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Tuesday 31 January 2012 – Morning

GCSE TWENTY FIRST CENTURY SCIENCE ADDITIONAL APPLIED SCIENCE A

A334/01 Agriculture and Food (Foundation Tier)

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)

Duration: 45 minutes

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A 3 3 4 0 1

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- 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).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

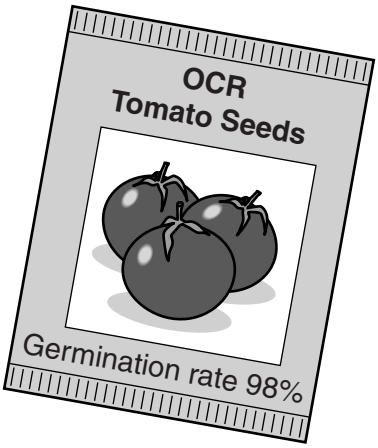
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **36**.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Alan wants to grow tomato plants.

He buys a packet of tomato seeds.

The packet is sealed.



(a) Why is the packet of seeds sealed?

Put a tick (✓) in the box next to the **two** correct answers.

The packet is sealed so that the seeds cannot …

… be fertilised. ☐

… be pollinated. ☐

… germinate. ☐

… photosynthesise. ☐

… rot. ☐ **[2]**

(b) The label on the packet states

"Germination rate is 98%"

If Alan plants 1000 seeds, how many seeds should germinate?

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

(c) Write down **two** conditions needed for germination.

1 .....

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

(d) Alan grows his tomato plants using three different growing media.

Draw a straight line from each **growing medium** to its correct **advantage**.

Then draw a straight line from each **growing medium** to its correct **disadvantage**.

advantage	growing medium	disadvantage
automatic control of water	compost from a garden centre	contains many pests
free	soil from his garden	expensive to buy in sacks
contains correct minerals at correct pH	hydroponics system	difficult to support tall plants

[4]

(e) Alan decides to grow his tomato plants in a glasshouse.

Alan needs to make sure they get enough light and carbon dioxide.

Explain why getting enough light and carbon dioxide is important to produce a good crop of tomatoes.

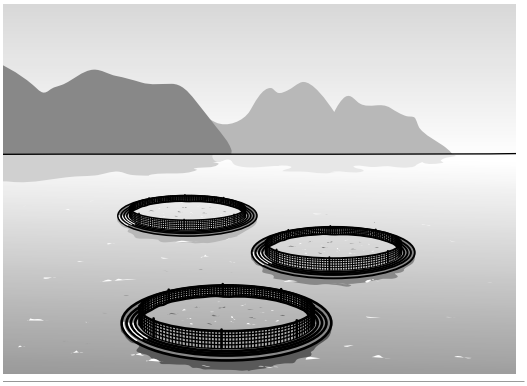
.....

.....

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

[Total: 11]

2 Salmon are kept in cages in sheltered sea bays.



This is called fish farming.

The salmon are fed a high protein diet so they grow quickly.

(a) What type of farming is this?

Put a tick (✓) in the box next to the correct answer.

dairy	☐
horticulture	☐
intensive	☐
arable	☐

[1]

(b) Some people **object** to this type of farming.

Suggest why.

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

(c) Write down **two** factors, apart from food, which affect the growth of fish such as salmon.

1 .....

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

(d) The types of salmon used in fish farming were developed by selective breeding.

Describe the main stages in selective breeding.

.....

.....

.....

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

[Total: 7]

3 Rosie is a fruit farmer.

(a) What type of harvest will Rosie produce?

Put a tick (✓) in the box next to the correct answer.

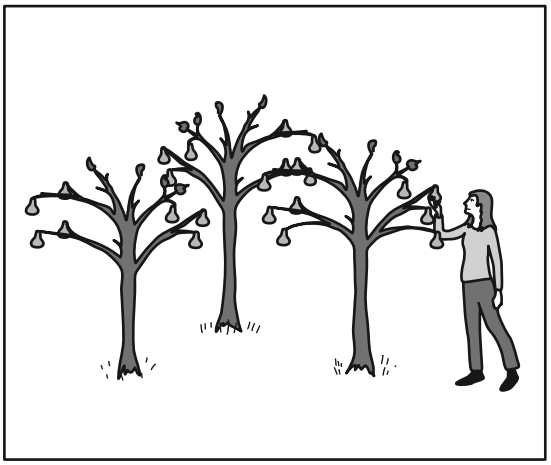
aseptic	☐
gathered	☐
microorganisms	☐
whole	☐

[1]

(b) Rosie wants to grow pear trees in a large field.

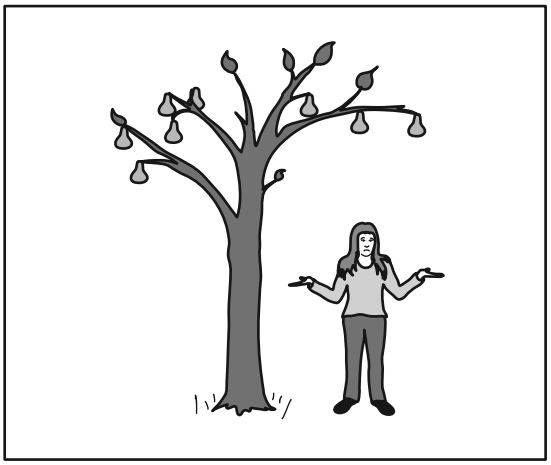
She can grow either dwarf trees (2 m tall) or tall trees (6 m tall).

using dwarf trees



- 500 trees used
- each tree produces 15 kg pears/year
- total crop = 7500 kg/year

using tall trees



- 40 trees used
- each tree produces 80 kg pears/year
- total crop = …… kg/year

(i) Work out the total crop from tall pear trees. Complete the box above. **[1]**

(ii) Rosie decides to use dwarf pear trees.

She thinks they will produce the larger crop.

Suggest **two** other advantages of growing dwarf trees in a large field.

.....

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

(c) Rosie will make pear cider with her pears.

Complete the sentences about this process.

Use words from this list.

alcohol

carbon dioxide

fermentation

germination

nitrogen

oxygen

pollination

The pears are squashed to make pear juice.

Yeast and sugar are then added.

The yeast produces …… and …… .

This process is called …… . **[2]**

(d) Rosie hopes her pears will get a quality mark.

What does a quality mark mean?

Put a tick (✓) in the box next to the correct answer.

The product has …

… been grown by intensive farming. ☐

… been grown for a long time. ☐

… reached a certain standard. ☐

… reached a maximum size. ☐ **[1]**

(e) Rosie is worried that microorganisms may damage her stored pears.

(i) Name a type of **microorganism** that could damage the pears.

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

(ii) Explain how microorganisms damage foods such as pears.

.....

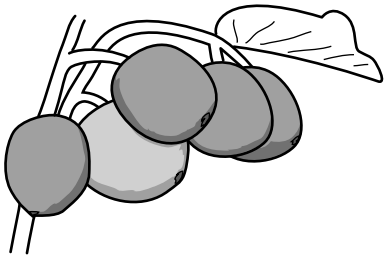
.....

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

[Total: 9]

4 Read the information on a new fuel.

A clean biofuel?



The first commercial crop of *Jatropha curcas* has been harvested in Africa.

It is a fast growing plant, producing seeds containing 45% oil.

The wild variety of *Jatropha* requires little water and can grow in poor soil. However, the crop yield and the flowering time of each wild plant varies from year to year.

The commercial crop of *Jatropha* is much better than the wild type. Each plant regularly produces about 3 kg of seed each year, resulting in 3 tonnes per hectare. This is six times the crop produced by wild plants.

(a) How much seed is produced by wild *Jatropha* plants per hectare in a year?

answer = …… tonnes per hectare **[1]**

(b) Suggest **two** ways, apart from a higher crop yield, in which the commercial *Jatropha* plants have been improved.

.....

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

(c) Which technique would have been used to develop the new commercial *Jatropha* plants?

Put a tick (✓) in the box next to the correct answer.

artificial insemination	☐
food processing	☐
selective breeding	☐
surrogate parents	☐

[1]

(d) New *Jatropha* plants can be grown in different ways.

A … from seeds

B … from cuttings

C … by tissue culture

Answer the questions below using the letters **A**, **B** and **C**.

More than one letter can be used for each answer.

(i) Which method(s) depends on pollination? ..... **[1]**

(ii) Which method(s) depends on sterile conditions? ..... **[1]**

(iii) Which method(s) produce identical plants? ..... **[1]**

(e) Some farmers in the UK are thinking about growing *Jatropha* plants.

They would use polytunnels to control the growing conditions.

Name **one** condition they would control and explain how it could be controlled.

condition .....

how it could be controlled .....

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

[Total: 9]

END OF QUESTION PAPER

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