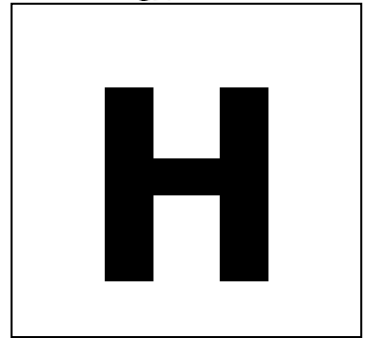




**ST MARY'S SCIENCE  
DEPARTMENT:  
BIOLOGY**



**GCSE BIOLOGY HOMEWORK BOOK  
TOPIC 4: MICROBES  
STUDENT BOOK**

**YOU MUST ANSWER ALL THREE SECTIONS IN EACH PART OF THE HOMEWORK TASKS**

<b>NAME</b>	
<b>CLASS</b>	
<b>TEACHER</b>	
<b>FORM</b>	

<b>TASK</b>	<b>MARK</b>	<b>GRADE</b>
<b>1</b>		
<b>2</b>		
<b>OVERALL</b>		

**GCSE  
BIOLOGY  
YEAR 10  
TOPIC 1**



## HOMEWORK SCHEDULE

Please use the following table to ensure each homework task is completed and submitted on time.

Carrying out these homework tasks can only increase your ability to gain a high grade in the GCSE examinations.

Failure to hand in work on time will lead to sanctions to complete this work.

<b>Task</b>	<b>Submission Date</b>	<b>Completed?</b>	<b>On Time?</b>
<b>Task 1</b> Antibiotics			
<b>Task 2</b> Monoclonal Antibodies			



## **SCIENCE DEPARTMENT MARKING CODE**

**ID** = Insufficient detail in answer

**W** = Wrong understanding of science

**IR** = Irrelevant information given.

**V** = This is too vague to get a mark.

**AQ** = Answer the question asked

**R** = Read the question/information

**M** = Maths mistake

**BOD** = Benefit of the doubt given.

**E** = Explain the answer further please.

**U** = Wrong units used.

**SF** = Wrong significant figures used.

**SP** = Wrong spelling of a technical term

**SR** = Same reason given more than once.

**A circle means this lost you marks**

**An underline means this gained you marks**

## **PLEASE READ**

This homework booklet has made with custom selected examination questions and activities to assess your understanding in the concepts covered in class. This will increase your familiarity with the style of examination questions.

Carrying out these questions can only increase your ability to gain a high grade in the GCSE examination.

Thank you for your hard work in completing this book, and good luck.

Mr. Turnbull



## TASK 1: ANTIOTIOTICS

### SPEC CHECK

Content	Achieved?
<p>Bacteria multiply by simple cell division (binary fission) as often as once every 20 minutes if they have enough nutrients and a suitable temperature.</p> <p>Bacteria can be grown in a nutrient broth solution or as colonies on an agar gel plate.</p> <p>Uncontaminated cultures of microorganisms are required for investigating the action of disinfectants and antibiotics.</p>	
<p>Students should be able to describe how to prepare an uncontaminated culture using aseptic technique.</p> <p>They should be able to explain why:</p> <ul style="list-style-type: none"> <li>• Petri dishes and culture media must be sterilised before use</li> <li>• Inoculating loops used to transfer microorganisms to the media must be sterilised by passing them through a flame</li> <li>• The lid of the Petri dish should be secured with adhesive tape and stored upside down</li> <li>• In school laboratories, cultures should generally be incubated at 25°C.</li> </ul>	
<p>Students should be able to calculate cross-sectional areas of colonies or clear areas around colonies using <math>\pi r^2</math>.</p>	
<p>Students should be able to calculate the number of bacteria in a population after a certain time if given the mean division time.</p>	
<p>(HT only) Students should be able to express the answer in standard form.</p>	





**SECTION A**

**This is a revision question on a previous topic.**

You should aim to spend **10 minutes** answering this section.

**1.** Eating food containing Salmonella bacteria can cause illness.

**1.1** Two symptoms of infection by Salmonella are vomiting and diarrhoea.

What causes these symptoms?

**[1 mark]**

.....  
.....

**1.2** Give **two** ways a person with a mild infection of Salmonella can help prevent the spread of the bacteria to other people.

**[2 marks]**

1

.....  
.....

2

.....  
.....

**1.3** In very serious infections of Salmonella, a doctor can prescribe drugs to kill the bacteria.

What type of drug can the doctor prescribe to kill the bacteria?

**[1 mark]**

.....  
.....



**1.4** A person with AIDS may take longer than a healthy person to recover from a Salmonella infection.

Explain why.

**[2 marks]**

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**1.5** Salmonella bacteria can be transmitted from chickens to humans. Chickens can be vaccinated to prevent the transmission of Salmonella bacteria to humans.

Suggest **one other** way farmers could prevent the transmission of Salmonella from chickens to humans.

**[1 mark]**

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A restaurant owner employed a scientist to test the effectiveness of two kitchen cleaning liquids.

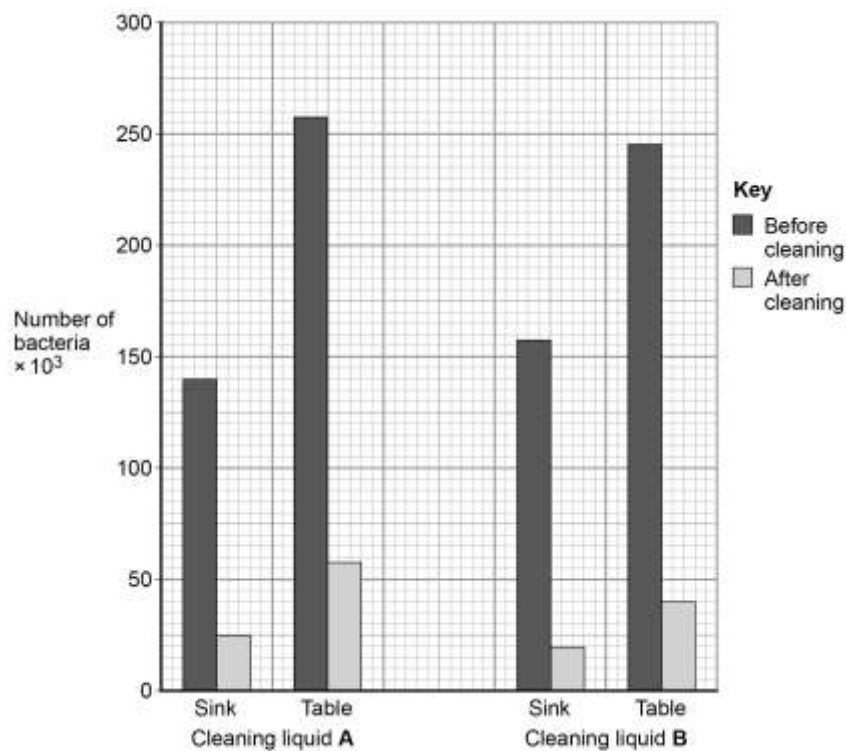
The scientist took samples from two work surfaces:

- Before the surfaces had been cleaned with the cleaning liquids
- After the surfaces had been cleaned with the cleaning liquids.

The samples were then analysed for the number of bacteria they contained.

The results are shown in **Figure 1**.

**Figure 1**



**1.6** Which cleaning liquid is the more effective?

Give a reason for your answer.

**[1 mark]**

Cleaning Liquid .....

Reason

.....

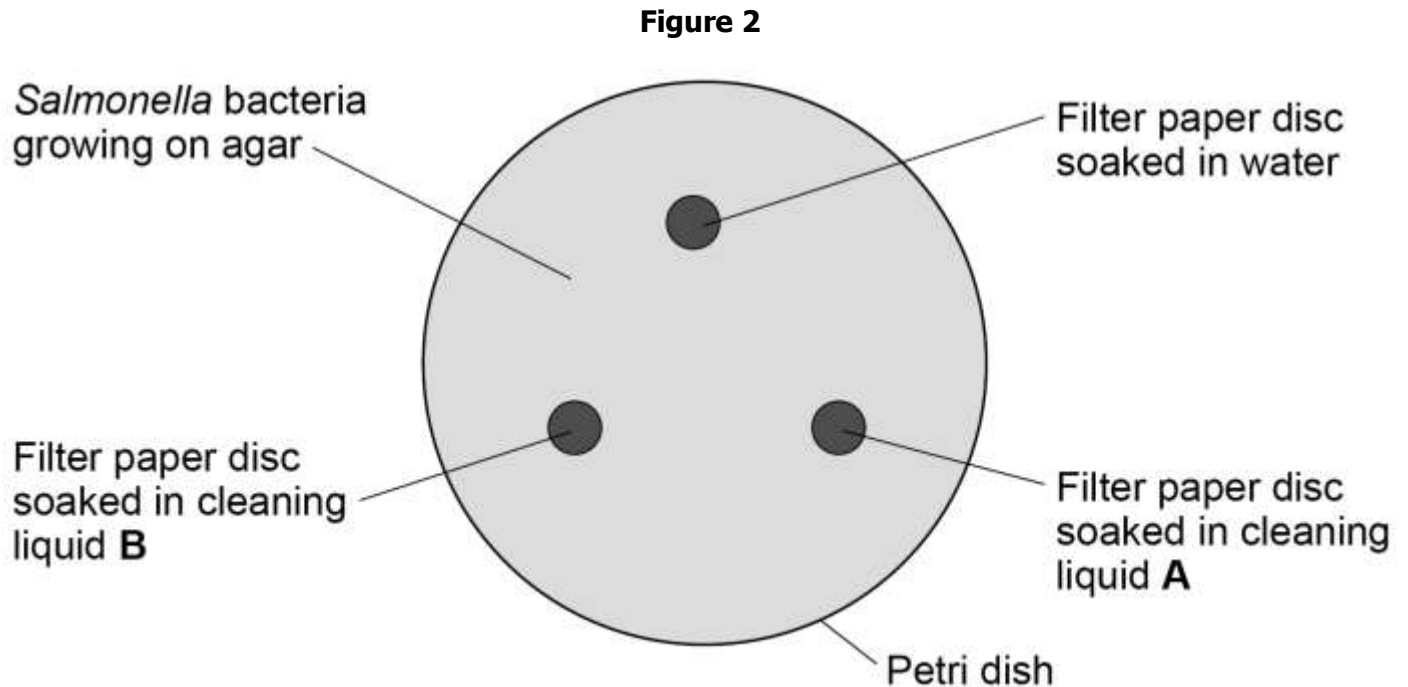
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The scientist investigated the effect of cleaning liquid **A** and cleaning liquid **B** on *Salmonella* bacteria grown in a laboratory.

**Figure 2** shows the way the investigation was set up.



The Petri dish was placed in an incubator at 25 °C for 48 hours.

After 48 hours, the scientist calculated the area around each paper disc where no bacteria were growing.

The results are shown in **Table 1**.

**Table 1**

Filter paper disc	Area around disc with no bacteria growing in cm <sup>2</sup>
Water	0
Cleaning liquid <b>A</b>	11
Cleaning liquid <b>B</b>	13

**1.7** What measurement would the scientist need to take to calculate the area where no bacteria were growing?

**[1 mark]**

.....

.....



**1.8** Give **one** change **to** the investigation that would allow the scientist to check if the results are repeatable.

**[1 mark]**

.....

.....

**1.9** The scientist showed the results to the restaurant owner.

Both cleaning liquids cost the same per  $\text{dm}^3$ .

Suggest **one other** factor the restaurant owner should consider when choosing which cleaning liquid to use.

**[1 mark]**

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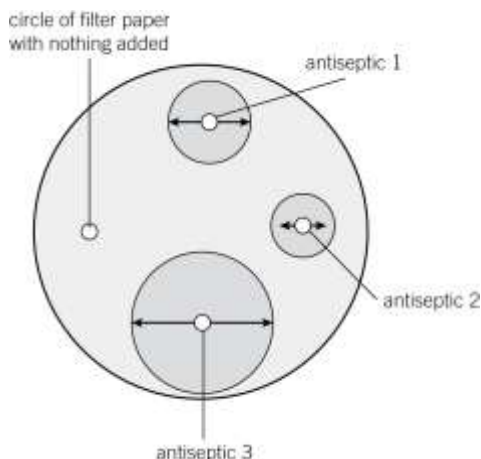
**SECTION B**

**This is a question to revise understanding carried out in lesson.**

You should aim to spend **10 minutes** answering this section.

**1.** Dylan set up a culture plate of bacteria and placed three filter paper circles onto the plate. The discs were labelled 1, 2, and 3; each disc contained a different disinfectant. Disinfectant chemicals kill bacteria but are too strong to be used on human tissue.

Dylan then incubated the plate for 5 days. These are his results.



**1.1** Describe how Dylan inoculated the agar plate with bacteria.

**[1 Mark]**

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.....

**1.2** State and explain **two** hazards that he controlled in his experiment.

**[4 Marks]**

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.....  
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**1.3** Describe the difference between antibiotics, antiseptics and disinfectants.

**[3 Marks]**

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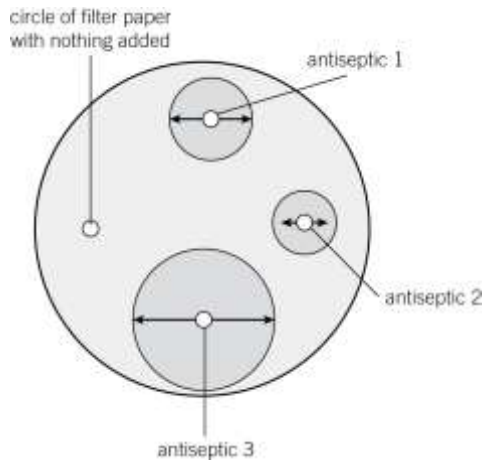
**SECTION C**

**This is a challenge question to extend your understanding.**

You should aim to spend **10 minutes** answering this section.

**1.** Dylan set up a culture plate of bacteria and placed three filter paper circles onto the plate. The discs were labelled 1, 2, and 3; each disc contained a different disinfectant. Disinfectant chemicals kill bacteria but are too strong to be used on human tissue.

Dylan then incubated the plate for 5 days. These are his results.



**1.1** Explain why Dylan also included a piece of filter paper with nothing added to his agar.

**[1 Mark]**

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.....

**1.2** Calculate the zone of inhibition for each disc.

**[3 Marks]**

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**1.3** State and explain which disinfectant was the most effective.

**[2 Marks]**

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**1.4** Calculate the difference in effectiveness between the most and least effective chemical.

**[2 Marks]**

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## FEEDBACK SHEET

<b>Overall Mark:</b>	<b>/27</b>	<b>GRADE ACHIEVED:</b>	
<b>Section A: Mark</b>	/11	<b>9</b> <input type="checkbox"/>	<b>5</b> <input type="checkbox"/>
<b>Section B: Mark</b>	/8	<b>8</b> <input type="checkbox"/>	<b>4</b> <input type="checkbox"/>
<b>Section C: Mark</b>	/8	<b>7</b> <input type="checkbox"/>	<b>3</b> <input type="checkbox"/>
		<b>6</b> <input type="checkbox"/>	<b>U</b> <input type="checkbox"/>

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding
<b>Strengths:</b>	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills <b>Others</b> (Topic Specific)		<input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving	
<b>Areas to Improve:</b>	<input type="checkbox"/> Basic Knowledge of Concepts <input type="checkbox"/> Quality of Written Communication <input type="checkbox"/> Working Scientifically <input type="checkbox"/> Answering Examination Questions <input type="checkbox"/> Analytical Skills <b>Others</b> (Topic Specific)		<input type="checkbox"/> Applications of Concepts <input type="checkbox"/> Mathematical Skills <input type="checkbox"/> Experimental Technique <input type="checkbox"/> Previous Topics <input type="checkbox"/> Problem Solving	
<b>Progress:</b>	Unsatisfactory	Satisfactory	Good	Outstanding
<b>Working:</b>	Below	In line with	Above	<b>(your target)</b>
<b>Effort:</b>	Poor	Inconsistent	Good	Excellent

### To improve further you need to:

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Carry out <b>independent</b> revision.</li> <li><input type="checkbox"/> Complete outstanding work.</li> <li><input type="checkbox"/> Make corrections as indicated by the teacher.</li> <li><input type="checkbox"/> Attend intervention for this topic</li> <li><input type="checkbox"/> Include more information in responses.</li> <li><input type="checkbox"/> Include more key words in responses.</li> <li><input type="checkbox"/> Attend departmental revision sessions.</li> <li><input type="checkbox"/> Read the questions carefully.</li> <li><input type="checkbox"/> Explain your answers in more detail.</li> <li><input type="checkbox"/> Carry out revision on Seneca Learning.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Revise the equations.</li> <li><input type="checkbox"/> Check the units on answers.</li> <li><input type="checkbox"/> Check the correct amount of sig figs on answers.</li> <li><input type="checkbox"/> Check to convert values correctly.</li> <li><input type="checkbox"/> Show your full working out.</li> <li><input type="checkbox"/> Check your calculations.</li> <li><input type="checkbox"/> Revise the science investigative skills.</li> <li><input type="checkbox"/> Revise the key concepts of the topics.</li> <li><input type="checkbox"/> Thoroughly check your work for mistakes.</li> </ul> <p>Other:</p> |
|--|--|

### Student response



## TASK 2: MONOCLONAL ANTIBODIES

### SPEC CHECK

Content	Achieved?
<p>(HT Only) Students should be able to describe how monoclonal antibodies are produced.</p> <p>Monoclonal antibodies are produced from a single clone of cells. The antibodies are specific to one binding site on one protein antigen and so are able to target a specific chemical or specific cells in the body.</p> <p>They are produced by stimulating mouse lymphocytes to make a particular antibody. The lymphocytes are combined with a particular kind of tumour cell to make a cell called a hybridoma cell. The hybridoma cell can both divide and make the antibody. Single hybridoma cells are cloned to produce many identical cells that all produce the same antibody. A large amount of the antibody can be collected and purified.</p>	
<p>(HT Only) Students should be able to describe some of the ways in which monoclonal antibodies can be used.</p> <p>Some examples include:</p> <ul style="list-style-type: none"> <li>• For diagnosis such as in pregnancy tests</li> <li>• In laboratories to measure the levels of hormones and other chemicals in blood, or to detect pathogens</li> <li>• In research to locate or identify specific molecules in a cell or tissue by binding to them with a fluorescent dye</li> <li>• To treat some diseases: for cancer the monoclonal antibody can be bound to a radioactive substance, a toxic drug or a chemical which stops cells growing and dividing. It delivers the substance to the cancer cells without harming other cells in the body.</li> </ul> <p>Students are not expected to recall any specific tests or treatments but given appropriate information they should be able to explain how they work. Monoclonal antibodies create more side effects than expected. They are not yet as widely used as everyone hoped when they were first developed</p>	





## SECTION A

**This is a revision question on a previous topic.**

You should aim to spend **10 minutes** answering this section.

**1.** This question is about digestion.

**1.1** Name the enzyme that digests starch in the human digestive system.

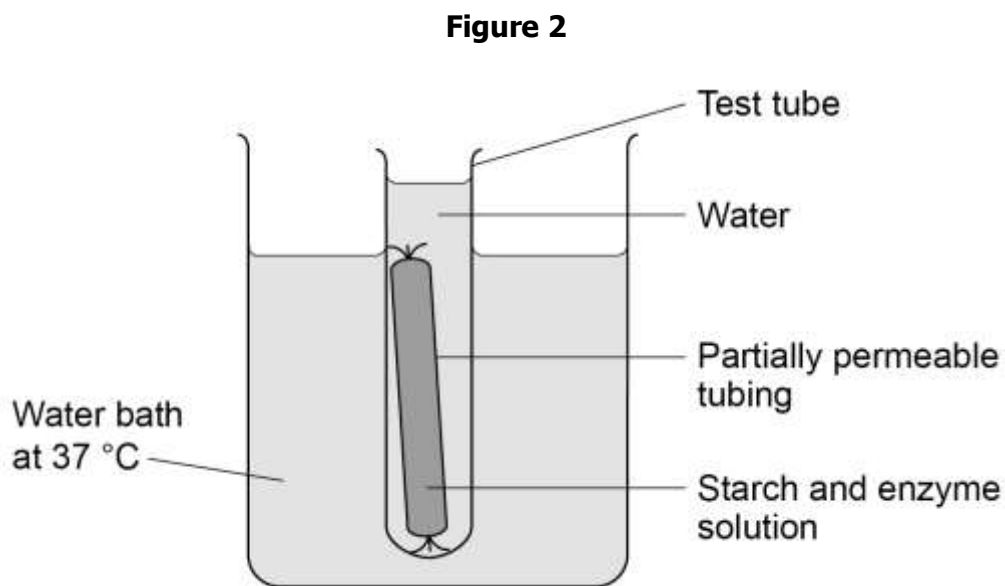
[1 mark]

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A student set up a model to represent the digestion and absorption of food molecules in the digestive system.

**Figure 2** shows the student's model.



This is the method used.

- 1.** Fill a test tube with water at 37 °C
- 2.** Test the water for starch and for sugar.
- 3.** Mix together starch and enzyme solution and immediately test it for starch and for sugar.
- 4.** Fill some partially permeable tubing with the starch and enzyme mixture.
- 5.** Seal the tubing and place it in the test tube of water.
- 6.** Place the test tube in a water bath at 37 °C
- 7.** After 30 minutes, test the mixture inside the partially permeable tubing and test the water in the test tube for starch and for sugar.



**1.2** Suggest which parts of the body the partially permeable tubing and the water in the test tube represent.

[2 marks]

Partially permeable tubing .....

Water in the test tube .....

**Table 2** shows the results.

**Table 2**

Test	Description of liquid	Result of starch test	Result of sugar test
1	Mixture inside tubing at start	✓	✗
2	Water in the test tube at start	✗	✗
3	Mixture inside tubing after 30 minutes	✓	✓
4	Water in the test tube after 30 minutes	✗	✓

**Key**

✓ = Present

✗ = Not present

**1.3** Name the reagents used to test for starch and for sugar.

[2 marks]

Starch

.....  
 .....

Sugar

.....  
 .....



**1.4** Why was there no sugar present in test **1**?

**[1 mark]**

.....

.....

**1.5** Explain the results for test **3**.

**[2 marks]**

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**1.6** Explain the results for test **4**.

**[2 marks]**

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**SECTION B**

**This is a question to revise understanding carried out in lesson.**

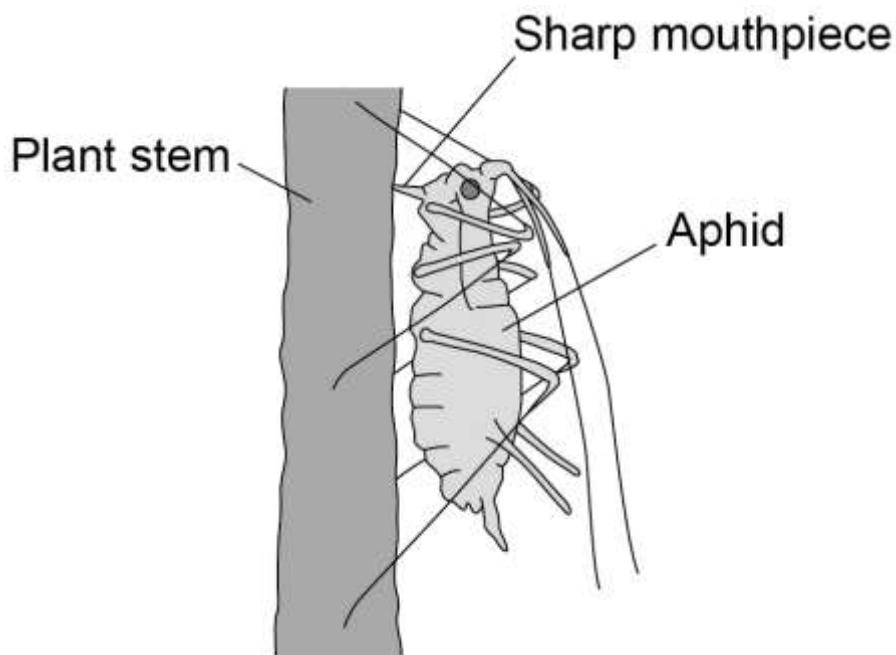
You should aim to spend **10 minutes** answering this section.

**1.** Plants can be infected by fungi, viruses and insects.

Aphids are small insects that carry pathogens.

**Figure 6** shows an aphid feeding from a plant stem.

**Figure 6**



**1.1** An aphid feeds by inserting its sharp mouthpiece into the stem of a plant.

Give the reason why the mouthpiece of an aphid contains a high concentration of dissolved sugars after feeding.

**[1 mark]**

.....

.....



A farmer thinks a potato crop is infected with potato virus Y (PVY).

The farmer obtains a monoclonal antibody test kit for PVY.

To make the monoclonal antibodies a scientist first isolates the PVY protein from the virus.

Describe how the scientist would use the protein to produce the PVY monoclonal antibody.

**[4 marks]**

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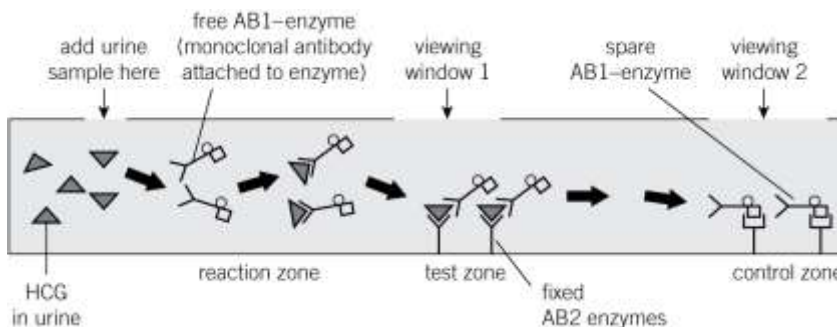
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**SECTION C**

**This is a challenge question to extend your understanding.**

You should aim to spend **10 minutes** answering this section.



**Figure 1**

**1.** The diagram in **Figure 2** shows the steps in using a monoclonal antibody in a pregnancy test. The test works by detecting a hormone called HCG which is made by the very early embryo and the placenta.

Use the diagram to explain what is happening in:

**1.1** The reaction zone

**[2 marks]**

.....

.....

.....

.....

.....

**1.2** The test zone

**[2 marks]**

.....

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**1.3** The control zone.

[2 marks]

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.....

**1.4** Explain the results in each example below:

[3 Marks]

	Viewing window 1	Viewing window 2	Conclusion?
<b>a</b>	no coloured line appears	coloured line appears	
<b>b</b>	coloured line appears	coloured line appears	
<b>c</b>	no coloured line appears	no coloured line appears	



## FEEDBACK SHEET

<b>Overall Mark:</b>	<b>/24</b>	<b>GRADE ACHIEVED:</b>	
<b>Section A: Mark</b>	<b>/10</b>	<b>9</b> <input type="checkbox"/>	<b>5</b> <input type="checkbox"/>
<b>Section B: Mark</b>	<b>/5</b>	<b>8</b> <input type="checkbox"/>	<b>4</b> <input type="checkbox"/>
<b>Section C: Mark</b>	<b>/9</b>	<b>7</b> <input type="checkbox"/>	<b>3</b> <input type="checkbox"/>
		<b>6</b> <input type="checkbox"/>	<b>U</b> <input type="checkbox"/>

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### Student response



### Acknowledgements

This document has been produced by Mr J Turnbull.

All relevant information has been credited in the document.

This document has been produced for educational purposes only.

This document has been produced for the AQA GCSE Science Specification.

