

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
 TWENTY FIRST CENTURY SCIENCE
 ADDITIONAL APPLIED SCIENCE A**

Agriculture and Food (Higher Tier)

FRIDAY 18 JANUARY 2008

Afternoon
 Time: 45 minutes

Candidates answer on the question paper.

Additional materials (enclosed):

None

Calculators may be used.

Additional materials: Pencil
 Ruler (cm/mm)



Candidate
 Forename

Candidate
 Surname

Centre
 Number

--	--	--	--	--

Candidate
 Number

--	--	--	--

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **36**.

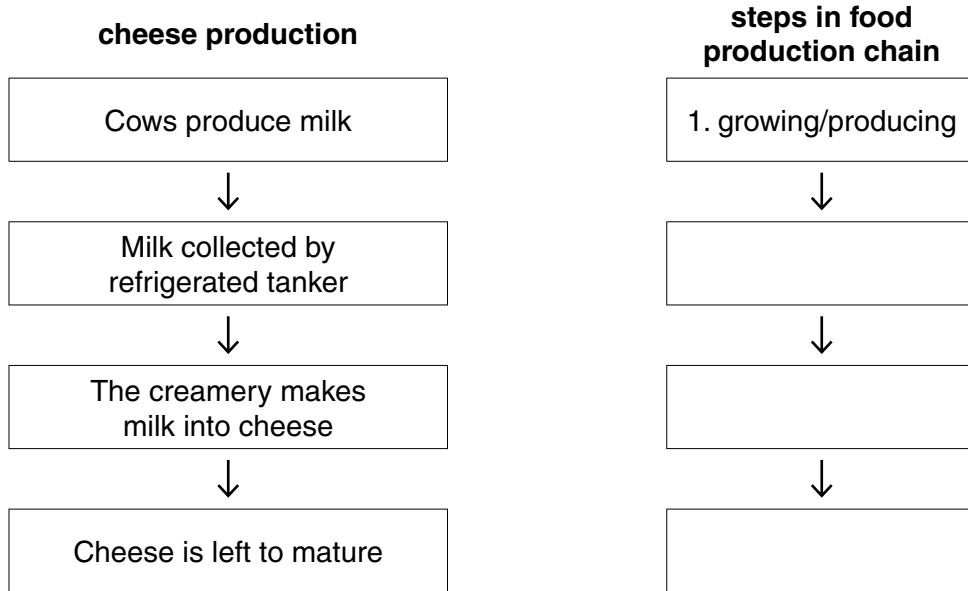
FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	6	
2	8	
3	10	
4	12	
TOTAL	36	

This document consists of **9** printed pages and **3** blank pages.

- 1 (a) There are many different types of cheese.
The food production chain of cheese has four main steps.

Complete the boxes by writing in the correct name of each step.

The first one has been done for you.



[3]

- (b) A factory inspector visits the creamery.

Suggest a reason for his visit.

.....
.....[1]

- (c) Name an organisation that supports a food product and explain the role of the organisation.

name.....
explanation

.....
.....[2]

[Total: 6]

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

2 Joe grows tomato plants.
He grows five plants in his garden and five plants in his greenhouse.
He plants the same type of tomato plant.
He weighs the tomato crop.

(a) He gets 0.5kg of tomatoes from each plant grown in his garden.

(i) What is the total mass of his garden crop of tomatoes?
Show your working.

.....kg [1]

(ii) Joe's total crop from his greenhouse tomato plants is 20 kg.
What is the average weight of tomatoes from **one** plant?
Show your working.

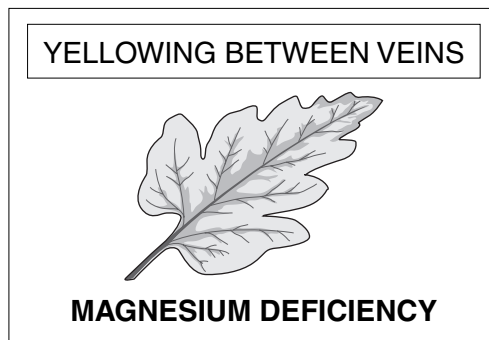
.....kg [1]

(iii) Joe gets a better crop from his greenhouse tomato plants than from his garden tomato plants.
Suggest **two** reasons why.

1

2 [2]

(b) His outdoor tomato plants have yellowish leaves.
He tests what is wrong by looking this up in a book.
He finds out that they need more magnesium.



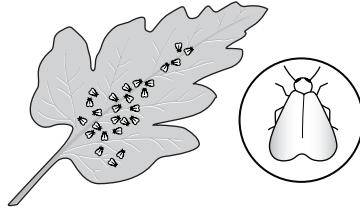
(i) What type of test is Joe using?
Put a tick (✓) in the correct box.

qualitative

semi-quantitative

quantitative

(ii) His greenhouse tomato plants have whitefly under their leaves.



GREENHOUSE WHITEFLY

Joe could use a chemical or a predator organism to control these whitefly pests.
Write down **one** advantage of each type of control.

using a chemical

using a predator

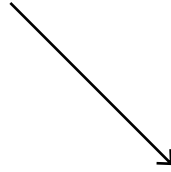
(iii) He uses the internet to search for a predator organism to kill the whitefly.
What is the **best** word to type into his search engine?
Put a **ring** around the best word.

biocontrol **biofly** **bionet** **bioorganism** **bioplant** [1]

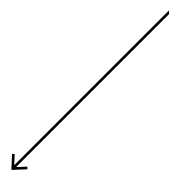
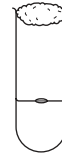
[Total: 8]

- 3 Cultivated banana plants do not produce seeds. They are propagated by taking cuttings or by tissue culture. The diagram shows the stages in **tissue culture**.

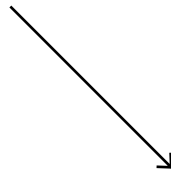
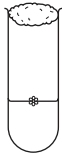
1. Small pieces are taken from the plant.



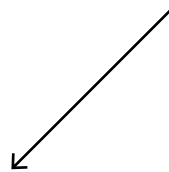
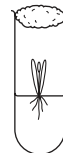
2. Plant tissue is put in a sterile nutrient medium.



3. A clump of cells develops.



4. The cells develop into a small plant.



5. The plant is grown in soil in a controlled environment until ready for outdoor planting.



(a) (i) Why must the nutrient medium in **stage 2** be sterile?

.....[1]

(ii) What can be added to the nutrient to make the clump of cells develop into a plant?

.....[1]

(b) Suggest **two** conditions that need to be controlled in **stage 5** to produce the best growth.

1.....

2.....[2]

(c) Describe the **commercial advantages** of producing plants by tissue culture.

.....
.....
.....
.....
.....
.....
.....[3]

(d) Plants can also be produced by taking cuttings.

(i) Describe how plant cuttings are taken and used to grow new plants.

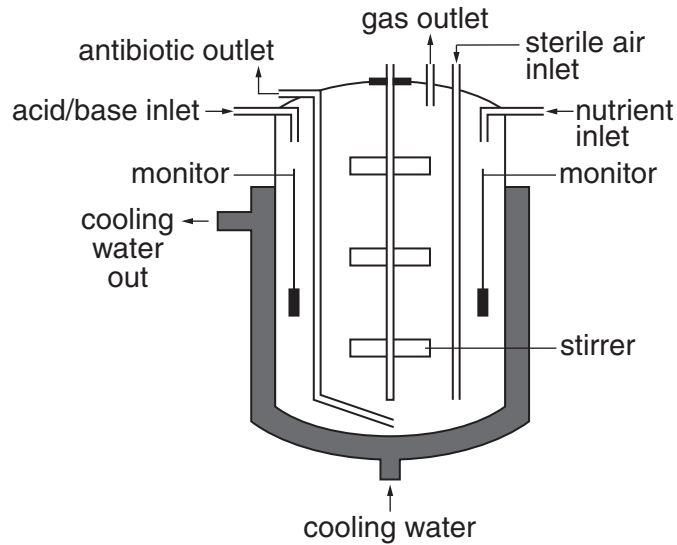
.....
.....
.....[2]

(ii) Write down **one** advantage of using cuttings instead of tissue culture to grow new plants.

.....
.....[1]

[Total: 10]

- 4 Alex has work experience in a factory producing medicines. She is working in the section producing the antibiotic penicillin. A microorganism called *Penicillium* produces the antibiotic penicillin. The microorganism is grown in a fermenter. Look at the diagram of the fermenter.



(a) It is necessary to cool the fermenter as the temperature rises during fermentation.

(i) Why does the temperature rise?

.....[1]

(ii) Explain **why** the temperature needs to be controlled.

.....
[2]

(iii) What is the reason for stirring the mixture?

.....
[1]

(b) Alex monitors conditions in the fermenter.

Name **two** conditions, other than temperature, that must be monitored during the process.

1.....

2.....[2]

(c) After eight days Alex empties the fermenter. The contents are processed to extract the penicillin. The fermenter is cleaned and sterilised before the process is repeated.

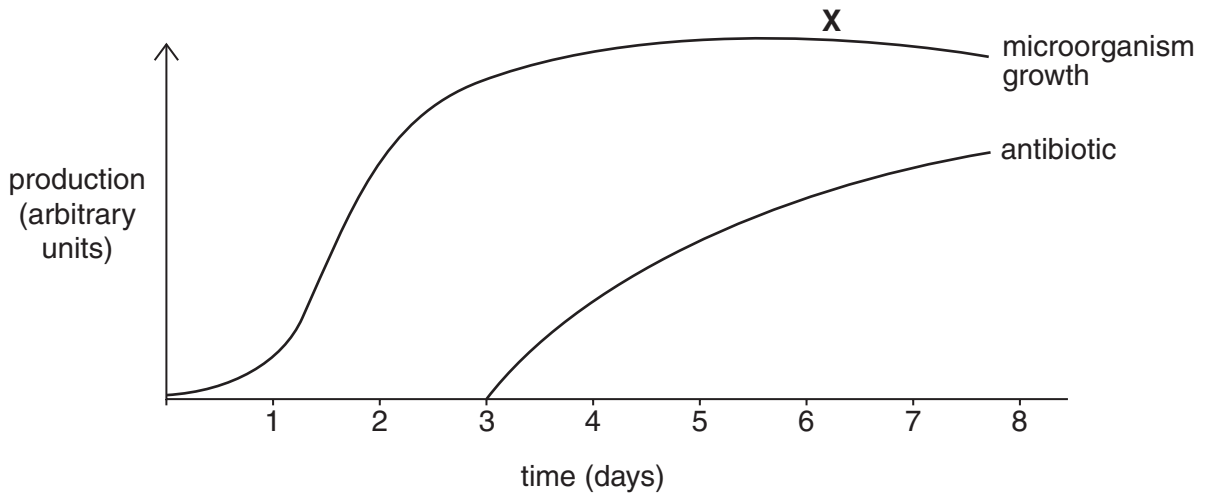
(i) Put a ring around the phrase or word which **best** describes how the fermenter was used.

batch culture **bio-reactor** **continuous culture** **respirometer** [1]

(ii) Explain why the fermenter must be sterilised before it is reused.

.....
.....
.....[2]

(d) Alex draws a graph to show microorganism growth and antibiotic production over an eight-day time period.



Explain the shape of the growth curve at **X**.

.....
.....
.....[3]

[Total: 12]

END OF QUESTION PAPER

10
BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

11
BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

Copyright Acknowledgements:

Q.4 diagram Adapted from www.biotopics.co.uk © Richard Steane. Reproduced by permission of Richard Steane.

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (OCR) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

OCR is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© OCR 2008