

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
ENVIRONMENTAL AND LAND-BASED SCIENCE**

B491/02

Plant Cultivation
(Higher Tier)

**Thursday 15 January 2009
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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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

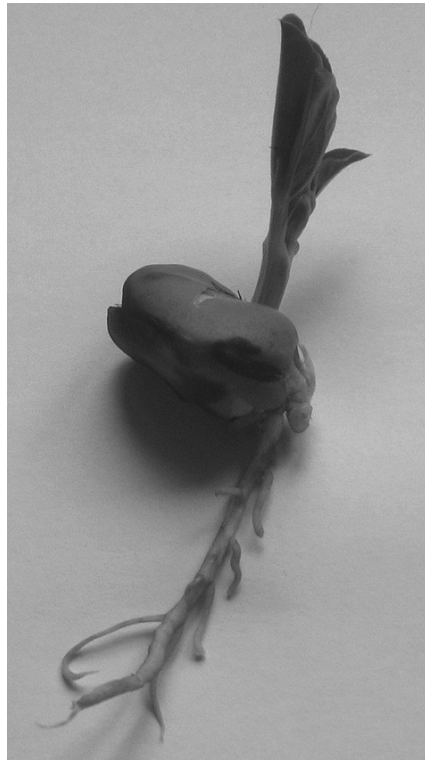
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **36**.
- This document consists of **16** pages. Any blank pages are indicated.

FOR EXAMINER'S USE		
		Mark
TOTAL	36	

2

Answer **all** the questions.

1 The photograph shows a germinating seed.



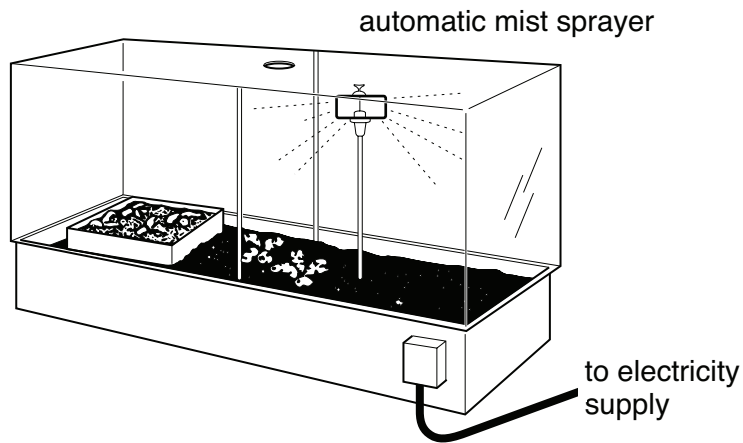
© OCR

On the photograph above, label the plumule with a **P** and label the radicle with an **R**.

Make sure your labels can be clearly seen.

[2]

2 The diagram shows a heated propagator.



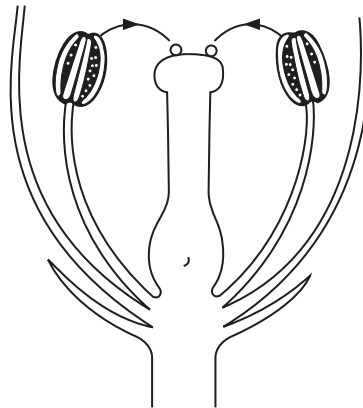
Which **one** of the following is **not** true about this heated propagator?

- A encourages cuttings to root
- B maintains high humidity
- C prevents spread of diseases
- D speeds up germination

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

3 Flowers can be self-pollinated.

This process is shown in the diagram.



Which of the statements **best** describes self-pollination in this diagram?

- A Pollen is transferred from the anther of one flower to the stigma of the same flower.
- B Pollen is transferred from the anther of one flower to the stigma of a different flower.
- C Pollen is transferred from the stigma of one flower to the anther of the same flower.
- D Pollen is transferred from the stigma of one flower to the anther of a different flower.

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

4 The photograph shows plants being watered automatically in a glasshouse.



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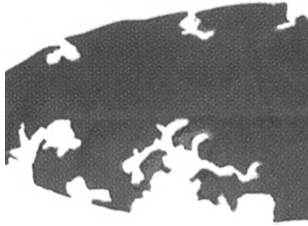
Which of the following statements is true for mist irrigation but **not** for capillary matting?

- A Compost might become waterlogged.
- B Costs of set-up are lower.
- C Watering can be controlled easily.
- D It might result in leaf scorching.

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

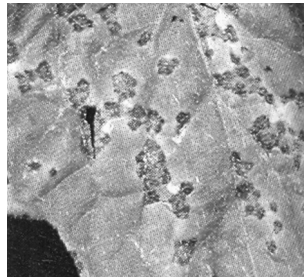
5 The photographs show leaves with different problems.

leaf 1



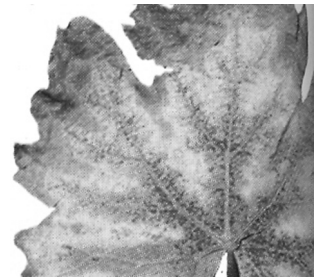
green leaf with holes in the edge

leaf 2



brown blotches on leaf

leaf 3



yellow leaf with brown edges

leaf 4



yellow green leaf

leaf 5



curled brown leaf

Complete the table to show what has caused **two** of these problems.

Write either **leaf 1**, **leaf 2**, **leaf 3**, **leaf 4** or **leaf 5** in the spaces in the table.

problem	photograph
lack of nitrate	
vine weevil (pest) damage	

[2]

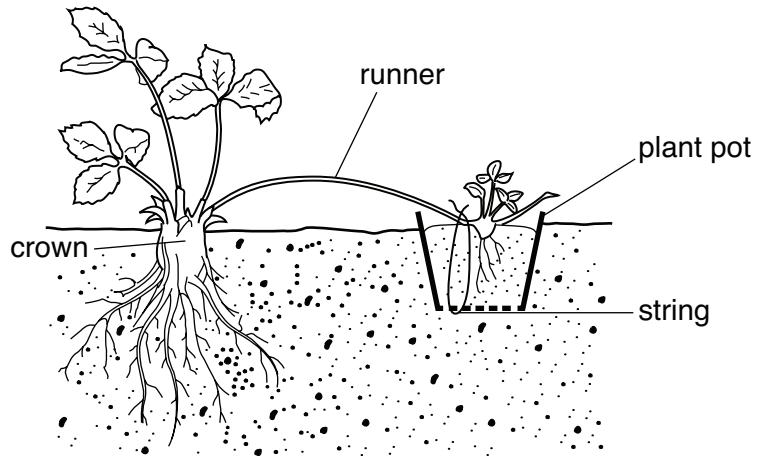
6 Which **one** of the following statements about garden compost is true?

Garden compost:

- A decays quickly to release nutrients into the soil
- B improves the crumb structure of the soil
- C improves drainage in all soils
- D reduces weed growth in the soil

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

7 The diagram shows a strawberry plant with a runner to a plantlet.



(a) Sarah noticed that the plantlet had variegated leaves (part green and part white).

What is the most likely cause of this?

- A cross pollination from another strawberry plant
- B genetic mutation
- C lack of sunlight
- D lack of nitrate

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

(b) Describe **and** explain what effect having variegated leaves (part green and part white) would have on plantlet growth.

.....

.....

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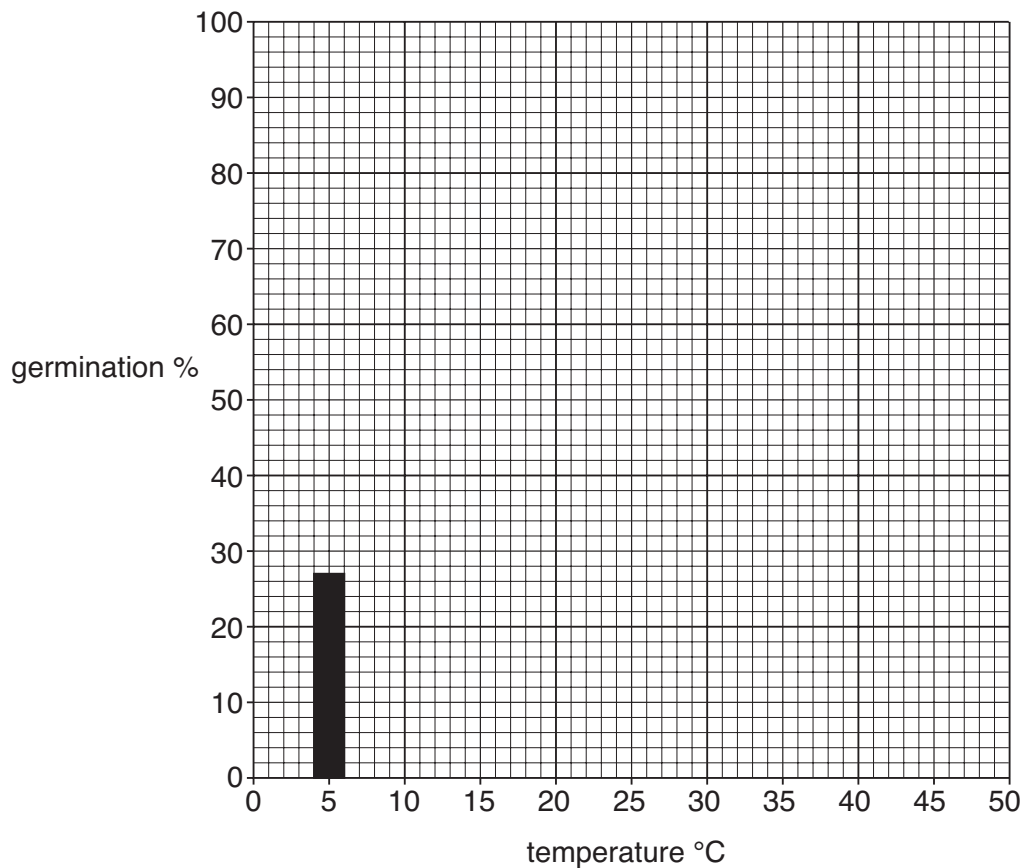
..... [3]

- 8 (a) (i) Justine investigates the germination of cabbage seeds. She does the experiment at different temperatures. She calculates percentage germination.

The results are shown below.

temperature °C	germination %
0	0
5	27
10	78
15	93
20	15
25	99
30	0
35	0
40	0

Complete the bar chart to show these results.



[2]

(ii) One of the results is anomalous (strange).

Suggest **one** reason for this anomalous result.

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

(b) (i) Gardeners rarely germinate seeds in soil temperatures of 25 °C. Give a reason for this.

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

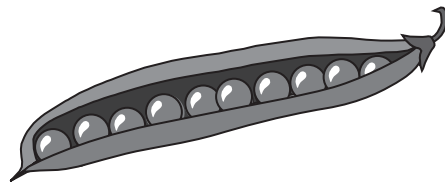
(ii) Explain the results of seed germination from 5–15 °C.

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

(iii) Explain the results of seed germination above 30 °C.

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

9 Peas are legumes.



Jack is growing peas and adds some inorganic fertiliser.

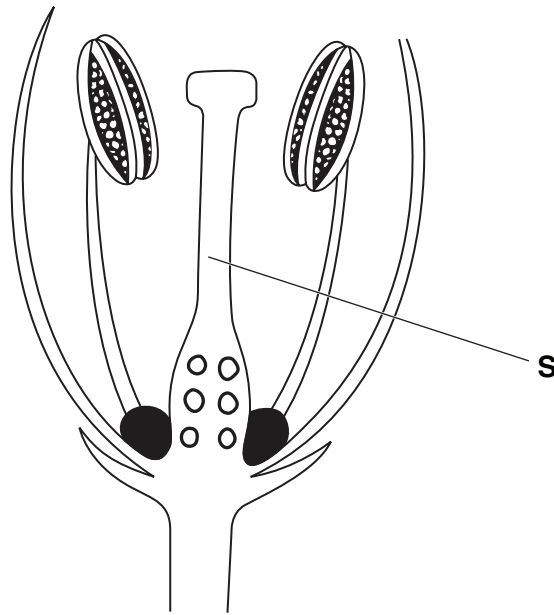
The fertiliser he uses has the following ratio of nutrients.

0:1:2

Explain why Jack uses this fertiliser.

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

10 The diagram shows a flower.



What is the function of the structure labelled **S**?

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

11 (a) A scientist was carrying out experiments on pea plants.

He crossed pea plants that were pure breeding (homozygous) for round peas with pea plants that were pure breeding for wrinkled peas.

He cross fertilized these F₁ plants to produce an F₂ generation as shown below.

parent plants	F ₁ generation	numbers in F ₂ generation	ratio in F ₂ generation
round peas × wrinkled peas	all round	428 round : 152 wrinkled	

(i) Calculate the ratio in the F₂ generation to complete the final column in the table. [1]

(ii) Explain the results for the F₂ generation.

A diagram may help your answer.

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..... [2]

(b) The ratio in the F₂ is not a whole number.

Give **one** reason for this.

.....

..... [1]

12 (a) The photograph shows a plant infested with aphids.



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A gardener compared this plant to an identical one without aphids.

The plant with aphids was not growing very well.

Explain why.

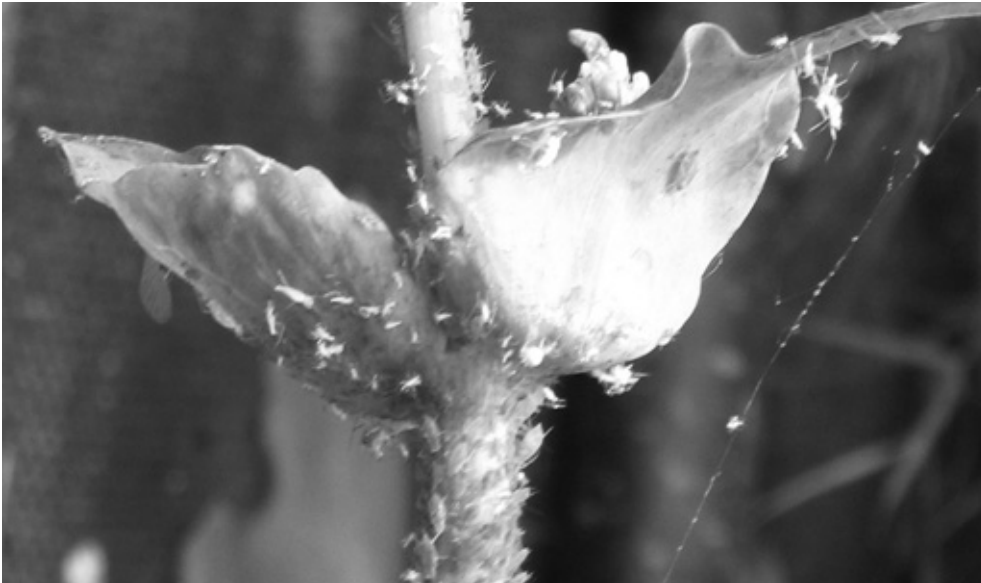
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..... [2]

(b) The photograph shows leaves infested with aphids.



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A gardener wants to control the aphids by spraying with a chemical pesticide.

Write a **risk assessment** for the gardener for this activity.

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..... [3]

13 A company claims that its fertiliser improves the growth of plants.



Dylan decides to test this claim.

Describe a trial or controlled experiment that he could carry out.

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..... [3]

14 Seeds can be collected from plants growing in the garden.

The instructions for collecting these seeds are as follows

- Choose a **disease-free** plant.
- Wait until the seeds are ripe then **collect them straight away**.
- Collect seeds on a **dry day**.

Give an explanation for each of the instructions in bold.

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..... [3]

END OF QUESTION PAPER

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Copyright Acknowledgements:

Q4 Image
Q5

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