

|                           |  |                          |  |
|---------------------------|--|--------------------------|--|
| <b>Candidate Forename</b> |  | <b>Candidate Surname</b> |  |
|---------------------------|--|--------------------------|--|

|                      |  |  |  |  |  |                         |  |  |  |  |
|----------------------|--|--|--|--|--|-------------------------|--|--|--|--|
| <b>Centre Number</b> |  |  |  |  |  | <b>Candidate Number</b> |  |  |  |  |
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**B491/02**

**ENVIRONMENTAL AND  
LAND-BASED SCIENCE**

**Plant Cultivation  
(Higher Tier)**

**MONDAY 28 JUNE 2010: Morning**

**DURATION: 45 minutes**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**Candidates answer on the Question Paper**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Electronic calculator**

**Pencil**

**Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **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.**
- **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).**

## **INFORMATION FOR CANDIDATES**

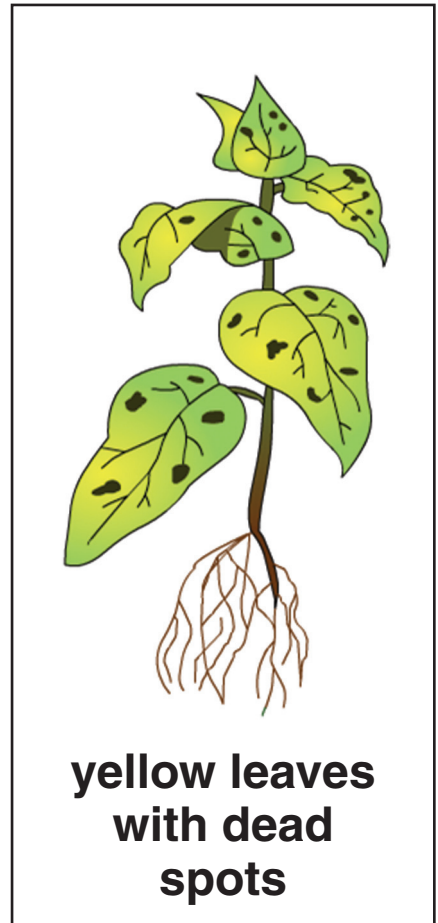
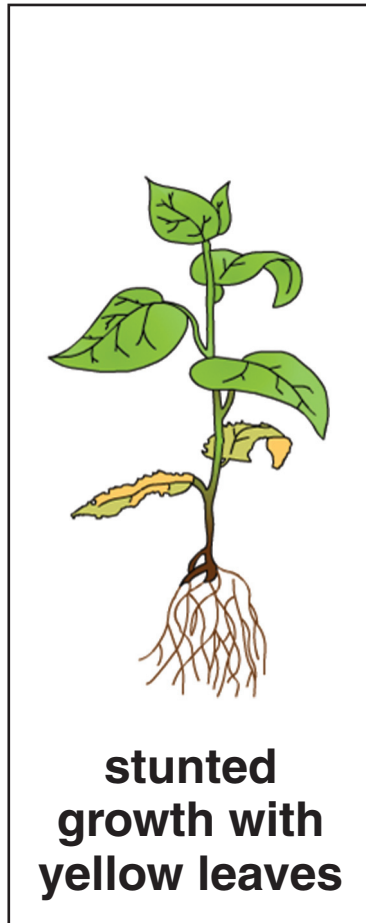
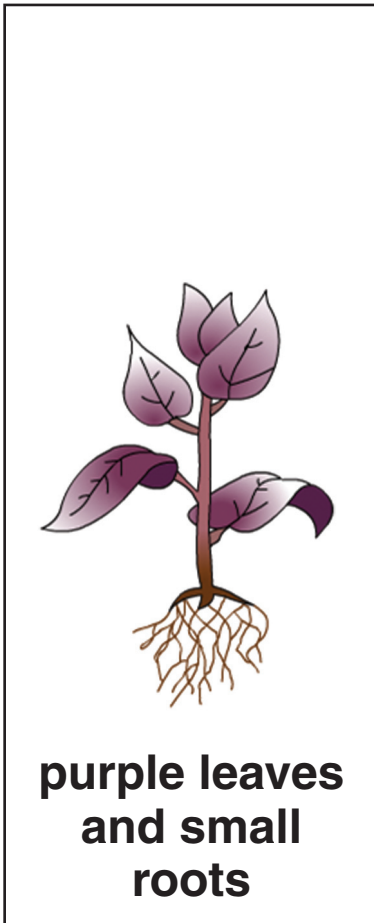
- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **The total number of marks for this paper is 36.**

**BLANK PAGE**

Answer ALL the questions.

- 1 The diagram below shows plants with different mineral deficiencies.

Draw a straight line to link the plant and the mineral it is lacking.



nitrate (N)

phosphate (P)

potassium (K)

[2]

**2 A geranium plant has 28 chromosomes in each leaf cell.**

**How many chromosomes would it have in a pollen cell (gamete)?**

**A 7**

**B 14**

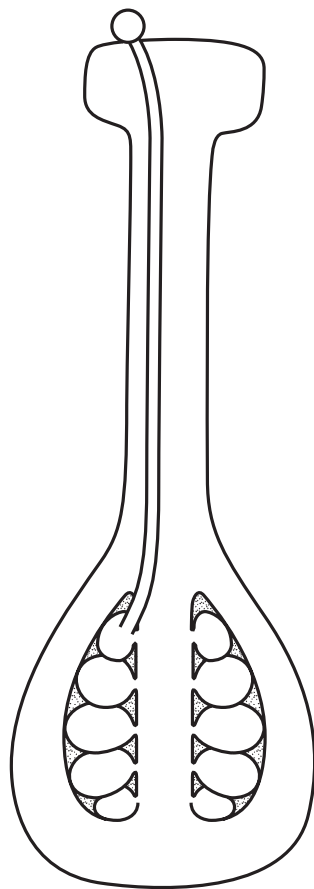
**C 28**

**D 56**

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

**3 In flowering plants, fertilisation takes place after pollination.**

**The diagram shows what happens.**



**Put a ring around the correct word to complete the sentences below to explain the process of fertilisation in flowering plants.**

**After pollination, the**

**POLLEN GRAIN NUCLEUS SEED SAC travels  
down the style.**

**It fertilises the CARPEL OVULE OVARY SEED.**

**After fertilisation, the ovary will develop into**

**the FRUIT RHIZOME SEPAL SEED. [3]**

**4 Gardeners often add lime to their soil.**

**Which one of the following statements about lime is NOT true?**

**Lime...**

- A ...decreases soil pH.**
- B ...encourages earthworms.**
- C ...improves the crumb structure of clay soils.**
- D ...increases the availability of calcium for plants.**

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

**5 Some plants have organs for vegetative propagation (asexual reproduction).**

**Complete the table using the terms below.**

| <b>ORGAN SHOWN</b> | <b>METHOD OF ARTIFICIAL PROPAGATION</b> |
|--------------------|---|
|                    |   |

**bulb**

**collect seeds then replant them next year**

**rhizome**

**peg down runners until they root in soil**

**runner**

**remove the bulblets from the base of the parent and pot in compost**

**tuber**

**split clumps then cut into sections**

**[2]**



**6 Organic fertilisers can be added to the soil to improve crop growth.**

**Which of the following is an advantage of ORGANIC fertilisers?**

**Organic fertilisers**

- A do not cause pollution.**
- B contain equal quantities of NPK.**
- C improve the crumb structure of the soil.**
- D are easy to store and apply.**

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

**7 Root crops such as carrots often deteriorate during storage.**

**Their storage life can be extended using the correct conditions.**

**Suggest, with reasons, THREE conditions that would extend the storage life of the carrots.**

**1** \_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_

**3** \_\_\_\_\_

\_\_\_\_\_ **[3]**

8 Louise wants to grow some sweet corn on her allotment.

A book advises her to plant the sweet corn in a

square  rather than

a row 

Explain why this is necessary if she wants the flowers of the sweet corn to be pollinated.

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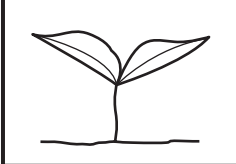
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[2]

- 9 The diagram shows instructions for growing runner beans.

**RUNNER BEANS 'ENORMA'**

An established favourite that produces good yields of long, tasty, straight, smooth pods.



Young Seedling

sow indoors    
  plant out  
 sow outdoors    
  harvest

| J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |   |   |   |

80%  
**GERMINATION  
GUARANTEED**

**OUTDOOR SOWING:**  
Sow seeds in a prepared seed bed with 12cm between each seed, in rows 45cm apart. Keep moist and weed free.

40 seeds £1.20

Harry has £10 to spend on seeds.

- (a) How many packets of seeds can he buy?

\_\_\_\_\_ [1]

- (b) Calculate the minimum number of plants he can expect to grow using the information on the packet.

\_\_\_\_\_ [1]

10 A grower notices that planting carrots different distances apart has an effect on yield.

He monitors the growth of carrots and weeds.

The table shows his results.

|                            |         | ROW SPACING |       |
|----------------------------|---------|-------------|-------|
|                            |         | 60 cm       | 30 cm |
| YIELD (kg/m <sup>2</sup> ) | CARROTS | 2.4         | 3.4   |
|                            | WEEDS   | 0.8         | 0.4   |
| COVER (%)                  | CARROTS | 63.4        | 90.9  |
|                            | WEEDS   | 14.0        | 5.1   |

(a) Describe the relationship between row spacing and carrot yield.

\_\_\_\_\_ [1]

(b) Suggest TWO reasons for the difference in carrot yield.

Use information from the table.

1 \_\_\_\_\_

2 \_\_\_\_\_ [2]

**11 A scientist is investigating the effect of weeds on the yield of carrots.**

**She grew carrots in two different ways as shown in the table.**

**She sowed all the seeds on the same date.**

| <b>TREATMENT</b>                       | <b>MEAN MASS PER CARROT (g)</b> |
|--|---------------------------------|
| <b>carrots sown with no weeds</b>      | <b>156</b>                      |
| <b>carrots and weeds sown together</b> | <b>61</b>                       |

**The mean mass per carrot is greater if the carrots are sown with no weeds compared with when carrots and weeds are sown together.**

**Which of the following shows the percentage increase in the mean mass per carrot when the two treatments are compared?**

- A  $61/156 \times 100 = 39.1\%$**
- B  $61/95 \times 100 = 64.2\%$**
- C  $95/61 \times 100 = 155.7\%$**
- D  $156/61 \times 100 = 255.7\%$**

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

12 The diagram shows three common fertilisers.

They each have different plant nutrient ratios.



**A**



**B**



**C**

A farmer wants to improve the growth of carrots in a field.

Which fertiliser would you recommend and why?

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[2]

**13 (a) What is meant by the term phenotype?**

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[1]

**(b) What determines phenotype?**

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[1]

**14 The diagram shows a wind pollinated flower.**



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

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[1]



**15 The garden pea can produce seeds that are either green or yellow.**

**A pure breeding pea with green seeds (GG) is crossed with a pure breeding pea with yellow seeds (gg).**

**All plants in the F<sub>1</sub> generation have green seeds.**

**The plants in the F<sub>1</sub> generation were crossed to produce an F<sub>2</sub> generation with a 3:1 ratio of peas with green and yellow seeds.**

**Each plant in the F<sub>2</sub> generation was allowed to SELF POLLINATE.**

**For each of the three different genotypes in the F<sub>2</sub> generation, state the genotypes and phenotypes of THEIR offspring.**

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**[3]**

**16 A humid atmosphere can be achieved in a glasshouse using a mist propagation unit.**

**Suggest TWO reasons why maintaining the correct level of humidity is so important.**

**1** \_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_ [2]

**17 A grower uses a computer to keep records about the plants in a large, commercial glasshouse.**

**State TWO pieces of information, other than environmental conditions, that the grower might keep about the plants.**

**1** \_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_ [2]

**18 A grower wants to make a large profit on the sale of his plants.**

**He thinks that using ICT will enable him to grow the plants more efficiently and maximise his profits.**

**Using THREE different examples, explain how using environmental monitoring sensors could help.**

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**[3]**

**END OF QUESTION PAPER**



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