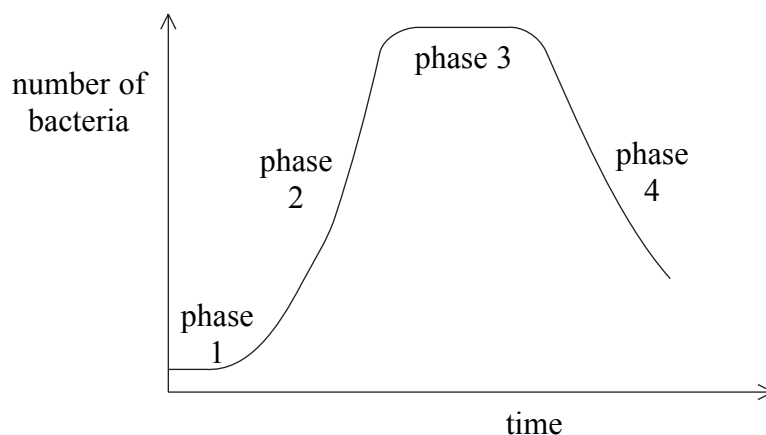


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1. One type of bacterium was grown in a culture. The graph shows changes in the population.



(a) In which phase is the population growing fastest?

..... (1)

(b) During **phase 2** each bacterial cell divides every 20 minutes.

(i) Starting with one bacterium, how many will there be after 60 minutes?

..... (1)

(ii) It takes 120 minutes for 1 cell to become 64 cells.

How long will it take for the population to rise from 64 cells to 256 cells?

..... (1)

(c) In **phase 4** various factors affect the size of the bacterial population.

Suggest **three** factors that could cause the change seen in the graph.

- 1
 - 2
 - 3
- (3)

(Total 6 marks)

Q1



2. (a) (i) What is a clone?

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

(2)

(ii) Explain how cloned humans can occur naturally.

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

(2)

(b) Dolly the sheep is an example of a cloned mammal.

(i) Which **three** steps are needed to make an unfertilised egg cell develop into a cloned embryo?

1
2
3

(3)



(ii) Suggest some of the social and ethical concerns about the possibility that humans could be cloned.

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(3)

(Total 10 marks)

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Q2

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3. (a) Some types of *Salmonella* cause food poisoning.

Tick **one** box next to another microorganism that causes food poisoning.

<i>Cholera</i>	<input type="checkbox"/>
<i>Escherichia</i>	<input type="checkbox"/>
<i>Fusarium</i>	<input type="checkbox"/>
<i>Lactobacillus</i>	<input type="checkbox"/>

(1)

(b) (i) A chicken is infected with *Salmonella*.
In which part of its body would the bacteria normally be found?

.....
(1)

(ii) How are these bacteria usually transmitted from one chicken to another?

.....
(1)

(c) (i) What is meant by the term **intensive rearing** of chickens?

.....
.....
(1)

(ii) How can intensive rearing lead to *Salmonella* infections in chickens?

.....
.....
.....
.....
(1)

(d) Describe **two** precautions that must be taken with a frozen chicken before it is eaten.

.....
.....
.....
.....
(2)



(e) Swallowing *Salmonella* bacteria can cause a serious attack of food poisoning which in some cases can be fatal.

Suggest **two** groups of people who, if they were infected with *Salmonella*, would be at the greatest risk of dying.

1

2

(2)

(Total 9 marks)

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Q3



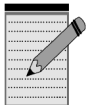
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4. Explain how lymphocytes and phagocytes defend the body against microorganisms.



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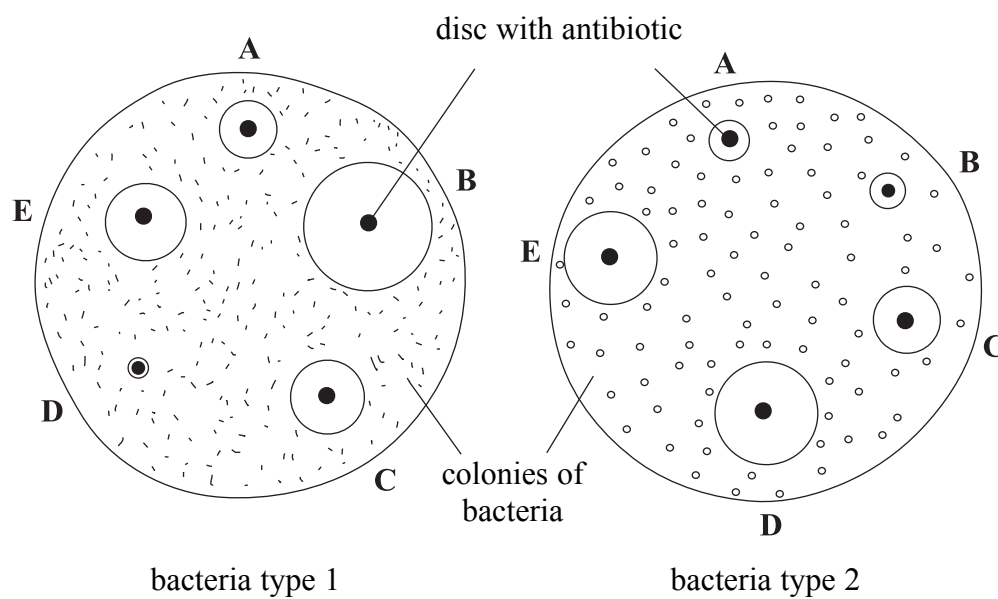
(Total 5 marks)

Q4



N 2 5 7 7 0 A 0 9 1 6

5. The diagram shows the results of an investigation into the effect of five antibiotics on two types of bacteria.



(a) (i) Which single antibiotic would be most effective in treating an infection with bacterium type 1?

.....
(1)

(ii) Which single antibiotic would be most effective in treating an infection involving both types of bacteria?

.....
(1)



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(b) A problem of modern health care is that some types of bacteria have become resistant to nearly all antibiotics.

(i) How does a bacterium become resistant to an antibiotic?

.....
.....

(1)

(ii) Explain how the overuse of antibiotics has contributed to an increase in antibiotic resistance in bacteria.

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

(3)

(c) Explain why antibiotics do not affect viruses.

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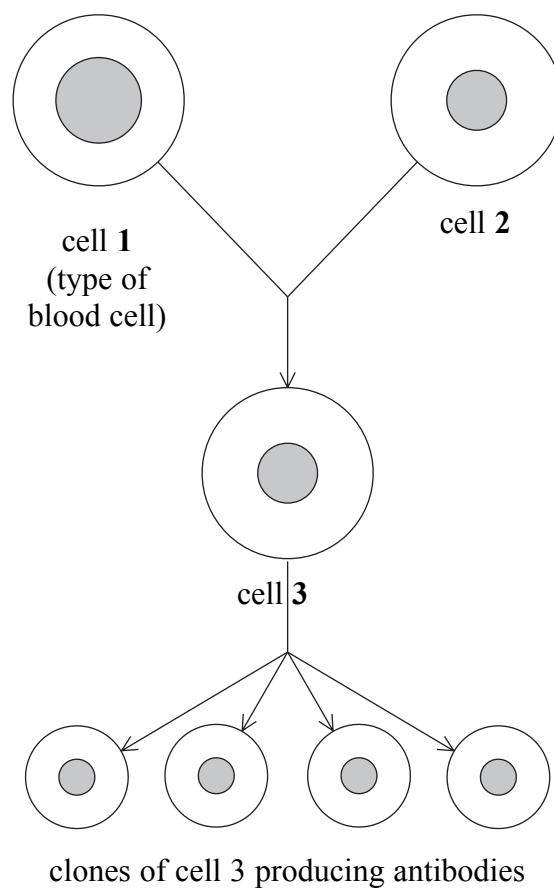
(2)

(Total 8 marks)

Q5



6. The diagram shows the basic stages in the manufacture of a monoclonal antibody.



(a) Name the **three** types of cell.

cell 1

cell 2

cell 3

(3)



(b) Suggest **three** possible uses for manufactured monoclonal antibodies.

.....

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.....

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(3)

(Total 6 marks)

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Q6



7. (a) The table lists the main stages in the process of transferring a gene for a specific antibody into a bacterium. The stages are in the wrong order.

Complete the table to show the correct order in which these stages occur. One has been done for you.

main stages in producing genetically modified bacterium	order of stages
a plasmid is taken from a bacterium	
bacterium is cloned	
human gene is placed into bacterial plasmid	
modified plasmid is put into bacterium	
relevant gene is cut from human DNA	
the plasmid is cut open	2

(5)

- (b) This technique could be used to transfer the gene into a sheep. Designer milk containing the antibody could then be produced.

- (i) Suggest which sheep cells would have to be modified. Give a reason for your answer.

.....

.....

.....

.....

(2)

- (ii) What proportion of the offspring of a modified sheep would be expected to have the antibody gene?

.....

(1)



(c) A specific antibody can be produced either in designer milk or from a culture of human cells.

Suggest an advantage of each method of antibody production.

designer milk

.....

culture of human cells

.....

(2)

(Total 10 marks)

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Q7

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