

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

A334/02

Unit 2: Agriculture and Food (Higher Tier)

**Wednesday 9 June 2010
Afternoon**

Duration: 45 minutes

Candidates answer on the Question Paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:

- Pencil
- Ruler (cm/mm)



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use 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.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **36**.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Charlotte grows strawberry plants.

She picks the strawberries from the plants.

This is called a **gathered harvest**.



(a) How is a gathered harvest different from a whole organism harvest?

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

(b) Charlotte grows the strawberries in a different way.

The strawberry plants are grown in plastic bags.

The plastic bags are placed on a framework above the ground.

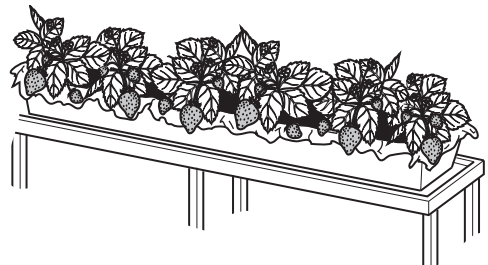
The soil in the plastic bags is watered automatically.

This new system of growing strawberry plants produces a better crop.

Suggest **two** reasons why.

1

2 [2]



(c) The chain of food production for strawberries includes a number of stages.

Some stages are missing.

Write in the names of the missing stages.

A

B transporting to factory

C

D storage

E delivering to shops

[2]

(d) Charlotte finds out that many strawberries are spoilt after a few days.

Suggest **two** ways that fresh strawberries could be stored to reduce this damage.

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

(e) Charlotte does some research on strawberry plants.

She finds out that scientists have produced genetically modified (GM) strawberry plants that are resistant to salty water.

Bacteria resistant to salty water were used to develop the GM strawberry plants.

(i) Suggest why it is useful to be able to grow strawberries in salty water.

..... [1]

(ii) Describe the stages used in the production of the GM strawberry plant.

Your answer should include information about

- the genetic material used
- the transfer of the genetic material.

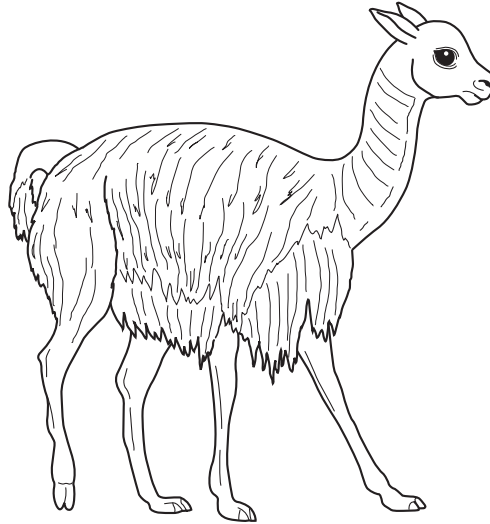
.....
.....
.....
..... [3]

[Total: 11]
Turn over

2 Vicunas are animals that live in the mountains of South America.

In 1960 there were very few vicunas left in the wild.

Vicuna wool produces light but warm clothing.



(a) A special technique is used to increase the numbers of vicunas.

Put a tick (✓) in the box next to this technique.

artificial insemination

batch culture

organic farming

tissue culture

[1]

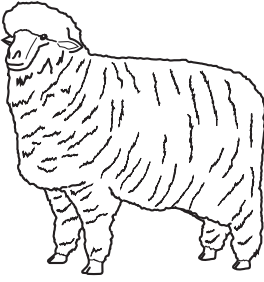
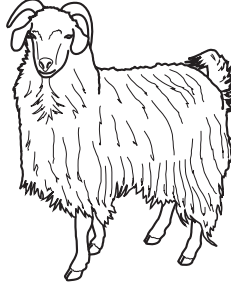
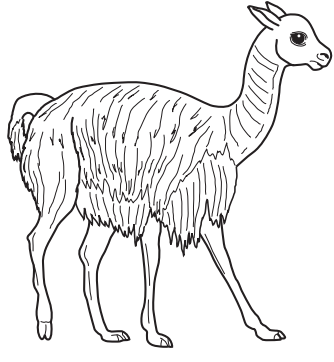
(b) Suggest **three** factors that could affect the growth of a vicuna.

1

2

3 [2]

(c) Look at the information about three different types of wool.

	merino sheep wool	cashmere goat wool	vicuna wool
			
how often wool is collected	every year	every year	every 2 years
amount of wool from one animal in grams	6800	190	190

(i) Which type of wool shows the **lowest** yield per year?

Explain your answer.

.....
 [2]

(ii) A sweater made from vicuna wool fibres costs about £2600.

Suggest reasons why a sweater made from vicuna wool is very expensive.

.....

 [2]

[Total: 7]

3 Ben works in a research laboratory.

He uses microorganisms.

(a) Why must Ben use aseptic techniques when using microorganisms?

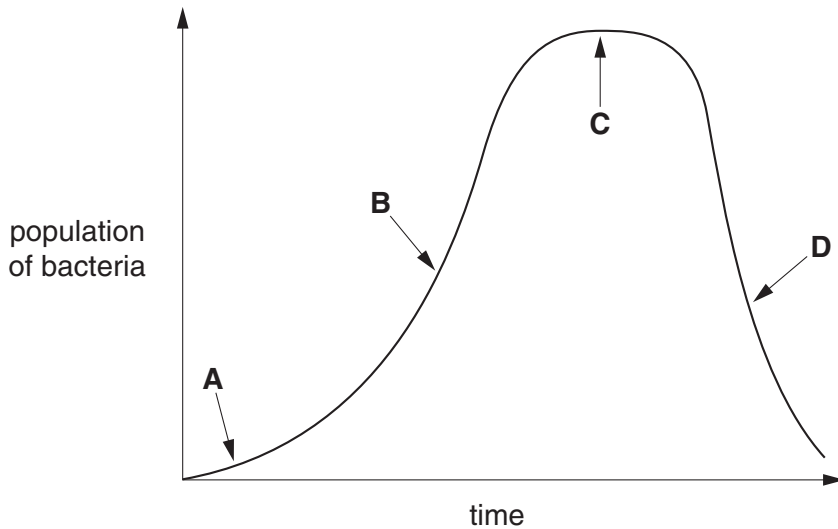
.....
..... [2]

(b) Ben can use colony counts to measure the population growth of microorganisms.

Write down two **other** methods to measure the population growth of microorganisms.

1
2 [2]

(c) Ben shows the growth of a population of microorganisms on a graph.



(i) Name the four stages shown on the graph.

A
B
C.....
D [2]

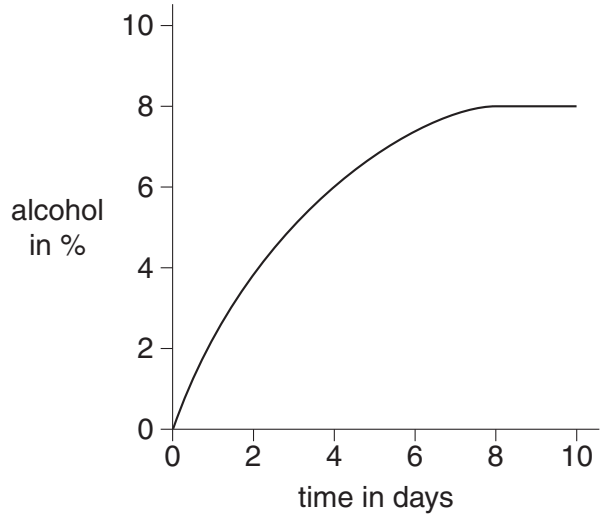
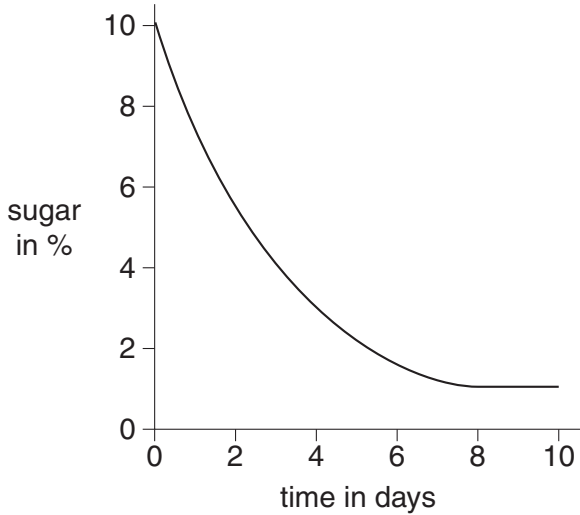
(ii) Explain what is happening to the population of microorganisms at C.

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

(d) Ben uses yeast to ferment sugars. Alcohol is produced.

He measures the amount of sugar and alcohol over 10 days.

The graphs show his results.



Explain what these graphs show about the fermentation process.

.....

.....

.....

..... [3]

(e) Ben uses a **batch** process to grow the microorganisms.

Name **one other** process he could use to grow microorganisms.

..... [1]

[Total: 11]

4 Shabeena works in a garden centre.

(a) (i) She grows many plants from seeds.

She knows that most seeds do not need light to germinate.

Explain why the seeds do not need light to germinate.

..... [1]

(ii) Shabeena knows that warm conditions speed up germination.

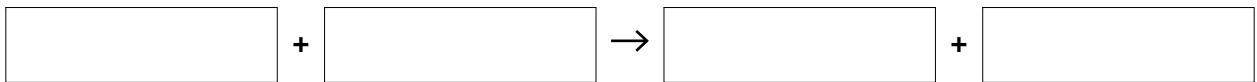
Write down **two other** conditions necessary for germination.

1

2 [1]

(b) After germination, plants use the process of photosynthesis.

(i) Complete the word equation for photosynthesis.



[1]

(ii) Light and temperature are limiting factors in photosynthesis.

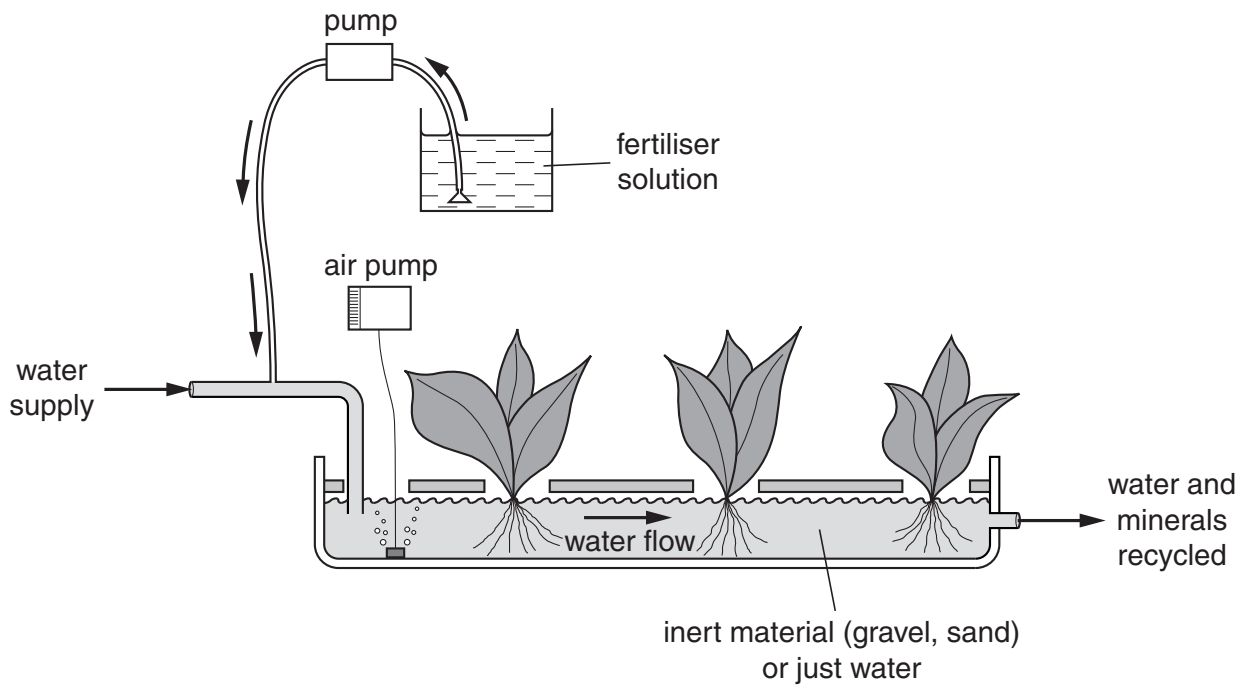
Explain what is meant by a **limiting factor**.

..... [1]

(iii) Write down **one other** limiting factor in photosynthesis.

..... [1]

(c) Shabeena grows some types of plants using hydroponics.



Apart from cost, describe **one advantage** and **one disadvantage** of using hydroponics to grow plants.

advantage

.....

disadvantage

..... [2]

[Total: 7]

END OF QUESTION PAPER

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