OCR
RECOGNISING ACHIEVEMENT

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B491/02

GENERAL CERTIFICATE OF SECONDARY EDUCATION

ENVIRONMENTAL AND LAND-BASED SCIENCE

Plant Cultivation (Higher Tier)

FRIDAY 23 MAY 2008

Afternoon

Time: 45 minutes

Candidates answer on the question paper
Additional materials (enclosed): None

Additional materials (required):
Pencil
Ruler (cm/mm)
Calculator

CUP/T52261

Candidate Forename		Candidate Surname	
Centre Number		Candidate Number	

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **36**.

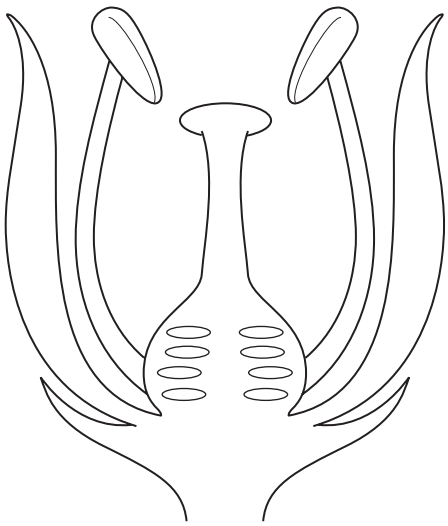
FOR EXAMINER'S USE		
		Mark
TOTAL	**36**	

This document consists of **16** printed pages.

[Turn over

Answer **all** the questions.

1 The diagram shows a flower which is pollinated by insects.



Place the letter **P** on the diagram to show where pollen is produced. [1]

Place the letter **F** on the diagram to show where fertilisation takes place. [1]

2 The photograph shows seedlings with damping off disease.

J North/ © OCR

A grower wants to prevent and control this disease.

What is the best way?

A Use a dry environment and apply a fungicide.

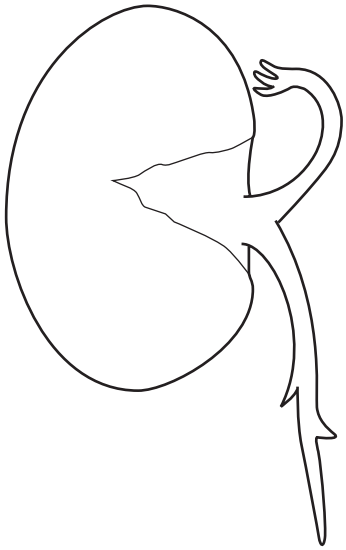
B Use a dry environment and apply an insecticide.

C Use a humid environment and apply a fungicide.

D Use a humid environment and apply an insecticide.

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

3 The diagram shows a germinating broad bean seed.



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

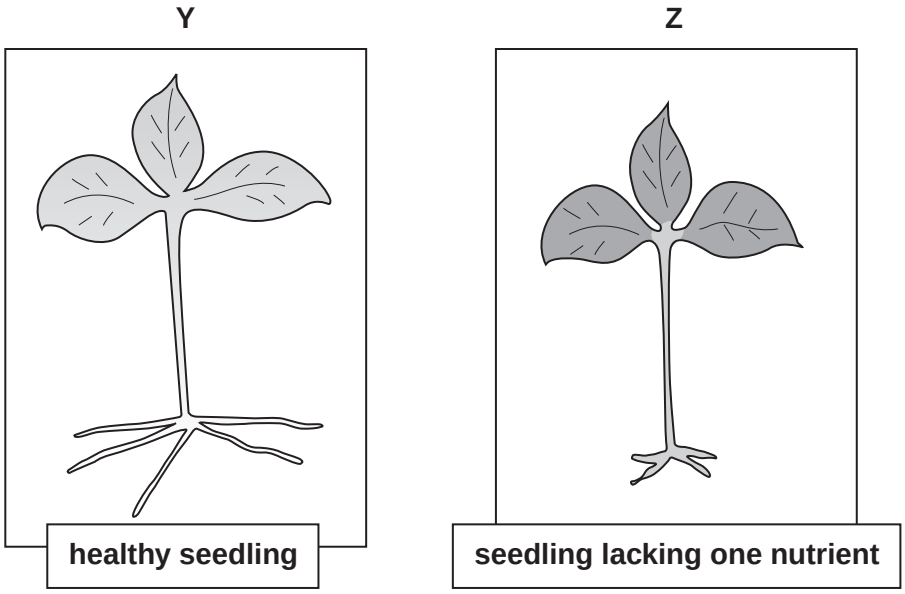
When a seed germinates the **testa** **cotyledon** **plumule** **radicle** absorbs water and swells up.

The **testa** **cotyledon** **plumule** **radicle** emerges and grows downwards.

The **testa** **cotyledon** **plumule** **radicle** emerges and grows upwards.

[2]

4 The diagrams show two seedlings, **Y** and **Z**.



Which **one** nutrient is seedling **Z** lacking?

A C

B K

C N

D P

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

5 The photograph shows the flower of a white lily.

The genes (alleles) responsible for its colour are **ww**.

J North/ © OCR

What is the **phenotype** of the flower?

A recessive

B ww

C w

D white

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

6 The photograph shows a container for storing grain which is to be used as animal feed.

J North/ © OCR

Which **two** of the following could help prevent the grain from spoiling?

A Always mix the old and new grain together.

B Keep the container in a dry environment.

C Keep the container in a warm shed.

D Keep the container in a well lit area.

E Make small holes in the container to allow air to circulate.

F Make sure the container is free from draughts.

G Remove all old grain before adding new grain.

H Spray the grain with fertiliser to prevent pests.

Choose **two** answers from **A**, **B**, **C**, **D**, **E**, **F**, **G** and **H**.

....[2]

7 The photograph shows some plants growing inside a glasshouse.

J North/ © OCR

The environment in the glasshouse is monitored automatically using ICT.

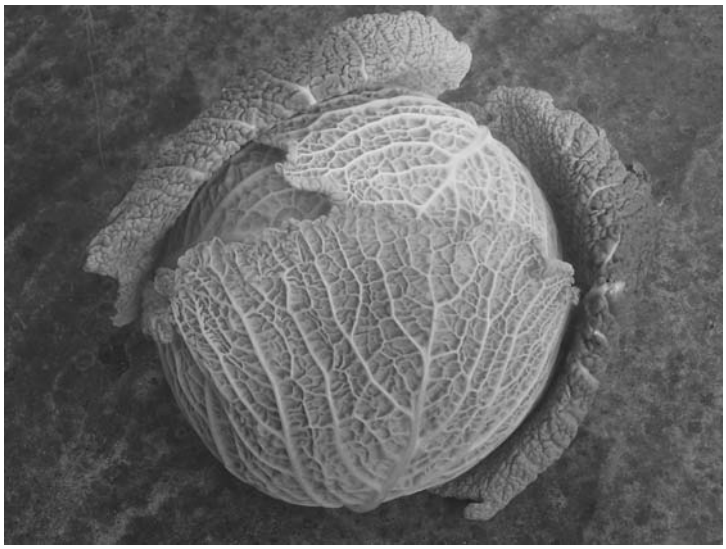
Different probes, linked to a computer, can be used to maintain a constant internal environment.

State **two** types of probe.

1 .....

2 .....[2]

8 The photograph shows a cabbage.



J North/ © OCR

A farmer growing cabbages wants to increase their yield.

Which nutrient would need to be added in large quantities?

Explain your answer.

nutrient .....[1]

explanation .....

.....

.....[1]

9 A farmer cultivates the soil to improve its crumb structure.

State **two** reasons why soil crumb structure is important.

1 .....

.....[1]

2 .....

.....[1]

10 The photograph shows a bulb.

J North/ © OCR

Bulbs reproduce by asexual reproduction.

Describe how a bulb propagates (produces more bulbs).

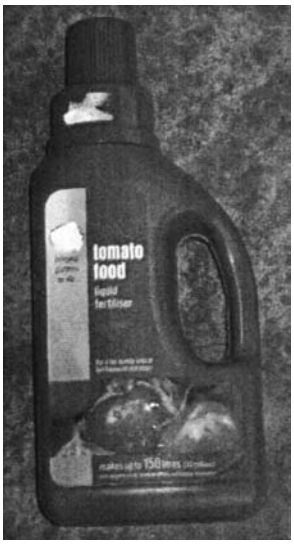
.....

.....

.....

.....[2]

11 The photograph shows a container of an inorganic fertiliser rich in potassium (**K**).



J North/ © OCR

This fertiliser will affect plant growth and development.

Describe **one** of these effects.

.....

.....[1]

12 A student planted a single broad bean seed in each of twelve plant pots.

The seeds were planted at the same depth.

Six of the pots had the holes at the bottom sealed.

The pots were kept in a glasshouse and watered daily.

After three weeks the dry mass of each bean plant was measured.

plant pot number	dry mass (kg)
1	0.00
2	0.15
3	0.13
4	0.00
5	0.19
6	0.00
7	0.10
8	0.00
9	0.00
10	0.12
11	0.08
12	0.00

(a) Use the information above to suggest why six of the seeds did not germinate.

.....

.....

.....[1]

(b) The student was carrying out an experiment on seed germination.

Why were twelve plants used rather than two?

.....

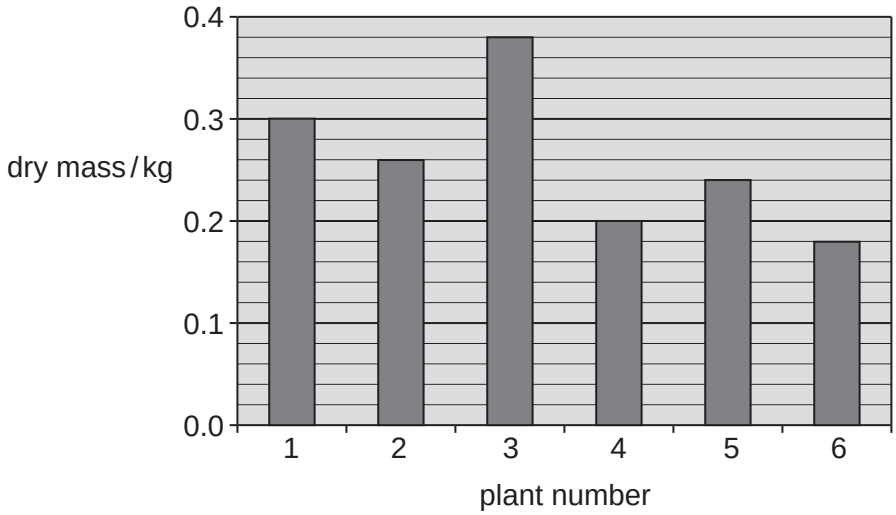
.....[1]

(c) Suggest **one** reason for the differences in the dry masses of the living plants.

.....

.....[1]

13 The bar chart shows the growth of bean plants after six weeks.



This table of results was used to draw the bar chart.

plant number	dry mass (kg)
1	0.30
2	0.26
3	0.38
4	0.20
5	0.24
6	0.18

(a) What is the difference in dry mass between the biggest and smallest bean plant?

..... [1]

(b) What is the average dry mass of the six bean plants?

A 0.30 kg

B 0.28 kg

C 0.26 kg

D 0.24 kg

E 0.22 kg

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

14 Disease resistance in pea plants is controlled by a dominant allele (gene) **R**.

Two hybrid (F1) pea plants (**Rr**) were crossed.

(a) Complete the genetic diagram. Fill in the gametes and show the genotypes of the F2 generation.

	gametes	
gametes		

[1]

(b) What is the ratio of resistant : non-resistant pea plants in the F2 generation?

.....[1]

(c) Two hybrid pea plants were crossed to produce an F2 generation.

All the F2 pea plants produced were self fertilised for several generations.

Non-resistant pea plants are less likely to survive than resistant ones.

Suggest what you would expect to happen to the proportion of the **Rr** genotype in the population.

Explain your answer.

.....

.....

.....

.....

.....

.....

.....

.....[2]

15 Plants in a glasshouse can be watered using capillary matting.

The matting is connected to a reservoir of water to keep it moist.

Tender plants are brought into the glasshouse over winter.

The reservoir is disconnected in order to keep the plants healthy.

Give **one** reason for this.

.....

.....[1]

16 A researcher genetically modified some maize plants by transferring a gene from another plant species to the maize.

He wanted to carry out trials to see whether this maize was resistant to aphid attack.

Maize is cross-pollinated by wind.

A local farmer objected to the trial because he said it could contaminate his own non-GM maize crop.

Explain how this could happen.

.....

.....

.....

.....[2]

17 The photograph shows soil being cultivated.

J North/ © OCR

Students at a school are about to start preparing their vegetable plots.

A risk assessment must be carried out for this activity.

Describe, **in detail**, **two** possible risks and how they may be controlled.

1 .....

.....

2 .....

.....[2]

18 Here is an extract from the question section of a gardening magazine.

Question:

"My sweet peas are not germinating very well. Please help!"

Answer:

"You will note that your sweet pea seeds vary in colour from pale buff to black. Nick the darker seeds with a sharp penknife before sowing them in seed trays."

Explain why nicking (chipping) the seeds improves germination.

.....

.....

.....[2]

19 The photograph shows a new variety of fuchsia that has recently been developed.

J North/ © OCR

In terms of genetics

- explain how this new variety has been produced
- explain how it can then be propagated in large quantities for sale to the general public.

.....

.....

.....

.....

.....[2]

END OF QUESTION PAPER