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Tuesday 31 January 2012 – Morning

**GCSE TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A**

A334/02 Agriculture and Food (Higher Tier)

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

Duration: 45 minutes

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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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.

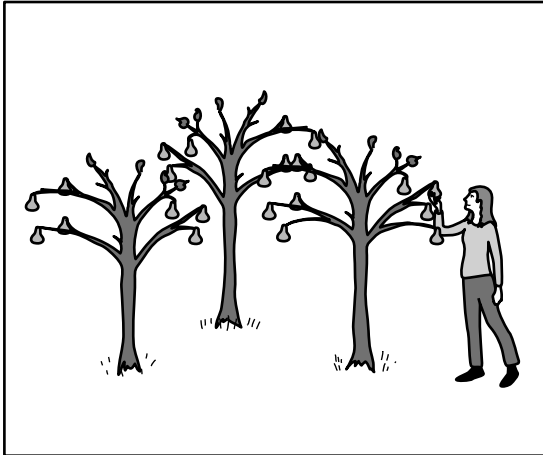
Answer **all** the questions.

1 Rosie is a fruit farmer.

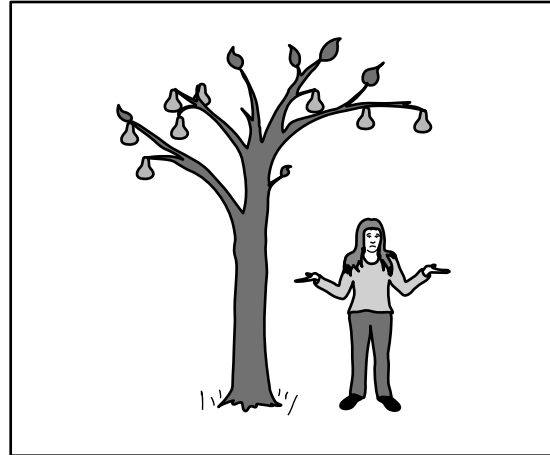
(a) She wants to grow pear trees in a large field.

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

using dwarf trees



using tall trees



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

- 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]

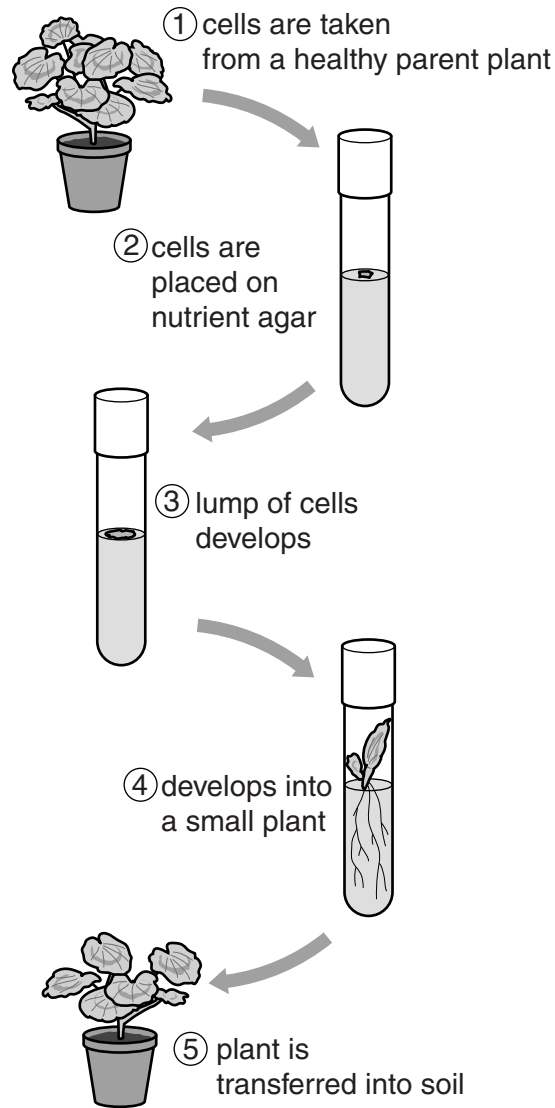
(b) Rosie will make alcoholic pear cider with her pears.

Write down the word equation for the **process** that produces alcoholic pear cider.

..... [1]

(c) Rosie wants many identical copies of the dwarf pear trees.

She uses this method.



(i) What is this technique called?

..... [1]

(ii) What substance is added to stimulate the cells to become a small plant?

..... [1]

[Total: 5]

2 Read the information on a new fuel.

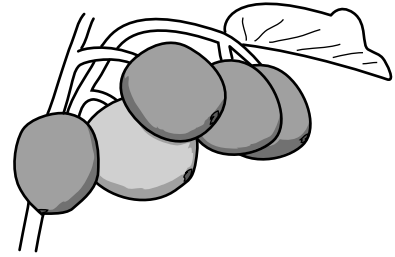
A clean biofuel?

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 3kg 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

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) depend on pollination? [1]
- (ii) Which method(s) depend 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 describe how it could be controlled.

condition

how it could be controlled

..... [2]

[Total: 9]

3 Read the information on GM salmon.

Monster salmon?

A salmon has been designed to grow at twice the rate of a wild salmon.

It could be the first genetically modified (GM) animal approved for human consumption in America.

The GM Atlantic salmon has been given a growth hormone gene from a Chinook salmon and another gene from a pout fish to ensure all year round growth.

The GM Atlantic salmon will be grown in fish farms, a type of intensive farming.



(a) (i) Describe **two** ways in which the GM Atlantic salmon will be better than wild salmon.

- 1
- 2 [1]

(ii) Imagine you were designing a better GM salmon.
Suggest **one other** characteristic you would include.

..... [1]

(b) Fish farms will prevent the GM salmon from escaping.

Suggest one **other** reason for keeping them in fish farms.

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

(c) Describe how genes are transferred to produce a genetically modified organism.

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

(d) What will the inserted genes produce in the GM salmon?

..... [1]

(e) The GM Atlantic salmon industry could be subsidised by the Government.

Explain what effects this would have.

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

(f) Write down an example of the use of genetic modification of a **microorganism** to make a useful product.

type of microorganism

useful product [2]

[Total: 11]

4 Anton is a cattle farmer.

(a) He treats his cattle with antibiotics to kill dangerous bacteria.

(i) What are disease-causing organisms called?

..... [1]

(ii) Explain the advantage of using antibiotics.

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

(b) Hormones can be used to control reproduction in cattle.

(i) Which female body organ is targeted?

..... [1]

(ii) Which female body cycle is controlled?

..... [1]

(iii) What is the effect of the hormone used in this process?

..... [1]

(iv) Explain the advantage to Anton of using these hormones on his cattle.

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

(c) Anton uses artificial insemination on his cattle.

(i) Describe the main stages in this process.

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

(ii) Write down **one** advantage of using artificial insemination of cattle.

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

[Total: 11]

END OF QUESTION PAPER

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