

**Monday 25 June 2012 – Afternoon**

**GCSE ENVIRONMENTAL AND LAND-BASED SCIENCE**

**B491/04** Plant Cultivation (Higher Tier)

Candidates answer on the Question Paper.

**OCR supplied materials:**  
None

**Other materials required:**

- Electronic calculator
- Pencil
- Ruler (cm/mm)

**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, 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.

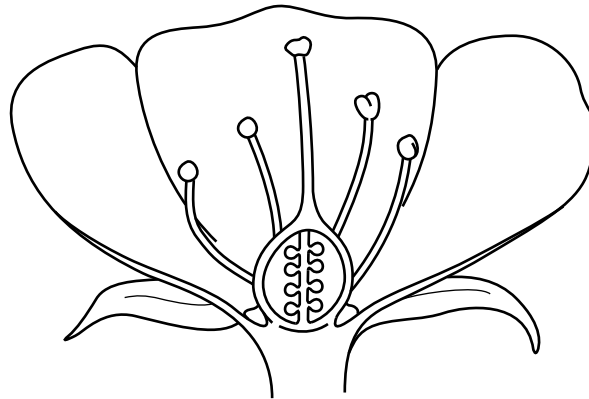
**INFORMATION FOR CANDIDATES**

- 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	
<b>TOTAL</b>	

Answer **all** the questions.

- 1 The diagram shows a section through a flower.



Complete the sentence about sepals.

The sepals ...

- A ... are where pollen lands during pollination.
- B ... are where the pollen tube grows down.
- C ... attract bees for pollination.
- D ... protect the flower whilst in bud.

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

- 2 Students are growing some plants from seed.

The students are advised to keep the plants in an area that is well ventilated.

Which of the statements about ventilation is **not** correct?

Ventilation provides ...

- A ... carbon dioxide for photosynthesis.
- B ... dry air to prevent fungal infections.
- C ... nitrogen for growth.
- D ... oxygen for respiration.

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

3 Plants can reproduce using different methods of **asexual reproduction** (vegetative propagation).

Draw lines to connect each **method** to its correct **description**.

method	description
bulbs	A horizontal above ground stem. At each node a bud grows into a new plant.
rhizomes	An underground stem. A new plant grows from a bud on this stem a short distance from the parent.
runners	A short vertical stem with overlapping leaves which are swollen with food. A new flower starts growing from the bud.

[2]

4 **Damping off** is a common disease of seedlings growing in glasshouses.

Which of the following statements about damping off is correct?

Damping off is ...

- A ... a bacterial infection most common in dry conditions.
- B ... a bacterial infection most common in humid conditions.
- C ... a fungal infection most common in dry conditions.
- D ... a fungal infection most common in humid conditions.

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

5 Pollination in plants is followed by fertilisation.

Which **two** of these statements about fertilisation in plants are **not** correct?

Put ticks (✓) in the boxes next to the two statements which are **not** correct.

The pollen grain lands on the stamen.

The pollen tube grows down the style.

The pollen nucleus fertilises the ovule.

The ovule is contained within the ovary.

The ovule develops into the fruit.

The seed develops in the fruit.

[2]

- 6 A student notices that some of the plants in the school greenhouse have got yellow leaves with dead spots.



The student thinks that the plants are deficient in a major nutrient.

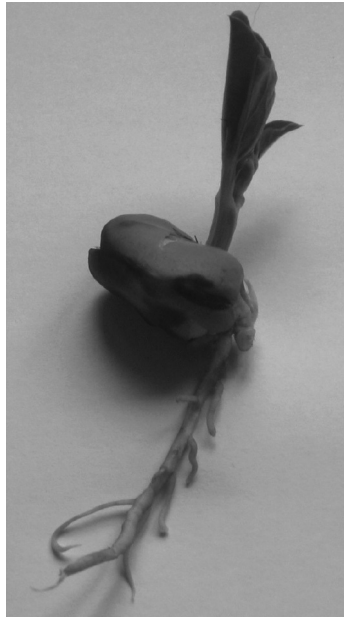
In order to confirm which nutrient is deficient the student should look for **other** symptoms.

Which symptoms should the student be looking for?

- A small leaves and stunted growth
- B few flowers and fruits
- C limited root growth
- D long spindly stems

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

7 The photograph shows a broad bean seed which is germinating.



Choose the correct terms from this list to complete the sentences below.

**testa**      **cotyledon**      **plumule**      **radicle**

When a broad bean seed germinates:

1. The seed absorbs water and swells causing the ..... to burst.
2. The ..... grows downwards forming the root.

[2]

8 Students grow bedding plants to sell to their friends and family.

The students want to keep a record of their enterprise for future use.



List **two** important pieces of information about the enterprise that the students might record on their computer.

1 .....

2 .....

[2]

9 Pea plants can have seeds that are either green or yellow.

The allele for green seeds is dominant over the allele for yellow seeds.

(a) A pea plant with green seeds was crossed with a pea plant with yellow seeds.

Half the F1 generation have green seeds and half have yellow seeds.

What are the **genotypes** of the parents?

..... [1]

(b) Explain your answer.

.....

.....

..... [1]

10 A team of scientists are researching the best way to grow potatoes.

They cover half of the ground with a fleece blanket.

Soil temperature under the fleece is 2 °C warmer than without the fleece.

They weigh the potatoes at harvest.

The results are shown below.

year	yield without fleece (tonnes/hectare)	yield with fleece (tonnes/hectare)	increase in yield with fleece (tonnes/hectare)
2006	16.89	19.40	2.51
2007	18.96	24.04	5.08
2008	19.11	23.59	4.48
2009	3.44	17.84	14.40

(a) The scientists repeated the experiment for four years.

Suggest **one** reason for this.

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

(b) Calculate the mean increase in yield of potatoes with the fleece over the four years.

Answer ..... tonnes/hectare [1]

(c) The increase in yield with the fleece was much greater in 2009 compared with the other years.

Suggest **one** reason for this.

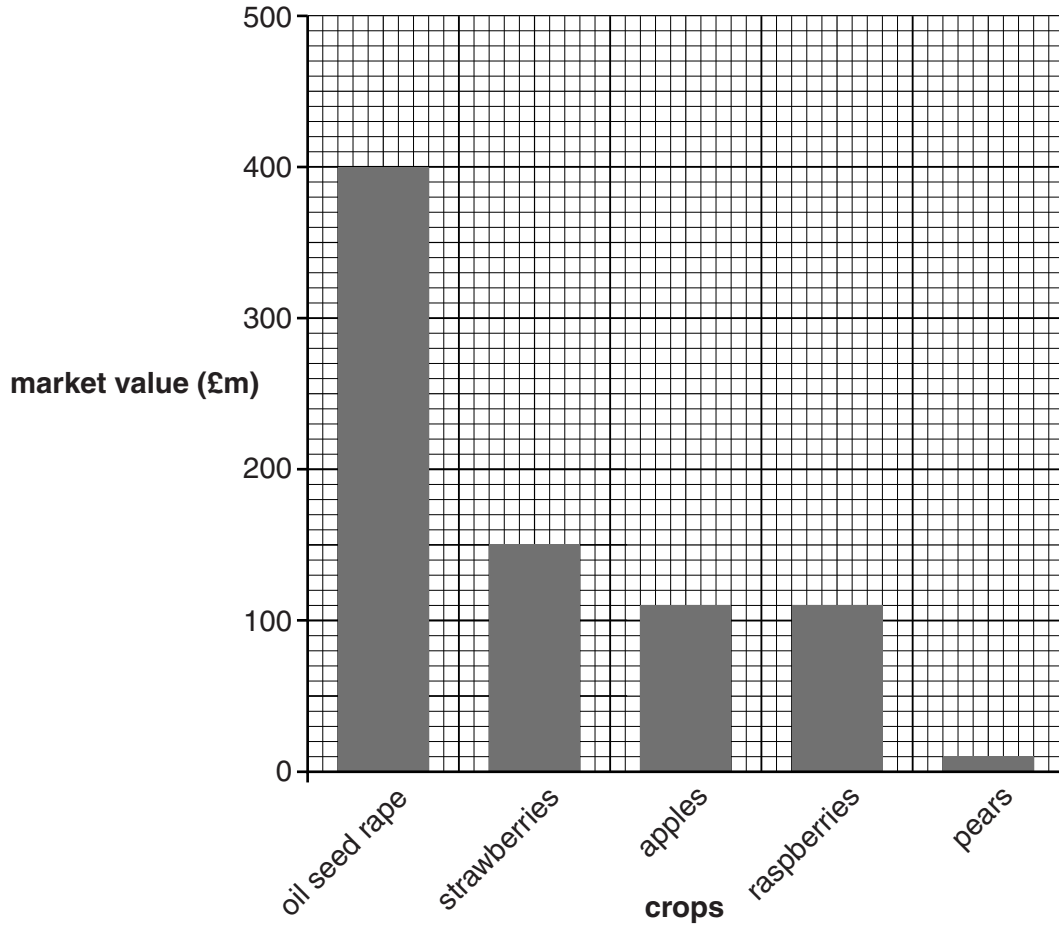
.....  
 ..... [1]



11 Honeybees are very important for pollinating crops.

Without honeybees, the yield of some crops would be reduced.

The graph shows the UK market value of honeybees in the production of some crops.



The market value of honeybees when growing oil seed rape is greater than when growing pears.

How many times greater?

- A 40 times
- B 100 times
- C 390 times
- D 400 times

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

12 Oil seed rape was grown in three different ways.

The yield and pollination efficiency were calculated.

The results are shown below.

	<b>yield (kg/hectare)</b>	<b>pollination efficiency (%)</b>
grown in a cage with bees	1113	62.6
grown in a cage without bees	32	12.4
grown in an open field	674	46.7

Describe the results in the table.

Suggest reasons for these results.

.....

.....

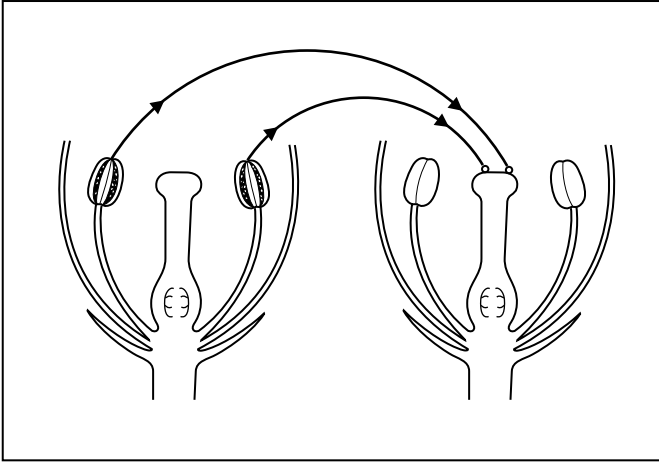
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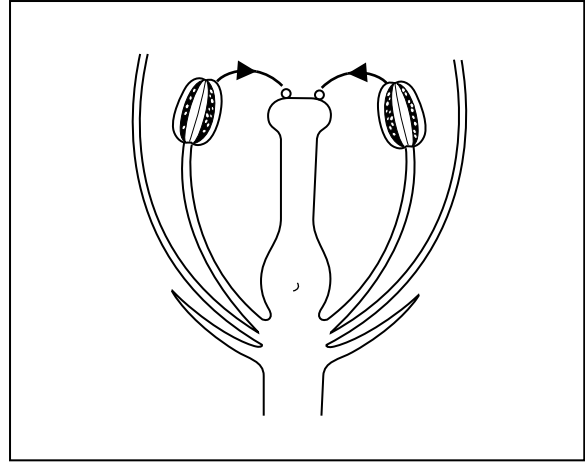
..... [3]

13 The diagrams show two methods of pollination.

method A



method B



State one **disadvantage** of each method of pollination.

**method A** .....

.....

**method B** .....

.....

[2]

14 The photograph shows a pea plant.

Peas are legumes.



A gardener wants to apply some fertiliser to her pea plants.

She knows that she should use fertiliser with the ratio 2:1:1 on her cabbages because it contains high levels of nitrate.

(a) What fertiliser ratio would you recommend for her peas?

..... [1]

(b) Explain the reason for your answer.

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

15 Lime is often used by farmers to improve the soil.

Using lime reduces the acidity of clay soil and also increases its **drainage** and **fertility**.

Explain how the drainage **and** fertility of clay soil are increased by using lime.

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

16 A grower compared two methods of watering shrubs in a garden centre.

The shrubs were monitored over 6 years.

The results are shown in the table.

method of watering	water used (litres)	weeks for a batch of shrubs to reach marketable size	installation cost (£)	sales of shrubs over 6yrs (£)
mist nozzles	7733	39	1000	8 000
capillary matting	2720	28	5500	15 000

(a) The shrubs grown with capillary matting made more money.

Taking into consideration the installation costs, how much **more** money did these shrubs make compared with shrubs grown under mist nozzles?

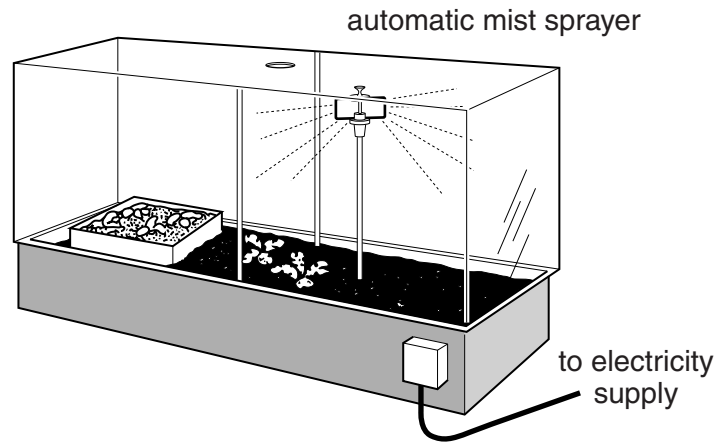
Answer £ ..... [1]

(b) How many batches of shrubs can the grower produce over 6 years when watering by **mist nozzles**?

Answer ..... [1]

17 Many growers use mist propagation systems for rooting cuttings.

The high humidity increases the success rate.



Explain why high humidity in a mist propagator helps cuttings to root more successfully.

.....

..... [1]

18 Food can be transported long distances by ship.

Storage conditions in the ship are carefully controlled.

For a named fresh fruit or vegetable, describe and explain the storage conditions in the ship, which will ensure that the food arrives in the UK ready to eat.

name of fresh fruit or vegetable .....

.....

.....

.....

.....

.....

..... [3]

Turn over for question 19.

19 Some plants in the school greenhouse are covered in insects called whitefly.

A technician is going to spray the plants with pesticide.

If they are not applied correctly, pesticides can cause damage to humans and the environment.



Write a list of safety instructions for the technician.

You must include a reason for each instruction.

.....

.....

.....

.....

..... [3]

**END OF QUESTION PAPER**



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