

Thursday 26 January 2012 – Morning

GCSE ENVIRONMENTAL AND LAND-BASED SCIENCE

B491/04 Plant Cultivation (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.

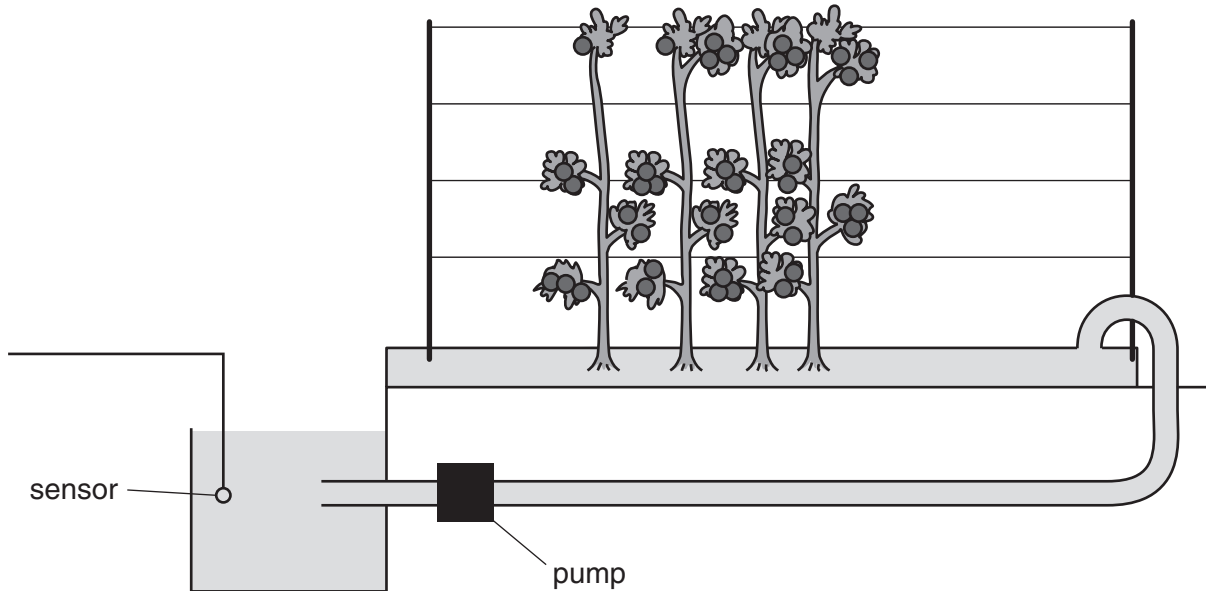
INFORMATION FOR CANDIDATES

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

| | |
|--------------------|--|
| For Examiner's Use | |
| TOTAL | |

Answer **all** the questions.

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



The sensor monitors environmental conditions in the solution.

This maintains ideal growing conditions for the tomatoes.

Which **two** of the following conditions would be monitored by the sensor?

- A carbon dioxide concentration
- B density
- C humidity
- D light
- E oxygen concentration
- F pH

Answer **A, B, C, D, E** or **F** and [2]

2 Mrs Platt is teaching about asexual reproduction (vegetative propagation) in plants.

She describes one type of asexual reproduction as follows:

“It has a short stem with swollen fleshy leaves filled with stored food. At the base are one or more buds which can split off from the parent and form new plants.”

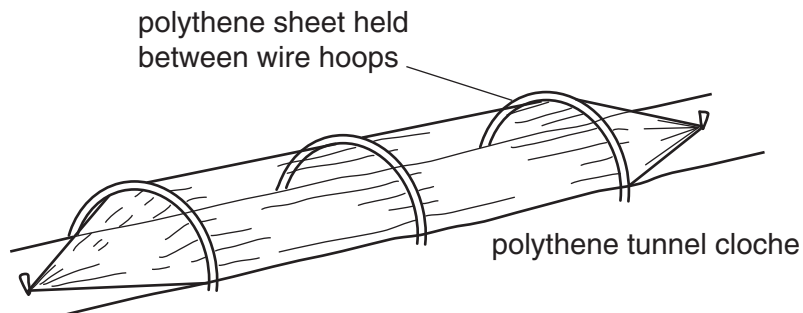
What is she referring to?

- A bulb
- B rhizome
- C runner
- D tuber

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

3 The diagram shows a cloche.

Cloches can affect pollination.



Which **one** of the following statements about this cloche is correct?

The cloche would...

- A ...increase both insect pollination and wind pollination.
- B ...decrease both insect pollination and wind pollination.
- C ...increase insect pollination and decrease wind pollination.
- D ...decrease insect pollination and increase wind pollination.

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

4 **Damping off** is a disease of seedlings.

The best way to prevent damping off is to...

- A ...increase humidity and spray with a fungicide.
- B ...increase humidity and spray with an insecticide.
- C ...reduce humidity and spray with a fungicide.
- D ...reduce humidity and spray with an insecticide.

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

5 Some plants may lack nitrogen (N).

Which of the following statements describes the appearance of a plant short of nitrogen (N)?

- A green leaves and tall spindly stem
- B leaves with dead spots and few fruits and flowers
- C purple leaves and small roots
- D yellow leaves and stunted growth

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

6 Patrick digs farmyard manure into the soil.

This releases nutrients.

State **one** other reason for adding the manure.

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

7 State **one** advantage of inorganic fertilisers over organic fertilisers.

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

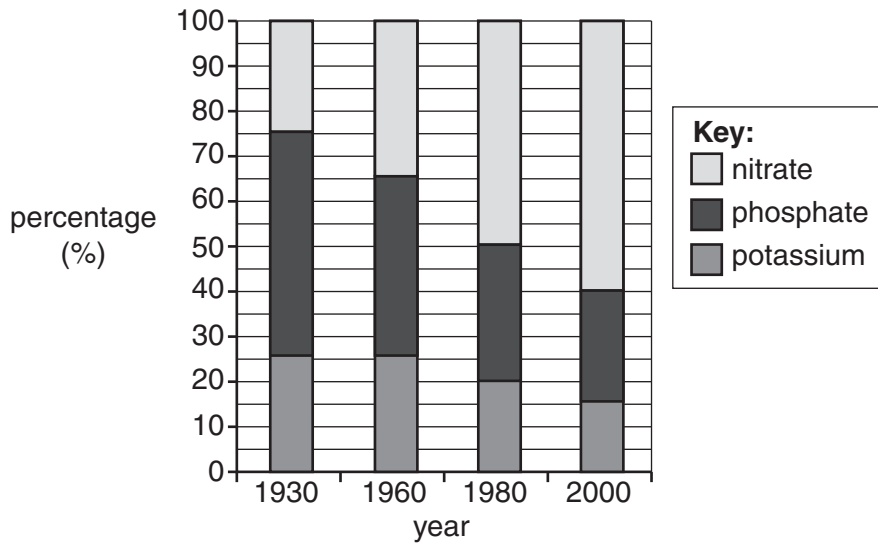
8 The diagram shows a bag of fertiliser.



How much phosphate (P) would there be in 50 kg of this fertiliser?

..... kg [1]

9 The chart shows percentages of different minerals in fertilisers between 1930 and 2000.



(a) For the three minerals describe in detail the trends shown.

Use data from the chart.

.....

.....

.....

..... [2]

(b) Look at the data for the year 2000.

A fertiliser was produced at this ratio.

What would be the value of N: P: K?

Give your answer in its lowest form.

..... [1]

10 Describe how the pH of a soil affects the uptake of minerals by plants.

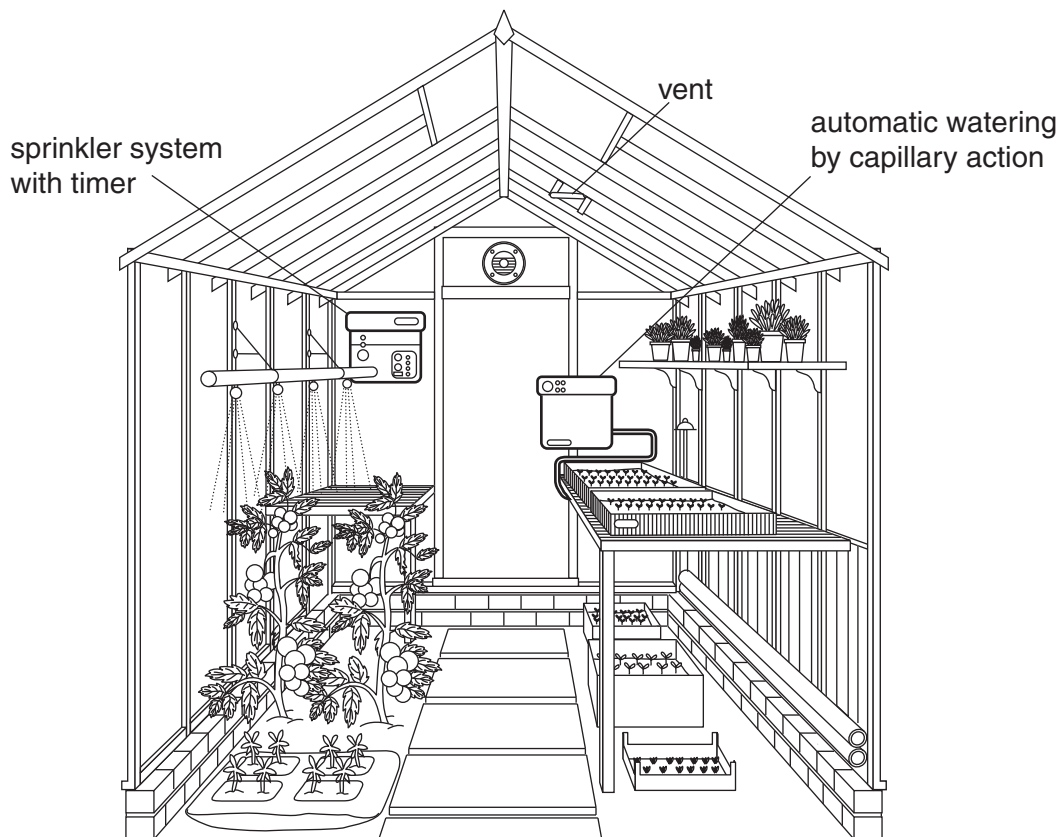
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..... [2]

11 The diagram shows a glasshouse suitable for growing plants from seed.



Closing the vents in the glasshouse would change the internal conditions.

Which **one** of the following statements about closing the vents is correct?

It would decrease...

- A ...air movement.
- B ...light.
- C ...rainfall.
- D ...temperature.

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

12 Water can be supplied to plants in the glasshouse either:

- from above by a sprinkler system
- or
- from below through capillary matting.

Select **one** of these methods and give **two** reasons for using it.

method selected

reasons

.....

.....

..... [2]

13 Jane cut forty leaves from the same plant.

She placed ten leaves in each of four different containers **A**, **B**, **C** and **D**.

The containers were maintained at different humidities.

The leaves were weighed at the start and at the end of the experiment.

The results are shown below.

| container | mass of leaves at start (g) | mass of leaf at end (g) |
|-----------|-----------------------------|-------------------------|
| A | 5.2 | 4.2 |
| B | 5.1 | 4.4 |
| C | 5.2 | 4.7 |
| D | 5.3 | 4.9 |

Which container was the most humid?

Explain your answer.

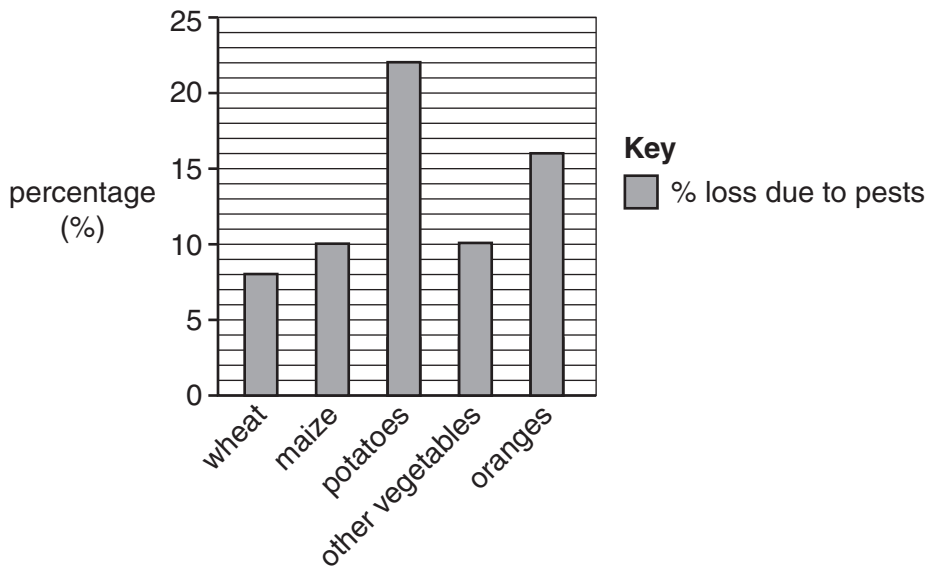
.....
..... [1]

14 The humidity in a glasshouse is controlled by opening and closing the vents.

Explain how ICT can be used to control the humidity.

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

15 The chart shows the percentage loss of different crops due to pests in 2005.



What is the difference between the largest and the smallest percentage loss?
Show your working.

..... [1]

16 Aphids are an example of a crop pest that you have studied.

Explain how aphids reduce crop yield.

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

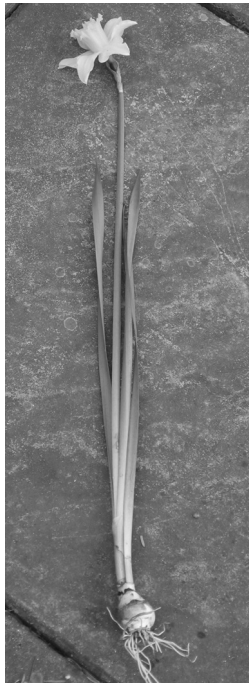
17 The ripening of fruit can be delayed after harvest by storage without oxygen.

Which of the following statements describes **one** other way in which ripening may be delayed?

- A addition of ethene
- B addition of hydrogen
- C removal of carbon dioxide
- D removal of ethene

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

18 The photo shows a daffodil.



A grower can produce more daffodils either by dividing the bulbs or collecting the seeds.

State **two** reasons why the grower might choose to produce new plants from seed.

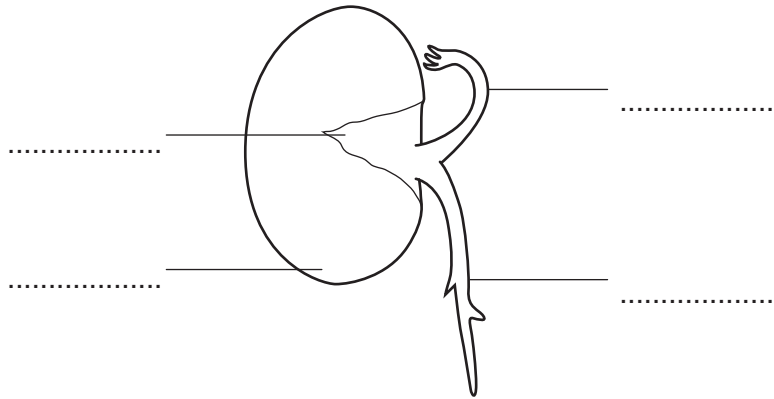
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..... [2]

19 The diagram shows a broad bean seed which is starting to germinate.



Write an **R** on the label line that points to the **radicle**.

[1]

20 Mary thinks seeds will only germinate if they are sown at the correct depth.

She wants to find out how deep to sow runner bean seeds.

Design an experiment you could carry out on a vegetable plot to investigate this.

In your answer include:

- how deep you would sow the seeds
- how many seeds you would sow
- how you would collect your results.

.....

.....

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.....

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.....

.....

..... [3]

21 State the function of the following organs.

anther

.....

.....

stigma

.....

..... [2]

22 Imogen crossed two tall pea plants.

She planted the seeds produced.

The plants grew.

$\frac{3}{4}$ of the plants were **tall**.

$\frac{1}{4}$ of the plants were **short**.

(a) What are the phenotypes of the F1 plants?

- A $\frac{3}{4}$ and $\frac{1}{4}$
- B tall and short
- C TT and tt
- D Tt and tt

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

(b) The short plants were discarded.

All the tall F1 plants were self-pollinated and their seeds were grown.

Would any short plants occur in the F2 generation?

State your reasoning.

.....

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..... [3]

END OF QUESTION PAPER

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