OCR
RECOGNISING ACHIEVEMENT

H

GENERAL CERTIFICATE OF SECONDARY EDUCATION
ENVIRONMENTAL AND LAND-BASED SCIENCE B491/02
Plant Cultivation (Higher Tier)

Candidates answer on the question paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:
- Pencil
- Ruler (cm/mm)

Monday 17 January 2011
Morning

Duration: 45 minutes

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

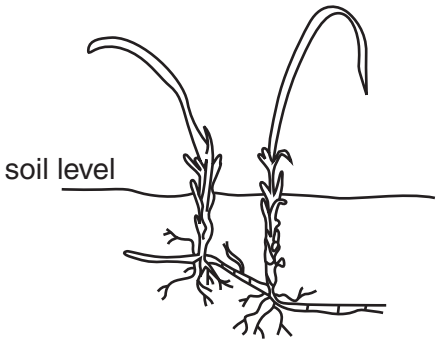
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer 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).
- Answer **all** the questions.
- 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 **20** pages. Any blank pages are indicated.

Answer **all** the questions.

1 This plant reproduces using rhizomes.



Which **one** of the following statements about a rhizome is correct?

A It produces genetically different offspring.

B It grows overground.

C It grows underground.

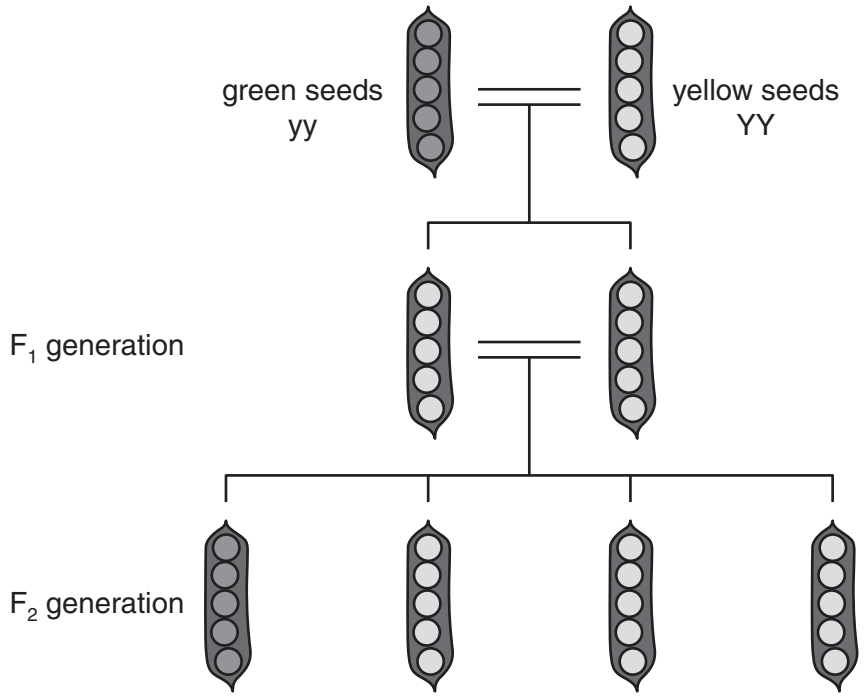
D It produces small bulblets.

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

2 Pea plants can either have yellow or green seeds.

A pea plant with yellow seeds is crossed with a pea plant with green seeds.

The results are shown below.



Which one of the following statements about the pea plants is **not** correct?

A All the F_1 generation have a genotype Yy.

B The phenotypes of the F_2 generation are YY:Yy:yy.

C Seed colour in pea plants is controlled by a single gene.

D 75% of pea plants in the F_2 generation will be yellow.

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

3 The diagram shows a fertiliser that could be added to a field of wheat.

This fertiliser was added **in excess** to a field of wheat.

What effect would this have on the crop?

A leafy growth and increased yield

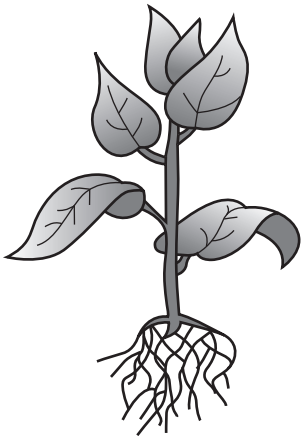
B healthy root growth and increased yield

C tall, weak stems and decreased yield

D yellow leaves and decreased yield.

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

4 The diagram shows a plant that is lacking a major nutrient.



a plant with purple leaves and short roots

Which nutrient is lacking?

A K

B Mg

C N

D P

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

5 The photograph shows tomatoes being grown in a greenhouse.

Conditions inside a greenhouse are controlled.

The conditions can be altered artificially.

Which one of the following statements is **not** correct?

A More light can increase the rate of photosynthesis.

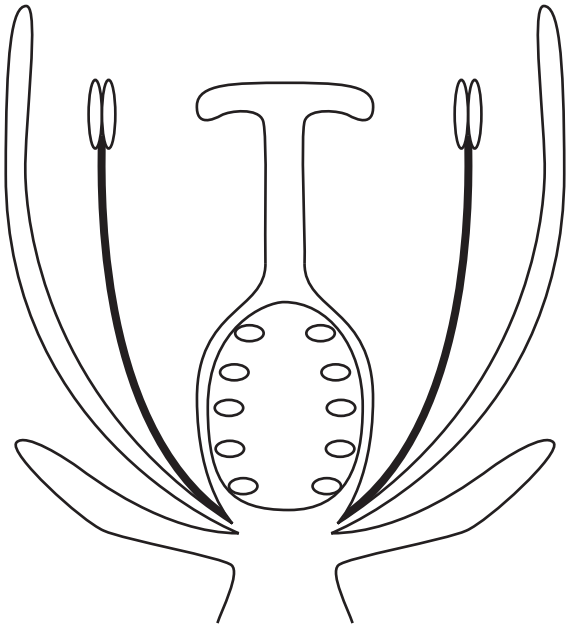
B More nutrients can increase the yield of tomatoes.

C More ventilation can increase oxygen for photosynthesis.

D More wind can increase the efficiency of pollination.

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

6 The diagram shows a flowering plant.



Write an **S** on the diagram to indicate the structure down which the pollen tube grows. **[1]**

7 The table shows some information about different types of fertilisers.

name	type	%N	%P	%K	nutrient release
chicken manure	organic	6.0	5.0	3.0	slow
bone meal	organic	4.0	20.0	0.0	slow
farmyard manure	organic	5.0	0.25	0.5	slow
leaf mould	organic	0.5	0.25	0.25	slow
growmore	inorganic	7.0	7.0	7.0	quick
potash nitrate	inorganic	15.0	0.0	10.0	quick
phostrogen	inorganic	10.0	10.0	27.0	quick

Which fertilisers contain twice as much **N** as **K**?

..... and ..... **[1]**

8 State **two** ways in which **organic** fertilisers benefit the **soil**.

1 .....

.....

2 .....

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

9 The photograph shows a summer basket.

A gardener wants to make sure that this basket produces a lot of flowers throughout the summer.

There is a choice of the following fertilisers:

10:10:10 **20:5:5** **5:20:5** **5:5:20**

Which fertiliser would you recommend? .....

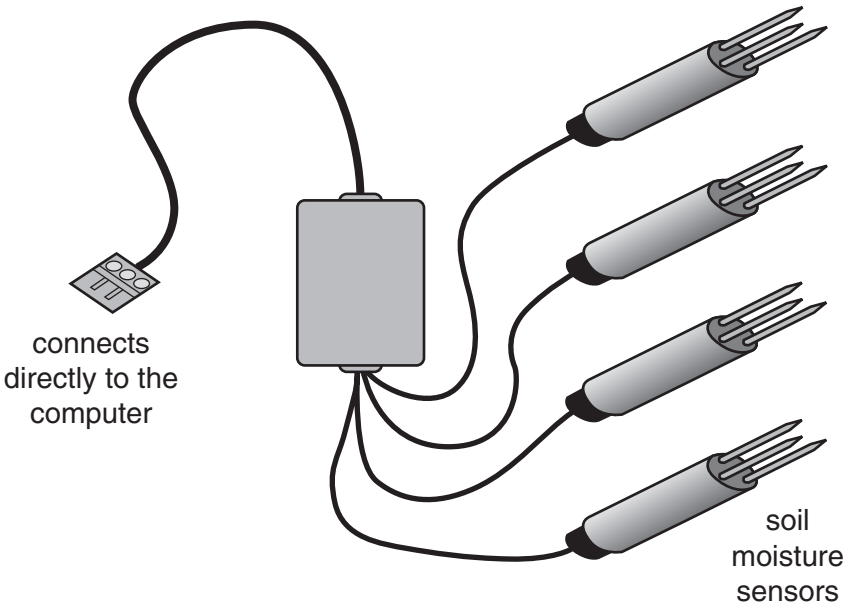
Explain your answer.

.....

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

10 ICT can be used to control the growing conditions in a glasshouse.

The diagram shows a device which can be used to monitor the moisture content of the soil.



The sensors are placed in the soil around the plants in the greenhouse.

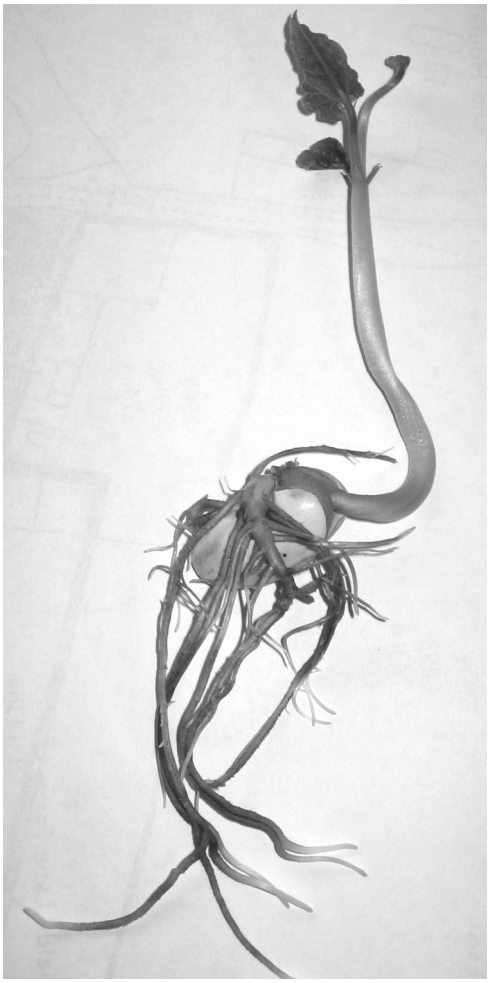
Explain how the sensors ensure that all the plants receive the correct amount of water.

.....

.....

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

11 The photograph shows a germinating bean seed.



(a) What are the cotyledons?

.....

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

(b) What is their function during germination?

.....

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

12 A gardener is going on holiday.

The gardener wants to make sure the houseplants are watered.

(a) Label the diagram using the words in the list.

capillary matting **reservoir** **water** **[1]**

(b) Explain how this watering system works.

.....

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

(c) This system saves someone having to water the plants during the holiday. State one **other** advantage of this system of watering.

.....

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

13 Some plants such as peas have flowers that self-pollinate.

Most flowers have mechanisms to help prevent this.

Suggest **two** ways that a flower can prevent self-pollination.

1 .....

.....

2 .....

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

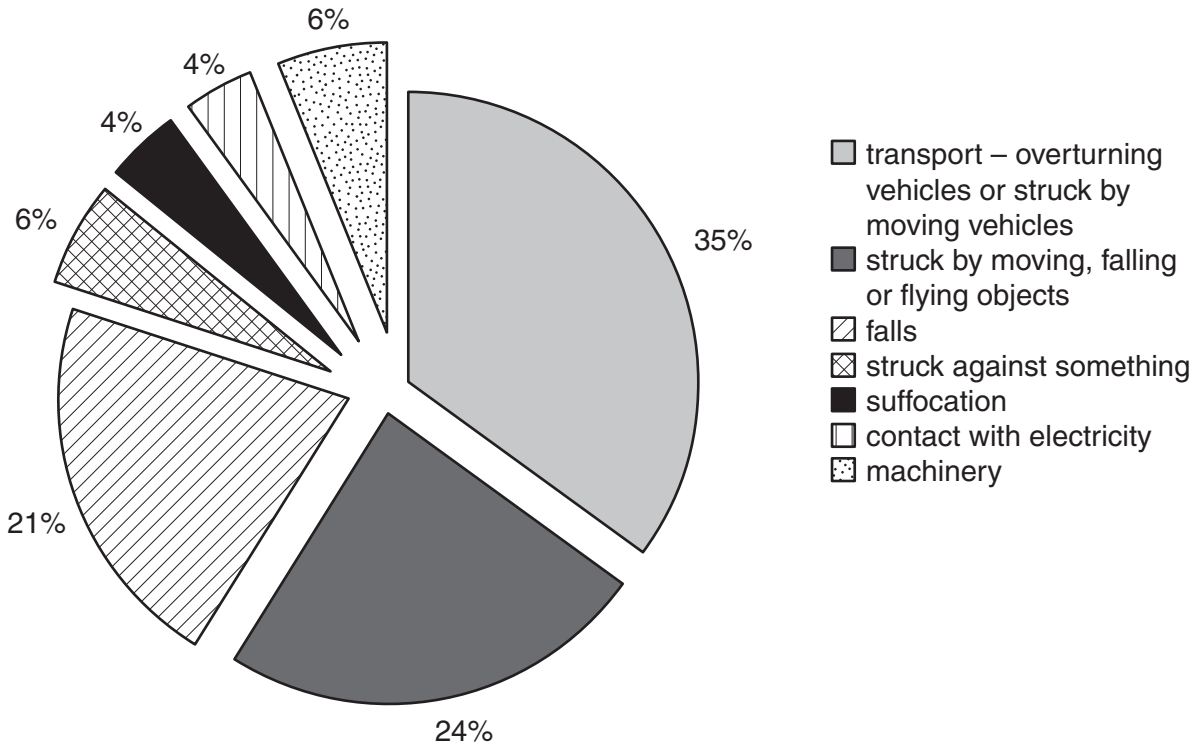
14 The table shows the number of fatal injuries that occurred in different land-based industries in 2004.

type of activity	number of fatal injuries
arable farming	2
mixed farming	21
forestry	6
horticulture	1
cattle (dairy and beef)	3
agricultural contractors	7
total	**40**

Calculate the number of fatal injuries that occurred in arable farming **and** horticulture combined as a percentage of the total injuries.

answer ..... **[1]**

15 The pie chart shows the cause of fatal injuries in land-based industries in 2008.



50 people died in 2008 whilst working in a land-based industry.

Calculate the number of people struck by moving, falling or flying objects.

answer ..... **[1]**

16 There are many hazards associated with practical work in the garden.

Write **two** risk assessments for **two** named gardening activities that you have carried out.

.....

.....

.....

.....

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

17 Peat is used in horticulture either as a soil improver or as a growing medium.

The RSPB have stated that:

- lowland peat bogs are being destroyed
- lowland peat bogs are one of Europe's rarest and most vulnerable habitats
- in the UK, 94% of lowland peat bogs have already been lost
- alternatives to peat are readily available.

The table shows the results of a survey into the quantity of peat and peat-free alternatives used in 1996 and 2006.

sector	**quantity used in m^3 per year**	
amateur gardener	**1996**	**2006**
peat	2 031 900 (94%)	2 047 800 (68%)
alternatives	115 200 (6%)	978 200 (32%)
local authority		
peat	16 200 (95%)	16 400 (57%)
alternatives	1000	12 300
private sector landscaping		
peat	26 300 (97%)	32 600 (96%)
alternatives	900	1 400

There has been a large increase in the use of peat-free alternatives in recent years.

The RSPB would be disappointed with the results of this survey.

Use data from the table to suggest why.

.....

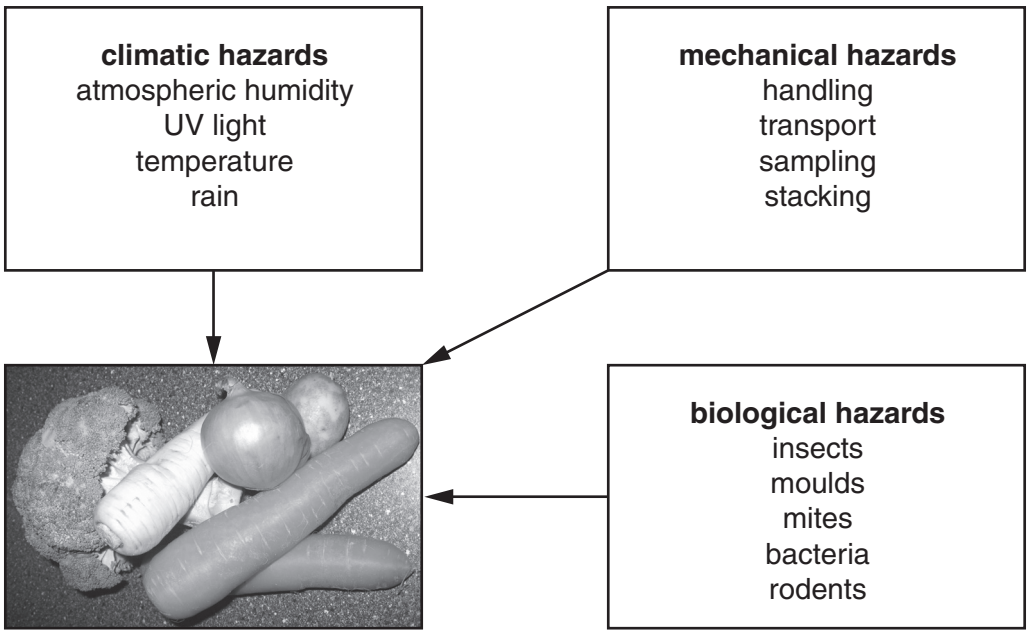
.....

.....

..... **[3]**

18 The vegetables shown have had to travel a long distance to reach the supermarket.

The boxes show the hazards that can cause these root vegetables to deteriorate.



For each type of **hazard** explain what measures could be taken to reduce vegetable deterioration.

climatic

.....

.....

mechanical

.....

.....

biological

.....

..... **[3]**

19 Flowering plants use sexual reproduction to form seeds.

There are two stages:
- pollination
- fertilisation.

(a) Describe the process of **pollination** in flowering plants.

.....

.....

.....

.....

..... **[3]**

(b) Complete the following sentences to describe fertilisation and seed production.

Choose from the list.

anther
ovary
ovule
pollen grain

The male nucleus in the ..... fuses with the female nucleus.

The ..... develops into a seed and the ..... develops into a fruit. **[3]**

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE