Surname		Centre Number	Candidate Number
First name(s)			0

GCSE

wjec cbac

3430U10-1

S23-3430U10-1

TUESDAY, 13 JUNE 2023 – MORNING

SCIENCE (Double Award)
Unit 1: BIOLOGY 1
FOUNDATION TIER

1 hour 15 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	9	
2.	11	
3.	8	
4.	11	
5.	6	
6.	5	
7.	10	
Total	**60**	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

Question **5** is a quality of extended response (QER) question where your writing skills will be assessed.

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VP/GR*(S20-3430U10-1)

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Answer **all** questions.

1. (a) Plant leaves absorb light for photosynthesis.

State the source of the light absorbed by the leaves. [1]

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(b) **Image 1.1** shows a violet plant (*Viola riviniana*).
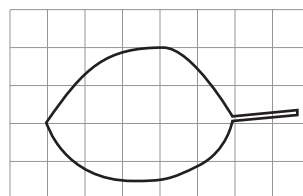
Image 1.1

Gareth calculated the area of a leaf from one of the violet plants. This is what he did:

Step 1. He drew an outline of a leaf on a grid as shown in **Image 1.2**.

Image 1.2

Step 2. He counted the number of **whole** squares inside the outline.

Step 3. He multiplied the total number of whole squares by the area of one square.

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(i) Count the number of **whole** squares inside the outline. [1]

Number of **whole** squares inside the outline = ...

(ii) Each square has an area of 0.25 cm^2.
Use the formula below to calculate the outline area. [1]

Outline area = 0.25 × number of whole squares inside the outline.

Outline area = ... cm^2

(iii) Counting only the whole squares gave an outline area which was much lower than the actual leaf area.

I. Explain why. [1]

....

II. Suggest **one** improvement to **step 2** to get an answer closer to the true value. [1]

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....

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Turn over.

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(iv) Gareth decided to test the following hypothesis:

"The leaf area of violet plants in the shade will be greater than that of violet plants in bright light".

He picked one violet plant growing in shade and one growing in bright light.

Gareth used his method to calculate the leaf areas of 10 leaves from each plant.

The mean results are shown in **Table 1.3**.

Table 1.3

Plant growing in	Mean leaf area (cm^2)
shade	1.5
bright light	0.9

I. Calculate the difference in mean leaf area between the two plants. [1]

Difference = ... cm^2

II. **Complete the following sentence** by underlining the correct word. [1]

The results show that Gareth's hypothesis is:

invalid   /   rejected   /   supported.

(c) Explain the advantage of a large leaf area for plants growing in shade. [2]

....

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2. **Image 2.1** shows the digestive system. Some structures have been labelled.

Image 2.1

oesophagus

gall bladder

stomach
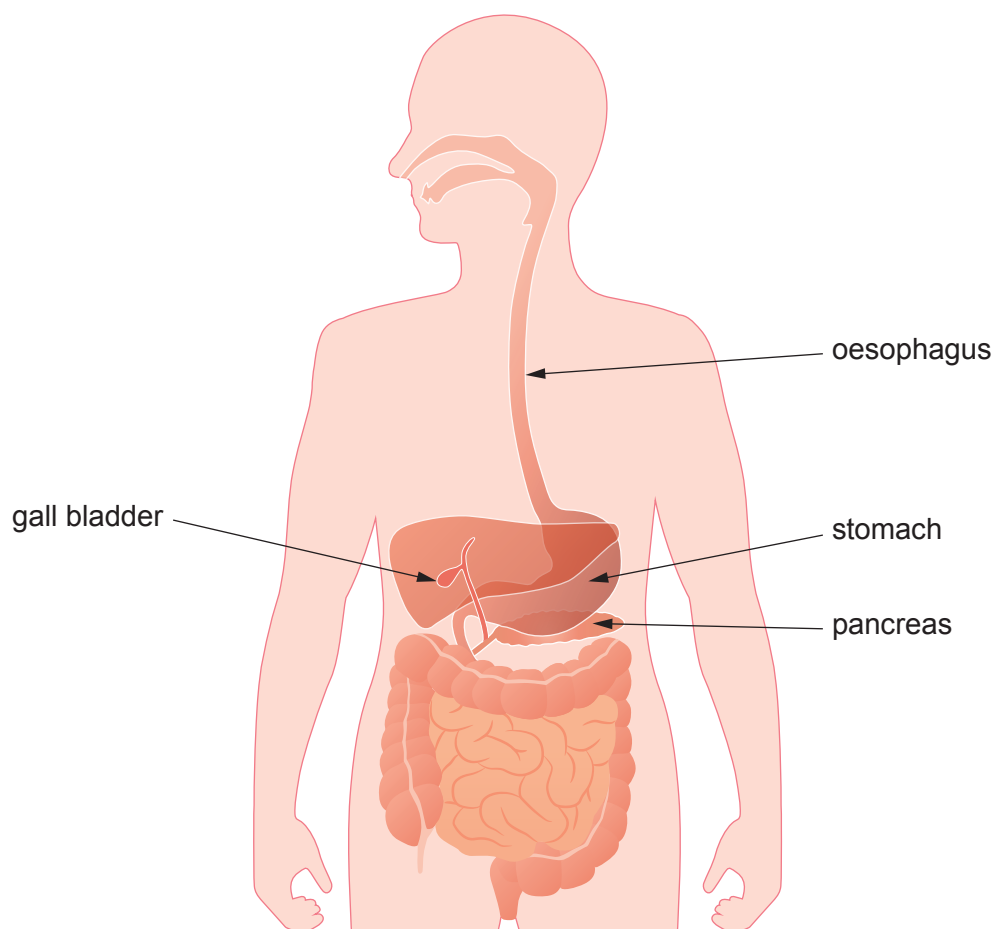
pancreas

(a) **Complete the following sentences** by underlining the correct word.

(i) Peristalsis in the digestive system causes food to be

digested / moved / absorbed. [1]

(ii) One organ where peristalsis happens is the

gall bladder / oesophagus / pancreas. [1]

(b) State the name of the organ labelled in **Image 2.1** in which the chemical digestion of protein **starts**. [1]

....

(c) (i) The liver makes bile.
On Image 2.1, **draw an arrow to label the liver.** [1]

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Turn over.

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(ii) Bile helps us digest fat.
Complete Table 2.2 by writing **true** or **false** against **each** statement. One has been done for you. [3]

Table 2.2

How bile works	True or false
increases the number of fat molecules	false
turns large droplets of fat into smaller droplets	....
increases the pH in the small intestine	....
digests fat molecules	....
neutralises stomach acids in the small intestine	....

(d) Fat is an important part of the diet.

State **one** function of fat in the body. [1]

....

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(e) Eating excess fat can lead to obesity.

Chitosan is a product that can help people lose weight.

Chitosan **stops the digestion** of fat.

(i) Explain why taking Chitosan would increase the amount of fat in the waste leaving the body. [2]

....

....

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(ii) Suggest **one** reason why taking Chitosan as part of a diet might be harmful to health. [1]

....

....

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3. This question is about enzymes.

(a) **Complete the following sentence** by <u>underlining</u> the correct word. [1]

Enzymes are made of **carbohydrate / lipid / protein**.

(b) **Graph 3.1** shows the effect of increasing pH on the rate of activity of an enzyme.

Graph 3.1
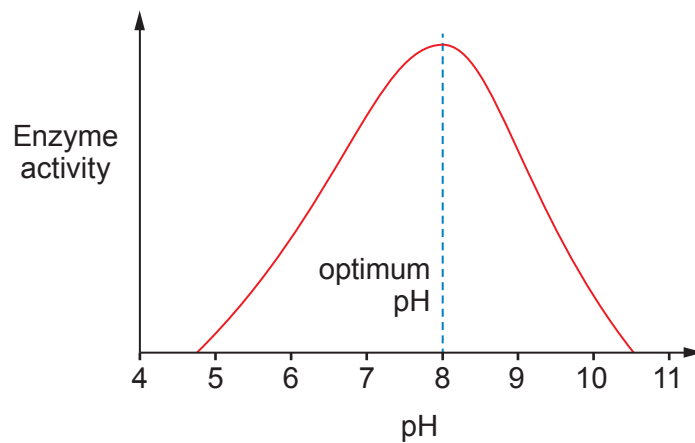
Use **Graph 3.1** to describe how increasing pH affects enzyme activity. [2]

....

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(c)   **Image 3.2** shows an enzyme, a denatured enzyme and a substrate molecule.

Image 3.2

enzyme   denatured enzyme

active site
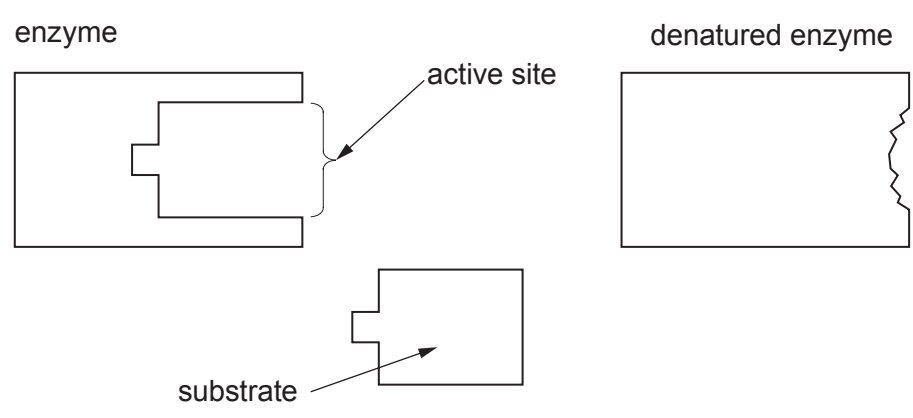
substrate

(i)   Describe what has happened to the active site in the denatured enzyme.   [1]

....

....

(ii)   Enzymes react with substrates to produce products.
Explain why the denatured enzyme can no longer produce products.   [2]

....

....

....

....

(d)   State **two** variables that could denature an enzyme.   [2]

....

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Examiner
only

4. (a) **Choose words from the list below to complete the word equation** for aerobic respiration. [2]

carbon dioxide   protein   oxygen   nitrogen

glucose + ... ⟶ .... + water + energy

(b) Tracy investigated the release of energy during respiration in germinating peas using one of the two methods (**1** or **2**) shown in **Image 4.1**.

Image 4.1
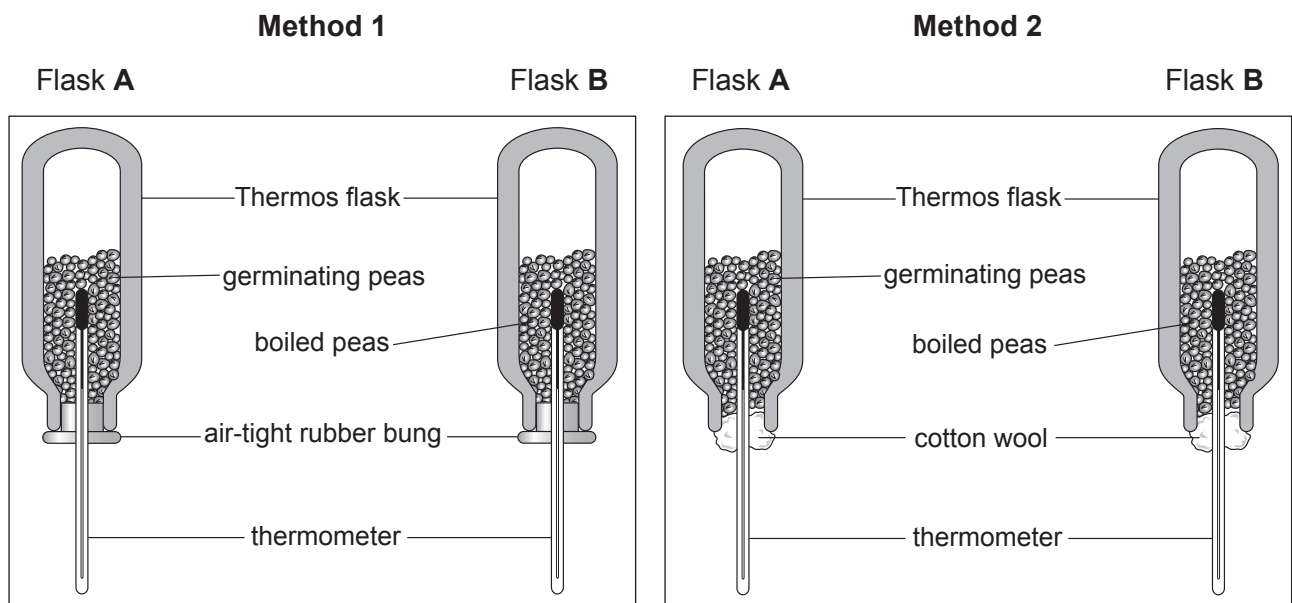
(i) State which of the two methods (**1** or **2**) Tracy should have used and explain your answer. [2]

Tracy should have used Method ....

Explanation

....

....

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(ii) **Table 4.2** shows the results of Tracy's investigation over seven days.

Table 4.2

Day	Temperature (°C)	
	flask **A**	flask **B**
1	20.0	20.0
2	21.0	20.0
3	23.0	20.0
4	26.0	20.0
5	27.5	20.0
6	28.5	20.0
7	29.5	20.0

Draw a line graph of the results on **Graph 4.3** by: [3]

I. plotting the points for flask **A** from day 3 to day 7. The first two days have been plotted for you.

II. joining **all the** plots with a ruler and labelling your line as flask **A**.

The results for flask **B** have been plotted for you.

Graph 4.3
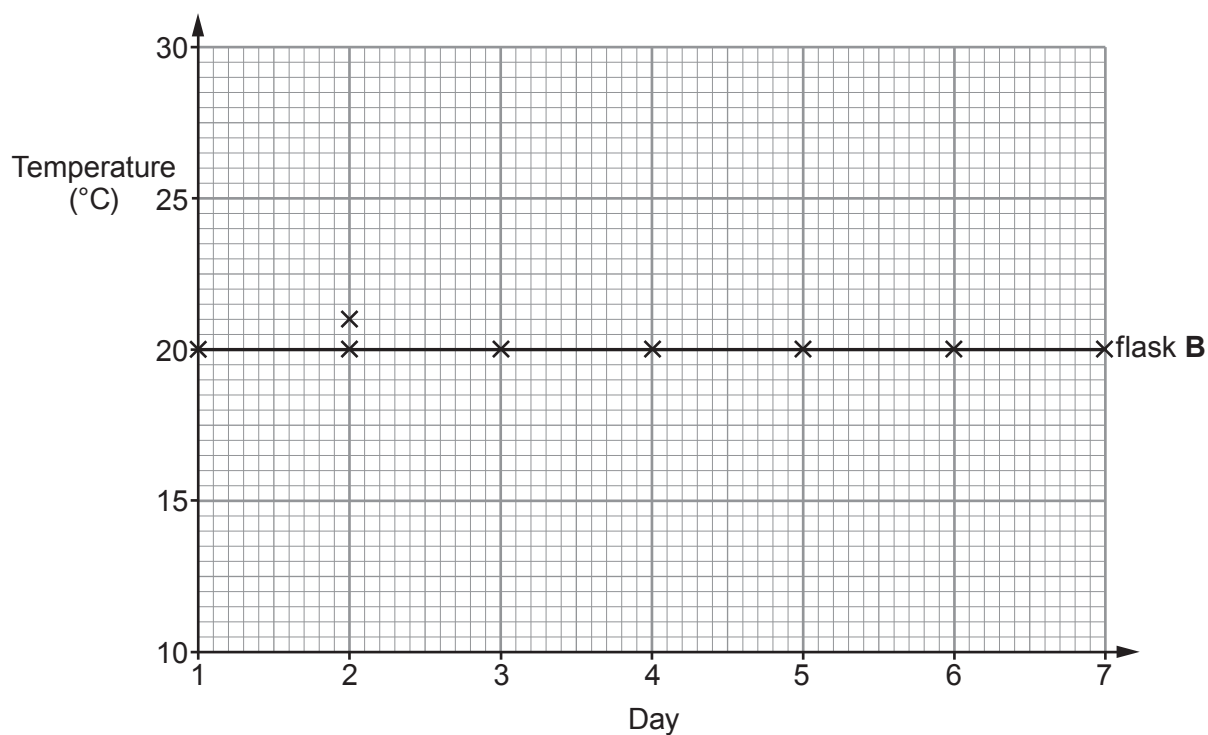
(iii) At the start of the investigation, Tracy made two predictions:

1. The temperature of the peas in flask **A** will rise but the temperature of the peas in flask **B** will not change.

2. Eventually the temperature in flask **A** will stop rising.

Use the results to state whether each of Tracy's predictions were correct. Explain your answers. [2]

Prediction **1** ....

....

Prediction **2** ....

....

(iv) Suggest **one** practical way in which Tracy could confirm or reject her second prediction. [1]

....

....

(v) Tracy recorded the mass of the peas in flask **A** at the start and at the end of the investigation. **Complete the sentence below** by underlining the correct outcome that you would expect Tracy to observe. [1]

During the investigation, the mass of the peas in flask **A** will have:

decreased   **increased**   **remained the same**

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Turn over.

5. The beaker in **Image 5** contains $150\,cm^3$ of an unknown solution.

Image 5

beaker

test tube

eye protection

dropper

pipette

$10\,cm^3$ syringe

IODINE SOLUTION

rack

brown iodine solution
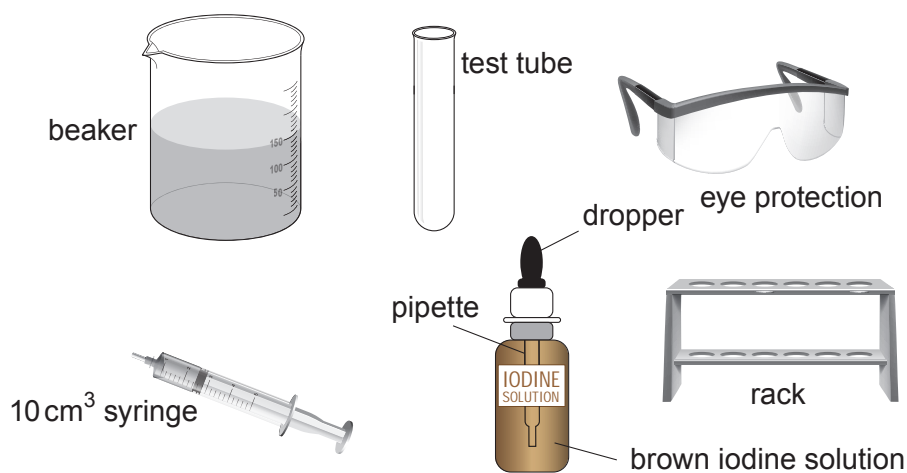
Diagram not drawn to scale

- Using **all** the materials shown in **Image 5** describe how you would:
  - transfer $10\,cm^3$ of the solution from the beaker to the test tube
  - test it for starch
- State the colour **change** if starch is present. [6 QER]

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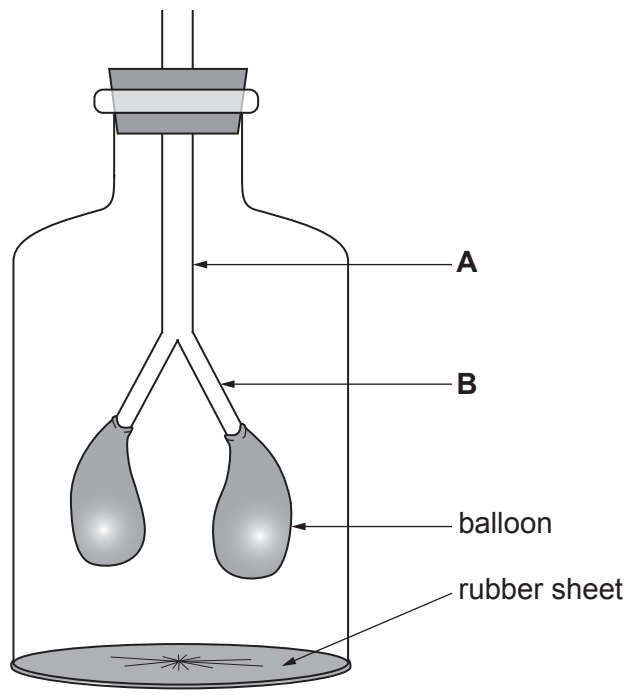
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Turn over.

6. **Image 6** shows the bell jar model which is being used to demonstrate inspiration.

Image 6

(a) (i) Parts **A** and **B** in **Image 6** represent two parts of the human respiratory system.

Complete the following sentence: [2]

In the bell jar model, part **A** represents the .... and part **B**

represents the ....

(ii) As the rubber sheet is pulled down, the air pressure inside the bell jar changes.
Explain how the air pressure change in the bell jar causes the balloons to inflate.
                                                                                               [2]

....

....

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(b) The balloons are in an air-tight space in the bell jar. Lungs are sealed in an air-tight space in the chest.

A wound to the chest means the chest is no longer air-tight. As a result, the wounded person cannot fully inflate their lungs.

Explain why a person with a hole in the chest cannot fully inflate their lungs. [1]

....

....

....

....

5

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7. **Image 7.1** and **Image 7.2** show examples of two methods of farming hens for egg production.

Image 7.1 – Intensively farmed chickens   **Image 7.2 – Free-range chickens**

- Intensive farming methods maximise production by controlling the conditions in which farm animals are kept. Inside animal sheds, temperatures may be kept high and each animal is given limited space.

- In 2015, a survey of 2000 people *(OnePoll)* found that 80% of those questioned always or often bought free-range eggs, even though they were more expensive.

Table 7.3 shows egg production in the UK by intensive and free-range methods between 2006 and 2016.

Table 7.3

Year	Egg production (billion)	
	intensive	free-range
2006	4.1	1.9
2008	4.0	2.1
2010	3.8	2.8
2012	3.5	3.4
2014	3.9	3.3
2016	3.8	3.8

(a) Use **Table 7.3** and the information above to answer the following questions.

(i) Calculate the percentage increase in the production of **free-range eggs** between 2006 and 2016. [2]

Increase = ... %

(ii) Give **one** way that intensive farming methods minimise energy loss from farm animals. Explain your answer. [2]

....

....

....

....

(b) Suggest **two** reasons why many people buy free-range eggs, even though they are more expensive than eggs produced by intensive farming methods. [2]

....

....

....

....

(c) (i) State **one** possible **pollutant** from intensive farming methods and explain how it could damage the environment. [2]

....

....

....

....

(ii) Farmers in Wales who plan to develop intensive methods of food production on rural land must first submit their plans to biologists at Natural Resources Wales. Describe the role of the biologists at both the planning stage and when the intensive farm is operating fully. [2]

Planning stage

....

....

When operating fully

....

....

END OF PAPER

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Question number	Additional page, if required. Write the question number(s) in the left-hand margin.	Examiner only

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