

GENERAL CERTIFICATE OF SECONDARY EDUCATION
ENVIRONMENTAL AND LAND-BASED SCIENCE
Plant Cultivation (Higher Tier)

B491/02

Candidates answer on the Question Paper

OCR Supplied Materials:
None

Other Materials Required:

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

Monday 28 June 2010
Morning

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 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. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

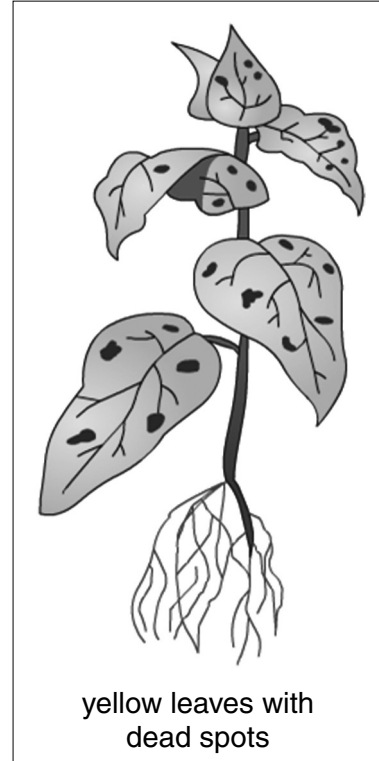
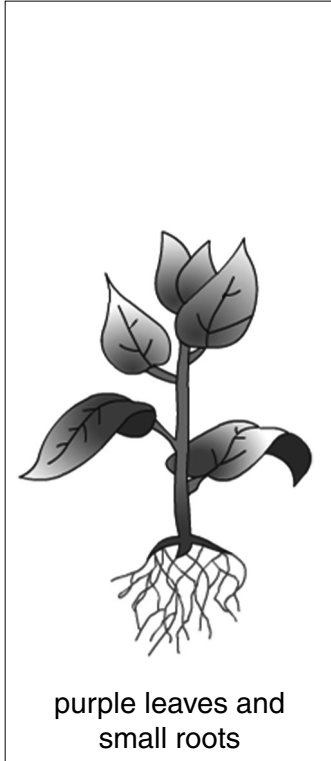
INFORMATION FOR CANDIDATES

- 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**.
- This document consists of **16** pages. Any blank pages are indicated.

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 The photograph shows a plant.



This plant has 28 chromosomes in each leaf cell.

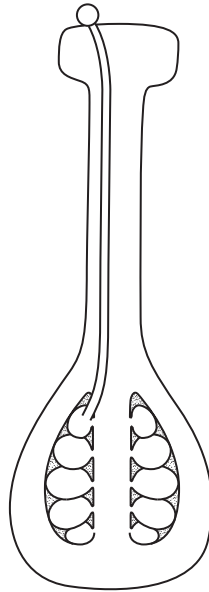
How many chromosomes would it have in a pollen cell (gamete)?

- 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 The photograph shows an organ of vegetative propagation (asexual reproduction).



Complete the table using the terms below.

organ shown	method of artificial propagation

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 The photograph shows some carrots.



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 The photograph shows part of a large field of sweet corn (maize).



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.

.....

.....


.....

..... [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

**80%
germination
guaranteed**

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

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 ²)	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.

treatment	mean mass per carrot (g)
carrots sown with no weeds	156
carrots and weeds sown together	61

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

Which fertiliser would you recommend and why?

.....

.....

.....

..... [2]

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

.....

..... [1]

(b) What determines phenotype?

.....

..... [1]

14 The diagram shows a wind pollinated flower.



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

.....

..... [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 F₁ generation have green seeds.

The plants in the F₁ generation were crossed to produce an F₂ generation with a 3:1 ratio of peas with green and yellow seeds.

Each plant in the F₂ generation was allowed to **self pollinate**.

For each of the three different genotypes in the F₂ generation, state the genotypes and phenotypes of **their** offspring.

.....

.....

.....

.....

.....

.....

..... [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 The photograph shows the inside of a large, commercial glasshouse.



The grower uses a computer to keep records about the plants.

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

1

.....

2

..... [2]

18 The photograph shows the inside of a large, commercial glasshouse.



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.

.....

.....

.....

.....

.....

.....

..... [3]

END OF QUESTION PAPER

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