. The Petri dish turns blue.
E. The group members are told to monitor the Petri dish.
List A – Action

- Heating loop in flame
- Placing loop on bench to cool
- Only lifting lid of Petri dish a little
- Placing Petri dish in incubator at 25°C

List B – Effect

- Risk of contamination with bacteria increased
- Fewer bacteria will enter
- Kills bacteria
- Prevents air entering
- Risk of growth of pathogens decreased

(Total 4 marks)
(a) It is important to prevent contamination when growing microorganisms.

The diagram shows the transfer and culturing of microorganisms.

Stage V

A Petri dish with agar is heated to 150 °C for 50 minutes, then cooled

Stage W

(i) Name the apparatus labelled A in stage W.

Draw a ring around one answer.

inoculating loop       pipette       thermometer

(1)
(ii) Give the letters of the two stages from V, W, X, Y and Z, which are carried out to kill microorganisms.

Stages [ ] and [ ]

(ii) Give the letter of the stage, V, W, X, Y or Z, where incubation takes place.

Stage [ ]

(b) A culture medium used for growing microorganisms contains various nutrients.

Which nutrient is the main source of energy for the microorganisms?

Draw a ring around one answer.

carbohydrates mineral ions vitamins

(1)

(Total 5 marks)
Mark schemes

(a) A (inoculating / wire) loop

B Petri dish
allow (agar) plate
ignore ref to culture medium

(b) (i) to kill (unwanted) bacteria / microorganisms / microbes
allow fungi
ignore viruses / germs

(ii) Using a flame

(iii) any one from:
• so bacteria / microorganisms / microbes / pathogens / fungi (growing in dish) do not get out
    ignore reference to gases
    ignore viruses / germs
• so bacteria / microorganisms / microbes / pathogens / fungi (from the air) do not get in.
    ignore viruses / germs

(c) 25 °C

 Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking guidance, and apply a 'best-fit' approach to the marking.

0 marks
No relevant content.

Level 1 (1-2 marks)
There is a brief description of at least one of the stages (pre-inoculation, inoculation, post-inoculation).

Level 2 (3-4 marks)
There is a simple description of at least two stages and an explanation of at least one of them.

Level 3 (5-6 marks)
There is a clear description of all three stages and an explanation of at least two of them.
Examples of Biology points made in the response:

**Pre-inoculation**
- Petri dish and agar sterilised before use
- to kill unwanted bacteria
- inoculating loop passed through flame / sterile swab
- to sterilise / kill (other) bacteria

**Inoculation**
- loop/swab used to spread/streak bacterium onto agar

*Allow other correct methods, eg bacterial lawns*
- lid of Petri dish opened as little as possible
- to prevent microbes from air entering

**Post-inoculation**
- sealed with tape
- to prevent microbes from air entering
- incubate
- to allow growth of bacteria

(b) (i) bacteria killed / destroyed

*ignore fights / attacks / stops growth / got rid of*

(ii) *Might be correct*

largest area / space where no bacteria are growing

*allow most bacteria killed*

*Might not be correct*

(need more evidence as) D may be harmful to people / animals / surfaces

*ignore ref to cost / dangerous or harmful unqualified*
or may work differently with different bacteria

or disinfectants may be different concentrations
  ignore different amounts of disinfectant unless reference to different drop size

or may not last as long
  ignore take longer to work
  allow reference to anomalous result or not repeated

3

<table>
<thead>
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any box on the left joined to > 1 other box - cancel

4

(a)  
  (i)   inoculating loop

  (ii) V

  W  
  **either order**

  (iii) Z

(b) carbohydrates