

GENERAL CERTIFICATE OF SECONDARY EDUCATION
ENVIRONMENTAL AND LAND-BASED SCIENCE
Plant Cultivation (Higher Tier)

B491/02

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)

Monday 18 January 2010
Morning

Duration: 45 minutes



Candidate Forename		Candidate Surname	
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Centre Number							Candidate Number				
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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, however additional paper may be used if necessary.
- There are no separate marks for the quality of written communication, but make sure that your answers are written in clear and well-structured English.

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 **16** pages. Any blank pages are indicated.

Answer **all** the questions.

1 A grower has two pure bred plants.

Plant **A** has red flowers.

Plant **B** has white flowers.

Plant **A** is crossed with plant **B**.

Plant **A** is crossed with plant **B** to produce plant **C**.

The photograph shows plant **C** which has red flowers.



What is the phenotype of plant **C**?

A dominant

B F_1

C red

D Rr

Answer **A, B, C** or **D** [1]

2 The photograph shows a bulb with two daughter bulbs.

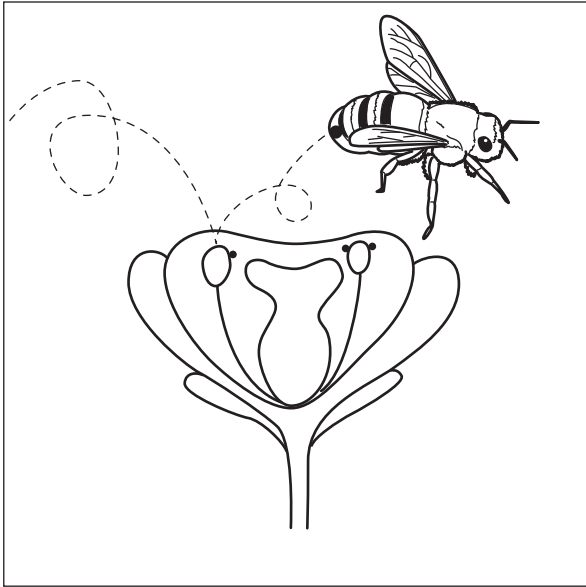


Which **one** of the following statements about the daughter bulbs is true?

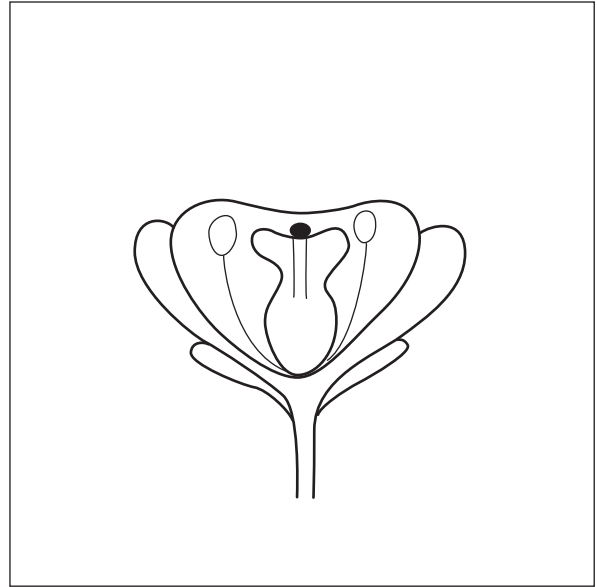
- A They will all produce different coloured flowers.
- B They will all produce the same coloured flowers as the original bulb.
- C They will produce smaller flowers than the original bulb.
- D They are more disease resistant than the original bulb.

Answer **A, B, C** or **D** [1]

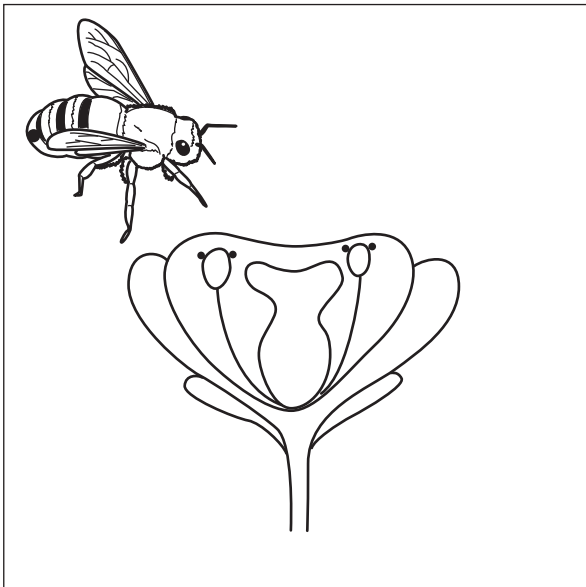
3 The diagrams show stages in insect pollination (not to scale).



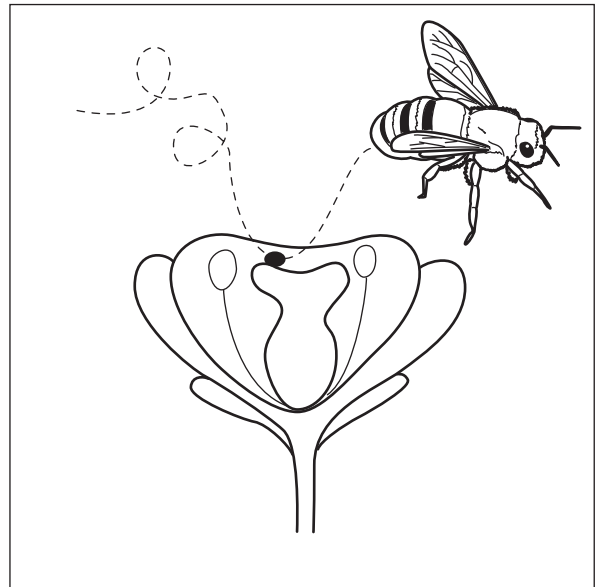
A



B



C



D

Put the diagrams in the correct order by writing **A**, **B**, **C** or **D** in the boxes.

[2]

(first)

(last)

4 The photographs below show different coloured flowers.



red flower



pink flower



yellow flower



white flower

The following Punnet square shows a genetic cross.

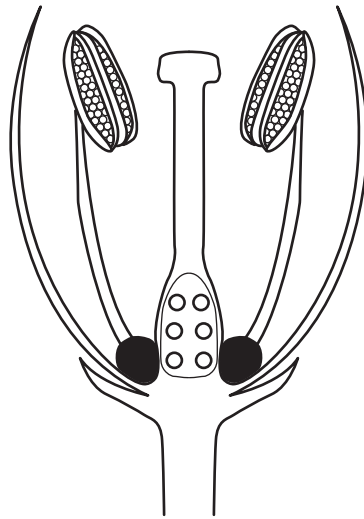
	R	R
r	Rr	Rr
r	Rr	Rr

R represents the allele for red flowers.
r represents the allele for white flowers.

Which flower is the result of this cross?

..... [1]

5 The diagram shows a section through a flower.



Complete the following sentences. Put a ring around the correct word.

After pollination, a pollen tube grows down the

style **filament** **anther** **ovary**

Fertilisation takes place in the

style **stigma** **anther** **ovary**

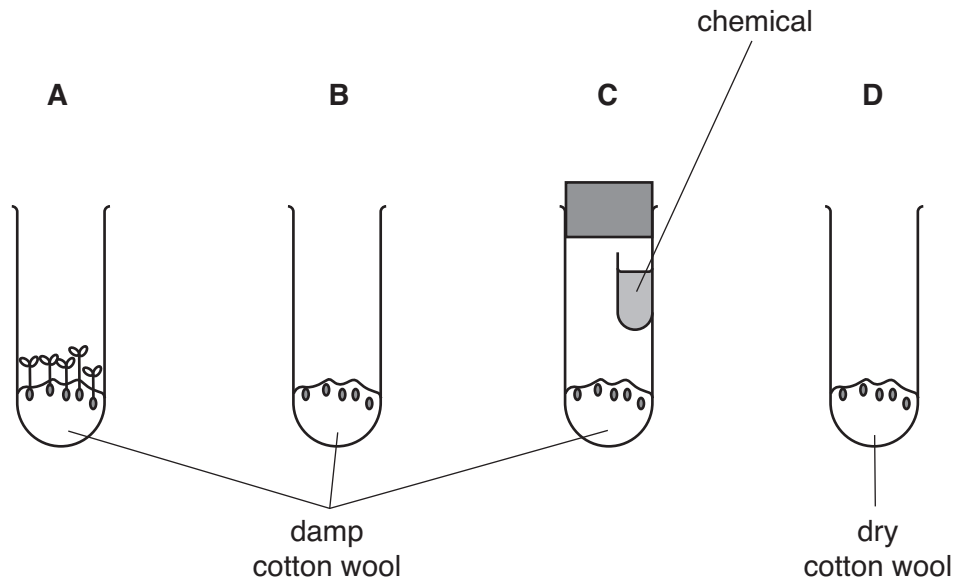
[2]

6 A student set up an experiment to see the conditions needed for cress seeds to germinate.

Tubes **A**, **C** and **D** were kept in a warm room for ten days.

Tube **B** was kept in a fridge for ten days.

The results are shown.



(a) A chemical was added to tube **C**.

This chemical removed a gas from the air which stopped the seeds from germinating.

Which gas did the chemical remove?

- A** carbon dioxide
- B** ethene (ethylene)
- C** nitrogen
- D** oxygen

Answer **A, B, C** or **D** [1]

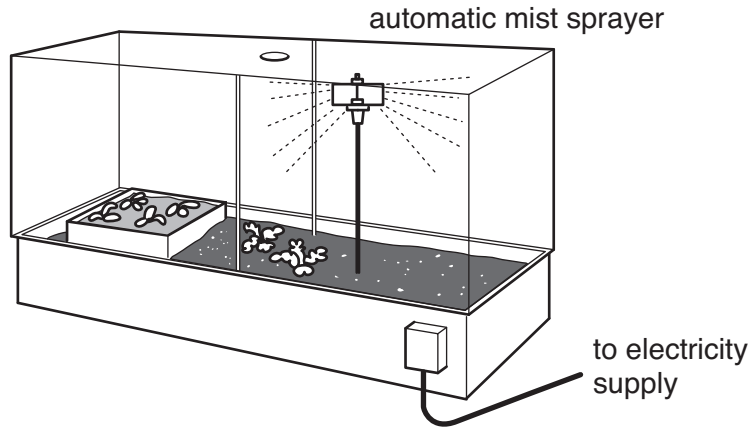
(b) Some of the seeds in tube **A** did not germinate.

The most likely explanation for this is:

- A** lack of nutrients
- B** damaged plumule
- C** pests
- D** lack of space

Answer **A, B, C** or **D** [1]

- 7 A student has taken some softwood cuttings.
She has left them to root in a mist propagation unit.

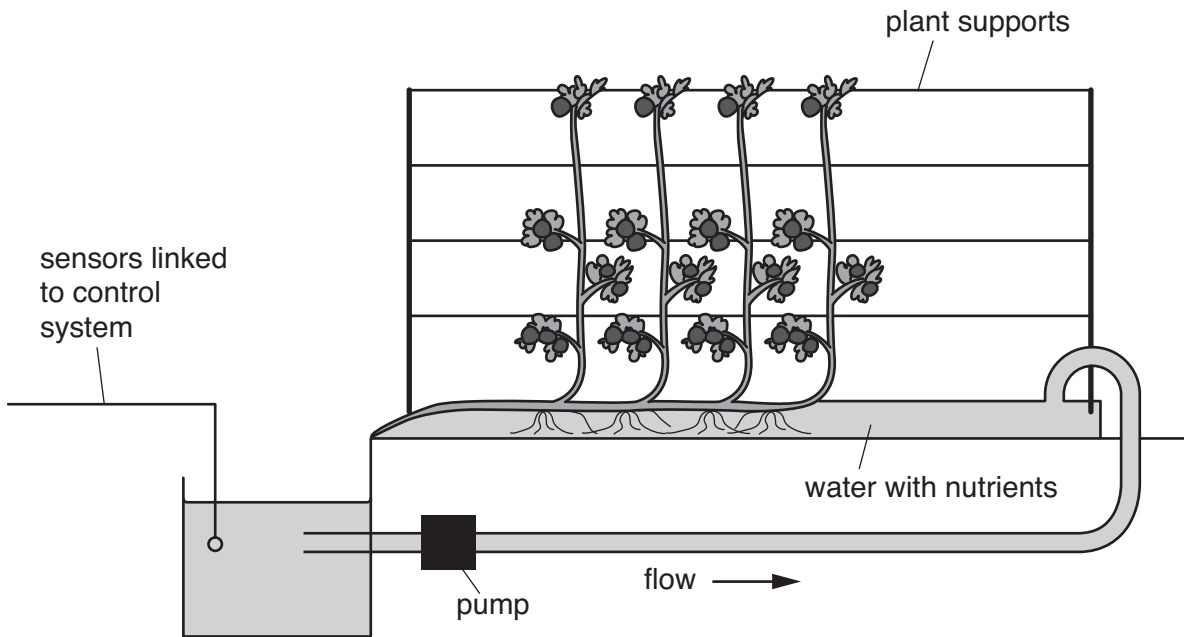


Cuttings root more quickly in a mist propagator.

Suggest **two** reasons why.

- 1
-
- 2
- [2]

- 8 Tomato plants are often grown using a system called **hydroponics** which does not use soil. Water and nutrients flow along shallow channels.



The sensors are used to detect and control conditions such as temperature.

- (a) Name **two** other conditions in the solution that the sensors could detect.

1

2 [2]

- (b) Which mineral nutrient should be present in the largest amount?

Suggest a reason.

.....

..... [2]

- (c) State **two** advantages of controlling this system using ICT.

1

.....

2

..... [2]

9 (a) A farmer is growing sugar beet.

It is important to control the weeds on the field.

The farmer carries out a trial to test this.

He measures the vigour or health of his crop on a scale from 0–10.

0 = poor crop growth

10 = maximum crop growth

The table shows the results of the trial.

control method	vigour of crop	weed count	cost (£/hectare)
standard herbicide	8	87	125
glyphosate herbicide	10	36	30
untreated	6	339	0

The farmer decides to change from using the standard herbicide to glyphosate herbicide.

Calculate the percentage (%) decrease in the cost of herbicide.

..... [1]

(b) Suggest **one** advantage and **one** disadvantage of the method he uses to measure the vigour of his crop.

advantage

.....

disadvantage

..... [2]

10 The photograph shows part of a pea plant.



Peas can self-pollinate.

(a) State **one** advantage and **one** disadvantage of this to a grower.

advantage

.....

disadvantage

..... [2]

(b) Explain how a scientist may **prevent** a pea plant from self-pollinating.

..... [1]

11 (a) When a crop is harvested, many nutrients are removed.

Sugar beet is grown for its root.

When it is harvested the leafy top of the plant is cut off the root.

These leafy tops may be ploughed back into the soil **or** used as animal feed.

The table below shows the amount of nutrients removed from the soil by a crop of sugar beet.

element	mass lost (kg/hectare)	
	tops ploughed in (kg/hectare)	tops used as animal feed (kg/hectare)
N	60	180
P	30	60
K	90	225

There is a difference between the amount of nutrients lost when the tops are ploughed in and when they are used as animal feed.

Describe and explain this difference.

.....

.....

.....

..... [2]

(b) Calculate the ratio of the amount of **K** removed for

tops ploughed in : tops used as animal feed

..... [1]

(c) A farmer decided to feed the tops of his sugar beet to his cattle.

The nutrients that have been lost from the soil can be replaced by using an inorganic fertiliser.

Which one of the following fertilisers would be the best?

- A 15:10:20
- B 36:12:45
- C 2:1:3
- D 40:30:50

Answer **A, B, C** or **D** [1]

12 Plants may become unhealthy due to the presence of disease organisms.

Name a plant disease that you have studied.

For this disease:

- describe the symptoms
- name the type of microorganism that causes it.

.....

.....

.....

.....

.....

.....

..... [3]

13 Mangoes are tropical fruits.

They are transported long distances for sale in the UK.



The mangoes can be transported in controlled-atmosphere containers.

Describe and explain the conditions inside these containers.

In your answer refer to

- temperature,
- humidity,
- gases present.

.....

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.....

.....

.....

.....

..... [3]

14 The photograph shows a spider plant.



Spider plants can reproduce by asexual reproduction (vegetative propagation).

Describe how this asexual reproduction takes place.

.....

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.....

.....

.....

.....

..... [3]

END OF QUESTION PAPER

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