

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**ENVIRONMENTAL AND LAND-BASED SCIENCE**

**B682/02**

Unit B682: Plant Cultivation and Small Animal Care (Higher Tier)

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

**OCR Supplied Materials:**

None

**Duration:** 1 hour

**Other Materials Required:**

- Calculator
- 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 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.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

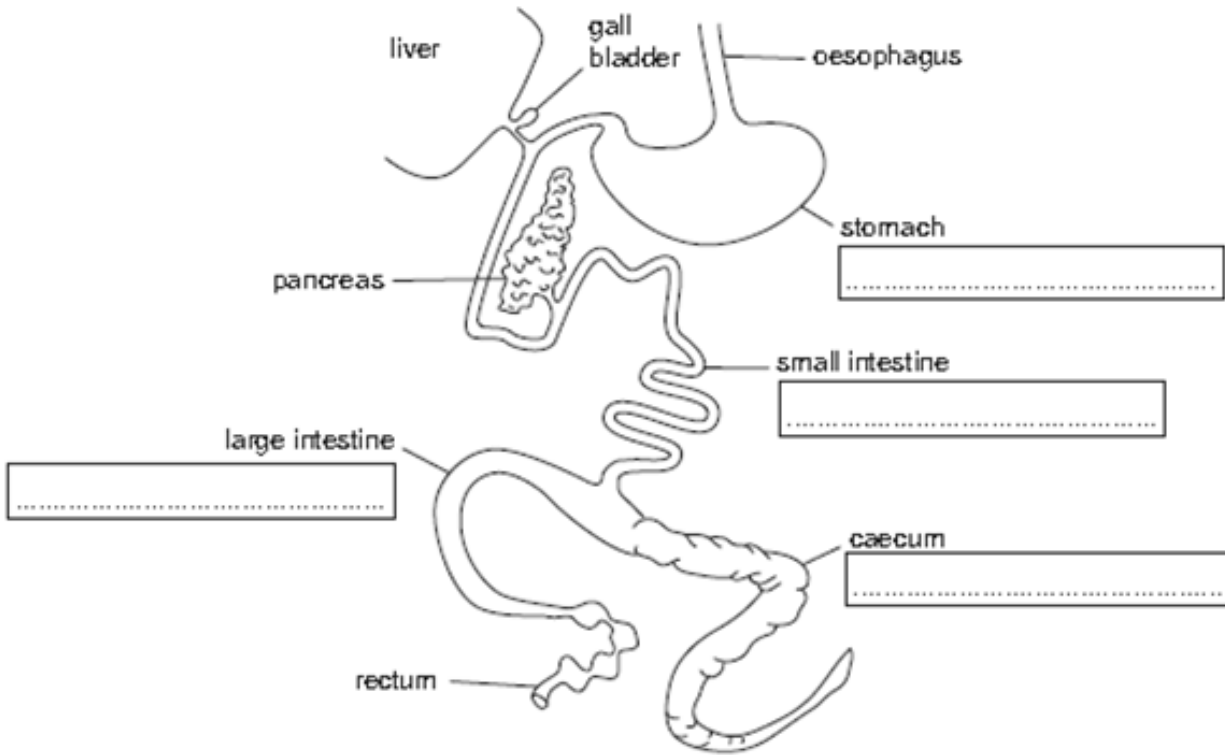
**INFORMATION FOR CANDIDATES**

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **50**.
- This document consists of **20** pages. Any blank pages are indicated.

For Examiner's Use		
	Max	Mark
1	4	
2	4	
3	6	
4	3	
5	1	
6	1	
7	6	
8	1	
9	1	
10	1	
11	3	
12	6	
13	5	
14	8	
TOTAL	50	

Answer **all** the questions.

1 The diagram shows the digestive system of a rabbit.



Write the function of the organs in the correct boxes on the diagram.

Choose from the list below.

**absorbs water**

**churns food**

**digestion of cellulose**

**digestion of fats**

**stores waste**

[4]

2 Some owners feed their cats a ration and some owners feed their cats ad-lib.

(a) Explain **one** advantage of each of these two systems of feeding.

.....

.....

.....

..... [2]

(b) The food is broken down by enzymes in the digestive system of the cat.

Explain how enzymes break down food.

.....

.....

..... [2]



4 A student investigated the conditions which affect the germination of broad bean seeds.

He planted a single broad bean seed in each of twelve plant pots.

The seeds in pots 1-6 were planted 5 cm deep and those in pots 7-12 were planted 10 cm deep.

Six of the twelve pots had the holes at the bottom sealed.

The pots were kept in a glasshouse and watered daily.

After three weeks the dry mass of each bean plant was measured.

plant pot number	dry mass (kg)
1	0.00
2	0.15
3	0.13
4	0.00
5	0.19
6	0.00
7	0.10
8	0.00
9	0.00
10	0.12
11	0.08
12	0.00

(a) Use the information in the table to suggest why six of the seeds did not germinate.

.....

.....

..... [1]

**(b)** The student concluded that planting depth has no effect on germination.

Does the evidence he collected support this conclusion?

Explain your answer.

.....

.....

.....

..... [2]

5 The diagram shows a germinating broad bean seed.



Complete the following sentence using one word from this list.

**testa   cotyledon   plumule   radicle**

When a seed germinates, the..... provides the energy needed.

**[1]**

6 This question is about the breeding of pea plants.

The following Punnet squares show different genetic crosses.

**A**

	W	W
R	RW	RW
r	rW	rW

**B**

	w	w
R	Rw	Rw
r	rw	rw

**C**

	r	r
R	Rr	Rr
r	rr	rr

**D**

	R	R
R	RR	RR
r	rR	rR

A heterozygous (hybrid) pea plant with round seeds was crossed with a homozygous (pure breeding) pea plant with wrinkled seeds.

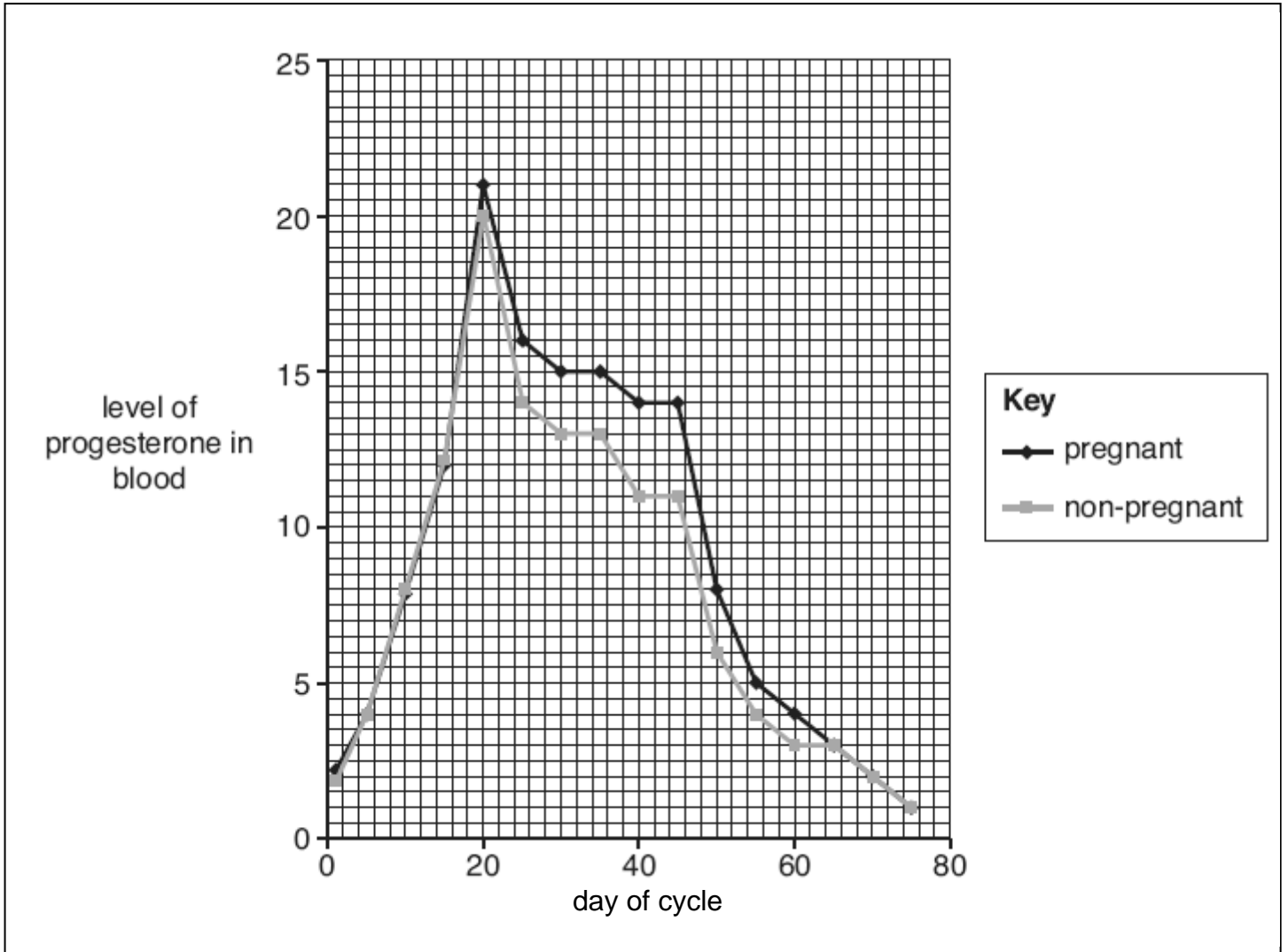
Which Punnet square shows the correct way of representing this cross?

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





- 8 The chart shows changes in the level of progesterone during a 75 day cycle in a pregnant bitch and in a non-pregnant bitch.



When carrying out a pregnancy test, the concentration of progesterone is not used.

Explain why.

.....

.....

..... [1]

9 The photograph shows the flower of a white lily.



The genes (alleles) responsible for its colour are **ww**.

What is the **phenotype** of the flower?

- A recessive
- B ww
- C w
- D white

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

10 The diagram shows a bag of fertiliser.



The fertiliser is used to improve the growth of a crop.

Which of the crops below would benefit most when this fertiliser is used?

- A cabbage
- B carrot
- C wheat
- D tomato

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

11 A researcher genetically modified some maize plants by transferring a gene from another plant species to the maize.

He wanted to carry out trials to see whether the new GM maize was resistant to aphid attack.

Maize is cross-pollinated by wind.

A local farmer objected to the trial because he said it could contaminate his own non-GM maize crop.

Explain how this could happen.

.....

.....

.....

..... [3]



**13** Some stored seed loses quality over time.

The table shows the effect of storage temperature and seed moisture content on the length of time seed can be stored.

Each column in the table is for a different seed moisture content, shown as a percentage (%).

storage temperature in °C	time (months) seeds can be stored at different seed moisture contents					
	13%	14%	15%	16%	17%	18%
5	150.0	61.0	29.0	15.0	9.4	6.1
10	84.0	35.0	16.0	8.9	5.3	3.4
15	47.0	19.0	9.2	5.0	3.0	1.9
20	26.0	11.0	5.0	2.8	1.7	1.1
25	15.0	6.0	2.9	1.6	0.9	0.9

- (a) What is the relationship between seed moisture content, storage temperature and the length of time the seed can be stored?

.....

.....

.....

..... [2]

- (b) Some seed is harvested at 15% moisture content and at a temperature of 20 °C.

It is then dried to 14% moisture content and cooled to 10 °C.

What percentage increase in storage time does this treatment produce?

.....

..... [2]

(c) Explain why storage time is increased by changing these conditions.

.....

.....

..... [1]



14 The photograph shows a new variety of fuchsia that has recently been developed. There is just one of these plants.



J. Norlin © OCR

In order to propagate this plant, the growers decide to use tissue culture.

They use sterile forceps and a sterile scalpel to cut 3-5 mm sections of stem and place them in a sterile Petri dish.

Dilute bleach solution is added.

The sections are then placed on the surface of a sterile agar plate using sterile forceps. The sides of the Petri dish are sealed with sellotape.

(a) Give **three** reasons why tissue culture is particularly suitable for propagating this fuchsia plant.

1.....

.....

2.....

.....

3.....

..... [3]

**(b)** Explain why the growers used sterile equipment, put the sections of stem in dilute bleach and sealed the agar plate.

.....

.....

.....

..... [3]

**(c)** Describe how new fuchsia plants would be produced by this technique.

.....

.....

.....

..... [2]

**END OF QUESTION PAPER**

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**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**ENVIRONMENTAL AND LAND-BASED SCIENCE**

Unit B682: Plant Cultivation and Small Animal Care (Higher Tier)

**B682/02**

**MARK SCHEME**

**Duration: 1 hour**

**MAXIMUM MARK 50**

## Guidance for Examiners

Additional guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, eg mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/ = alternative and acceptable answers for the same marking point

(1) = separates marking points

**not/reject** = answers which are not worthy of credit

**ignore** = statements which are irrelevant - applies to neutral answers

**allow/accept** = answers that can be accepted

(words) = words which are not essential to gain credit

words = underlined words must be present in answer to score a mark

ecf = error carried forward

AW/owtte = alternative wording

ORA = or reverse argument

Eg mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)

work done = 0 marks

work done lifting = 1 mark

change in potential energy = 0 marks

gravitational potential energy = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.
6. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

Eg

For a one mark question, where ticks in boxes 3 and 4 are required for the mark:

Put ticks (✓) in  
the two correct  
boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be  
worth 0 marks.

Put ticks (✓) in  
the two correct  
boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be  
worth one mark.

Put ticks (✓) in  
the two correct  
boxes.

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be  
worth one mark.

## 7. The list principle:

If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, eg one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

## 8. Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

eg If a question requires candidates to identify a city in England, then in the boxes


Edinburgh	
Manchester	
Paris	
Southampton	

**the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).**


Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question		Expected answer	Marks	Additional guidance
1		<p>clockwise from oesophagus:  churns food  digestion of fats  digestion of cellulose  absorbs water</p>	[4]	
2	(a)	<p>ration:  stops animal over eating / wasting food / eating can be controlled – because - food is measured out</p> <p>ad-lib:  easier for owners / more convenient / stops animals gorging / eating cannot be controlled – because - food always available</p>	[2]	<p><b>reject</b> references to keeping animal healthy</p> <p>must explain the advantage for each mark  answers must be linked in order to gain full credit; they must link the correct advantage to each feeding system</p>




Question		Expected answer	Marks	Additional guidance
2	(b)	breaks down chemical / peptide bonds in large food molecules / proteins to produce smaller soluble molecules / amino acids	[2]	<b>accept</b> act as a catalyst, for 1 mark
3		<p><b>[level 3]</b> Answer describes the process in detail with all stages correctly sequenced and none omitted; additional points included. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5 – 6 marks)</p> <p><b>[level 2]</b> Some details given about all the stages but additional points not included. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3 – 4 marks)</p> <p><b>[level 1]</b> Not all stages included, or not correctly sequenced, and few details given. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the information. (1 – 2 marks)</p> <p><b>[level 0]</b> Insufficient or irrelevant information. Answer not worthy of credit. (0 marks)</p>	[6]	<p><b>relevant points include:</b></p> <ul style="list-style-type: none"> <li>• identification of desired features of animal – ear length, face shape, length of coat, body size and shape, colouring etc.</li> <li>• animals with desired characteristics bred together</li> <li>• offspring selected for these characteristics</li> <li>• continued for many generations</li> </ul> <p>also credit for</p> <ul style="list-style-type: none"> <li>• idea of line breeding to 'fix' characteristics</li> <li>• avoidance of in-breeding to prevent health problems (examples for this breed could be included)</li> </ul>

Question		Expected answer	Marks	Additional guidance
4	(a)	soil was waterlogged so no air / oxygen for roots	[1]	
4	(b)	conclusion supported because same number of seeds grew at each planting depth but not enough evidence because has only used two planting depths / only 3 seeds grew at each depth	[2]	<b>allow</b> idea of no significant difference between dry masses in pots 1-6 and 7-12  answers can be given in any order
5		cotyledon	[1]	
6		<b>C</b>	[1]	

Question	Expected answer	Marks	Additional guidance
7 	<p><b>[level 3]</b> Answer includes most of the preventative / treatment methods and these are fully explained with reference to the way in which the fungus is spread. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5 – 6 marks)</p> <p><b>[level 2]</b> Answer includes some of the preventative / treatment methods but these are not fully explained. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3 – 4 marks)</p> <p><b>[level 1]</b> Answer includes a few of the preventative / treatment methods but these are not explained. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the information. (1 – 2 marks)</p> <p><b>[level 0]</b> Insufficient or irrelevant information. Answer not worthy of credit. (0 marks)</p>	<b>[6]</b>	<p><b>relevant points include:</b></p> <p>prevention</p> <ul style="list-style-type: none"> <li>• use new compost or if re-using then sterilise</li> <li>• sow seeds thinly</li> <li>• spread sand on surface of compost so surface is dry</li> <li>• ensure good drainage from seed trays</li> <li>• don't over-water</li> <li>• water from below – or avoid getting foliage wet</li> <li>• allow good ventilation through glasshouse</li> </ul> <p>treatment</p> <ul style="list-style-type: none"> <li>• use a fungicide</li> </ul> <p>explanation</p> <ul style="list-style-type: none"> <li>• disease caused by fungus</li> <li>• fungal spores can live in soil / compost for a long time</li> <li>• fungal spores are killed by heat</li> <li>• spores spread quickly though water in / on compost or where water is on foliage</li> <li>• spores also spread in the air</li> </ul>
8	The difference between the levels of progesterone in pregnant and non-pregnant bitches is not significant / only significant from 25-45 days / too similar to allow an accurate prediction	<b>[1]</b>	
9	<b>D</b> - white	<b>[1]</b>	




Question		Expected answer	Marks	Additional guidance
10		B - carrot	[1]	
11		pollen (containing the new gene) transferred / blown by wind from the GM maize to the non-GM crop; pollination and then fertilisation of non GM crop; seeds (may) now contain the new gene / gene from GM maize	[3]	answers must be linked in order to gain full credit; they must link transfer of pollen, fertilisation and development of the seeds and should be in the order specified

Question	Expected answer	Marks	Additional guidance
12 	<p><b>[level 3]</b> Well balanced and detailed answer including all advantages and disadvantages of biological pest control. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5 – 6 marks)</p> <p><b>[level 2]</b> Answer with some examples of advantages and disadvantages of biological pest control, but lacking detail. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3 – 4 marks)</p> <p><b>[level 1]</b> Answer with few advantages and disadvantages of biological pest control. May only present one side of the argument. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the information. (1 – 2 marks)</p> <p><b>[level 0]</b> Insufficient or irrelevant information. Answer not worthy of credit. (0 marks)</p>	[6]	<p><b>relevant points include:</b></p> <p>advantages:</p> <ul style="list-style-type: none"> <li>• only affect target organism / do not kill other insects</li> <li>• is not harmful to humans when sprayed / eaten</li> <li>• increased control as pests increase</li> </ul> <p>disadvantages:</p> <ul style="list-style-type: none"> <li>• wasps must be introduced early in the year (OWTTE)</li> <li>• do not kill all pests, just reduce numbers</li> <li>• may escape from the glasshouse</li> </ul>

Question		Expected answer	Marks	Additional guidance
13	(a)	the lower the moisture content the lower the temperature the longer the seeds can be stored	[2]	must link condition with storage time to gain each mark
	(b)	35.0 – 5.0 / 5.0 x100 = 600%	[2]	2 marks for the correct answer with % sign 1 mark if % sign not given or if answer incorrect but working in first line is correct
	(c)	kills / prevents breeding of pests and diseases	[1]	
14	(a)	only one plant so cannot breed will enable large number of offspring to be produced very quickly all offspring will be identical to the parent / clones	[3]	
14	(b)	to ensure aseptic conditions / so that not infected with bacteria / fungi with: bleach will kill bacteria or fungi sealing agar plates prevents infection from the air	[3]	answers must be linked in order to gain full credit; they must link experimental details given with need for aseptic conditions, but can be in this or reverse order
14	(c)	explants / stem sections produce roots and shoots (on agar plates) can be transferred to compost	[2]	<b>allow</b> reference to use of hormones

### Assessment Objectives (AO) Grid

(includes quality of written communication )

Question	AO1	AO2	AO3	Total
1	4			4
2(a)	2			2
2(b)	2			2
3 	3	3		6
4(a)		1		1
4(b)			2	2
5	1			1
6		1		1
7 	3	3		6
8		1		1
9	1			1
10		1		1
11		3		3
12 	3	3		6
13(a)		2		2
13(b)		2		2
13(c)	1			1
14(a)		3		3
14(b)		3		3
14(c)	2			2
<b>Totals</b>	<b>22</b>	<b>26</b>	<b>2</b>	<b>50</b>

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