

Environmental and Land Based Science

General Certificate of Secondary Education

Unit **B491/02**: Plant Cultivation (Higher Tier)

Mark Scheme for January 2012

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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




Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk







Annotations

Used in the detailed Mark Scheme:

| Annotation | Meaning |
|---------------------|---|
| / | 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 |

Available in scoris to annotate scripts

| | |
|---|---|
|  | indicate uncertainty or ambiguity |
|  | benefit of doubt |
|  | contradiction |
|  | incorrect response |
|  | error carried forward |
|  | draw attention to particular part of candidate's response |
|  | draw attention to particular part of candidate's response |

| | |
|---|---|
|  | draw attention to particular part of candidate's response |
|  | no benefit of doubt |
|  | reject |
|  | correct response |
|  | draw attention to particular part of candidate's response |
|  | information omitted |

Subject-specific Marking Instructions

- a. If a candidate alters his/her response, examiners should accept the alteration.
- b. 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.

E.g.

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

This would be worth 1 mark.

c. 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, e.g. 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.

d. 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.

E.g. 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 | | CBT | Answer | Marks | Guidance |
|----------|-----|-----|--|-------|---|
| 1 | | 1 | E oxygen concentration; F pH | 2 | |
| 2 | | 2 | A - bulb | 1 | |
| 3 | | 3 | B – decrease both insect pollination and wind pollination | 1 | |
| 4 | | 4 | C - reduce humidity and spray with a fungicide | 1 | |
| 5 | | 5 | D - yellow leaves and stunted growth | 1 | |
| 6 | | 6 | any one from to improve crumb/soil structure; to improve water retention/soil drainage | 1 | |
| 7 | | 7 | any one from: higher levels of NPK/nutrients; quick release; easier to apply/less bulky; known composition; free from pests or diseases | 1 | |
| 8 | | 8 | 3.75 (kg) | 1 | |
| 9 | (a) | 9 | increase % N and decrease % P and %K; any correct data used eg. P has reduced by half/ from 50-25% | 2 | must mention all three nutrients to gain the first mark |
| | (b) | 9 | 12:5:3 | 1 | accept 6:2.5:1.5 |
| 10 | | 10 | pH determines solubility of mineral ions; less uptake of insoluble minerals/minerals have to be dissolved to be absorbed; pH alters the adsorption of minerals on soil particles; greater leaching of soluble minerals from the soil/ soluble aluminium ions are toxic to plant roots | 2 | |
| 11 | | 11 | A – air movement | 1 | |

| Question | | CBT | Answer | Marks | Guidance |
|----------|--|-----|---|-------|------------------------------|
| 12 | | 12 | <p>capillary matting two from: does not cause leaf scorching; constant supply of water; easy to install/cheap; does not lead to increase in fungal diseases due to humidity; water is supplied directly to the roots; doesn't waste water</p> <p>or sprinkler system two from: high humidity reduces water loss/transpiration/maintains leaf turgor; soil does not become waterlogged; can cover larger areas; more control</p> | 2 | |
| 13 | | 13 | D - because it lost the least water/transpired less | 1 | |
| 14 | | 14 | idea of sensor picking up information; idea of computer sending information to open and close the vents | 2 | |
| 15 | | 15 | 14 (%) | 1 | |
| 16 | | 16 | any two from: suck sap/ remove sugars/nutrients; reduce sugar/energy available for growth; aphids carry viruses/ spread disease; encourages growth of sooty mould | 2 | reject eat the leaves |
| 17 | | 17 | D - removal of ethene | 1 | |

| Question | | CBT | Answer | Marks | Guidance |
|--------------|-----|-----|--|-----------|--|
| 18 | | 18 | any two from: offspring will be genetically different/ produce new combinations of characteristics; offspring will not all be susceptible to the same diseases; larger number of offspring; seeds can be stored for longer | 2 | |
| 19 | | 19 | radicle labelled on the bottom right | 1 | |
| 20 | | 20 | any three from: grows at three or more depths; sows at least three seeds at each depth; determine the number of seeds which germinate; keep all other variables/ named variable the same | 3 | accept growth for germination |
| 21 | | 21 | anther - produces pollen (1) stigma - collects/catches pollen (1) | 2 | |
| 22 | (a) | 22 | B - tall and short | 1 | |
| | (b) | 23 | yes some of the tall plants will be heterozygous/ contains a recessive allele for short growth; crossing 2 heterozygous tall plants will result in some short plants; short plants are homozygous/double recessive/tt; 1 in 4 short : tall; self pollinating TT results in all tall offspring | 3 | no mark for yes or no only 1 mark awarded for Punnett square, unless fully annotated to gain all three marks, students must refer to alleles not genes |
| Total | | | | 36 | |

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

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