



## RHS LEVEL 2 CERTIFICATE IN HORTICULTURE

**Wednesday 16 February 2011**  
**10.00am – 11.30am**

### **HORTICULTURE I – Planning, Principles & Production**

#### **Section 1 – Short Answer Questions**

Candidate Number: .....

Candidate Name: .....

Centre Number/Name: .....

**IMPORTANT - Please read carefully before commencing:**

- i) The duration of the papers in Horticulture I is **1½ hours**;
- ii) **ALL** questions should be attempted in Section 1;
- iii) **EACH** question carries **2 marks**;
- iv) Write your answers legibly on the lines provided;
- v) Use metric measurements **ONLY**;
- vi) Where plant names are required, they should include genus, species and where appropriate, cultivar.

Please turn over .....

ALL questions should be attempted.

Marks

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**Q1** Define **EACH** of the following terms in relation to garden plants and give **ONE NAMED** example for **EACH**:

- i) 'woody perennial';
- ii) 'hardy annual'.

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**Q2** a) Define 'dehiscent fruit'.

b) Name **ONE** plant example.

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**Q3** State the function of the following:

- i) 'epidermis';
- ii) 'lenticel'.

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Marks

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**Q4** a) Define the term 'tepal'.

b) Name **TWO** examples of plants with tepals.

**2**

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**Q5** Define the following terms in relation to roots:

**2**

<b>Adventitious</b>	
<b>Lateral</b>	
<b>Tap</b>	
<b>Fibrous</b>	

**Q6** Define the following:

- i) 'apical bud';
- ii) 'adventitious bud'.

**2**

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**Q7** State **THREE** specific conditions required for the successful germination of seeds of half-hardy annual plants.

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**Q8** a) Define the term 'simple layering'.  
b) **NAME ONE** plant that is usually propagated in this way.

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**Q9** State **THREE** factors which should be taken into account when harvesting the seed of **ONE NAMED** woody perennial plant.

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Marks

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- Q10** Complete the table below to show how the waste materials listed can be dealt with in **FOUR** different environmentally friendly ways.

**2**

Waste Material	Treatment
Annual weed	
Plastic pots and other containers	
Plastic bags	
Woody prunings	

- Q11** State **TWO** benefits of double digging a vegetable plot.

**2**

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- Q12** Define the term 'intercropping' and give **ONE NAMED** example of a crop used.

**2**

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Please turn over .....

**Q13** List **FOUR** potential hazards relating to boundaries that should be assessed when planning a garden.

2

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**Q14** Define the term ‘triangulation’ in relation to surveying a garden.

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**Q15** List **FOUR** user requirements that might be considered when preparing a basic garden plan.

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## **RHS LEVEL 2 CERTIFICATE IN HORTICULTURE**

**Wednesday 16 February 2011**  
**10.00am – 11.30am**

### **HORTICULTURE I – Planning, Principles & Production**

#### **Section 2 – Structured Questions**

**IMPORTANT - Please read carefully before commencing:**

- i) The duration of the papers in Horticulture I is **1½ hours**;
- ii) Any **THREE** questions in Section 2 should be attempted;
- iii) **EACH** question carries **10 marks**;
- iv) Start **EVERY** new question on a separate answer booklet;
- v) Use metric measurements **ONLY**;
- vi) Where plant names are required, they should include genus, species and where appropriate, cultivar.



Answer **THREE** questions from this section.

		Marks
<b>Q16</b>	a) Describe <b>FIVE</b> differences between a gymnosperm and a angiosperm.	<b>5</b>
	b) Using <b>NAMED</b> plant examples, state <b>FIVE</b> reasons why it is important to use botanical nomenclature in horticulture.	<b>5</b>
<b>Q17</b>	a) List <b>SIX</b> components of a typical plant cell.	<b>3</b>
	b) Describe the function of <b>FOUR</b> of the components listed in a).	<b>4</b>
	c) Describe the role of plant meristems and state the location where they are found.	<b>3</b>
<b>Q18</b>	a) State <b>FOUR</b> benefits of propagating plants from seed.	<b>2</b>
	b) State <b>FOUR</b> limitations of propagating plants from seed.	<b>2</b>
	c) Describe how <b>TWO</b> of the limitations stated in b) may be overcome in horticultural practice.	<b>6</b>
<b>Q19</b>	Describe the advantages to the plant propagator of <b>EACH</b> of the following techniques:	
	i) leaving shrub seed outdoors over winter;	<b>2</b>
	ii) sanding seeds with hard seed coats;	<b>2</b>
	iii) use of virus free mother plants for cuttings;	<b>2</b>
	iv) use of juvenile growth for cuttings;	<b>2</b>
	v) grafting.	<b>2</b>

Please see over .....

**Q20** Describe **ONE** method of cultivation for an outdoor tomato crop using **EACH** of the following headings:

- |      |   |          |
|------|---|----------|
| i)   | plant propagation;                                  | <b>3</b> |
| ii)  | plant nutrition;                                    | <b>2</b> |
| iii) | plant support;                                      | <b>2</b> |
| iv)  | harvesting;   | <b>1</b> |
| v)   | <b>ONE</b> pest and <b>ONE</b> disease of the crop. | <b>2</b> |

**Q21** Describe **FIVE** factors to consider when planning a garden for **EACH** of the following uses:

- |     |                    |          |
|-----|--------------------|----------|
| i)  | plant collections; | <b>5</b> |
| ii) | wildlife.          | <b>5</b> |

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## RHS LEVEL 2 CERTIFICATE IN HORTICULTURE

**16 February 2011**

### **Horticulture I**

<b>Candidates Registered</b>	529	<b>Pass with Commendation</b>	85 (26.4%)
<b>Candidates Entered</b>	322	<b>Pass</b>	122 (37.89%)
<b>Absent/Withdrawn/Deferred</b>	207	<b>Fail</b>	115 (35.71%)
<b>Total Candidates Passed</b>	207 (64.29%)		

#### Senior Examiner's Comments:

1. Candidates should be able to demonstrate a good range of plant knowledge and be able to give accurately named plant examples where appropriate. Common names and generic names are often too vague and cannot be rewarded in the positive manner that genus, species and, where appropriate, variety/cultivar can. This is particularly important when answering questions relating to particular (named) plant(s). Marks can only be awarded for these narratives where the example(s) are correctly and fully identified.
2. Candidates must be able to display accurate knowledge of the technical terms and concepts detailed in the syllabus, in the context of horticulture, and are aware that wider interpretation will not be rewarded. The examination should be regarded as a possible introduction to higher level studies, which will only be open to those who are in possession of a clear understanding of the horticultural terms and concepts which are current.
3. The introductory rubric given on the first page of the question paper should be read carefully by candidates. At each examination there are a significant number of candidates who ignore or misread the instructions given and consequently may not perform as well as they could have done. This is particularly so where candidates answer either more questions or more parts to a question than are required.
4. Candidates should pace themselves during each paper. The most successful candidates allow sufficient time to read the question thoroughly before answering it and also take time to read through their answers. They should take care to write as legibly as possible, so that the examiner is in no doubt about what is intended.
5. Candidates need to interpret key words within questions, particularly those such as 'state', 'list' and 'describe'. Questions requiring descriptions or explanations obviously require a more detailed answer than those requiring a list.

6. In the short answer sections it is important to ensure that responses are to the point and contained within the space allocated. Candidates should bear in mind that small sketches might be used to convey information more succinctly than words.
7. Successful candidates ensure that their answers to structured questions are focussed and to the point. It is disappointing when they cannot be rewarded for their efforts because the answer is irrelevant to the particular question. Candidates should take note of the mark allocation for specific sections and allocate their time and efforts accordingly.
8. Diagrams in structured questions can enhance an answer and, where appropriate, can replace detailed descriptions. They should be large, clear and well annotated, and preferably in pencil. Colour may be used successfully but only where it is relevant to the answer.
9. In each examination, it is clear that some candidates are ill prepared to answer papers of the type set. It is essential that candidates have the opportunity to practice both short and structured questions. Ideally some papers should be answered in a time-constrained situation.
10. Candidates should be aware of the reading list of suggested books for the RHS (Level 2) Certificate in Horticulture which is available from the Qualifications Section and can also be found on the RHS website together with past examination papers.

### Examiners' Comments:

#### Section 1 - Short Answer Questions

Marks

**Q1** Define **EACH** of the following terms in relation to garden plants and give **ONE NAMED** example for **EACH**:

i) 'woody perennial';

ii) 'hardy annual'.

2

i) A good proportion of candidates were able to correctly identify a woody perennial as a plant which has a life cycle of more than two years which maintains living stems from one growing season to the next. Better answers also mentioned the concept of secondary thickening. However, some rather sketchy responses were also seen where, for example, woody perennials were given a fixed life span, while others wrongly stated that the life cycle was completed every year for three or more years. Any example of a true tree or shrub was acceptable, but not of herbaceous perennial plants with a woody base for example *Penstemon* spp.

ii) Many candidates correctly identified a hardy annual plant as one which completes its life cycle in one growing season without the benefit of protection. For example, *Limnathes douglasii*. Some incorrect answers included reference to plants being able to withstand temperatures as low as -18° C, while others suggested that plants should be sown in autumn.

- Q2** a) Define 'dehiscent fruit'.  
b) Name **ONE** plant example. **2**

- a) Good answers included some reference to fruits which open spontaneously to release seeds on reaching maturity.  
b) Examples included any legume, Delphinium spp. etc. Unfortunately some candidates confused the terms and/or gave incorrect examples, for instance, Malus and Pyrus species.

**Q3** State the function of the following:

- i) 'epidermis';  
ii) 'lenticel'. **2**

- i) Most candidates were able to correctly identify the epidermis as the outmost protective layer of plant cells.  
ii) Many scripts also rightly stated that lenticels are pores in the bark of woody plants which allow two way gaseous exchange. There was some confusion shown in answers which referred to other plant structures.

- Q4** a) Define the term 'tepal'.  
b) Name **TWO** examples of plants with tepals. **2**

Most candidates appeared to be unfamiliar with the term 'tepal' referring to flowers which have sepals and petals which are indistinguishable, (undifferentiated). Good examples include Tulipa spp. and Lilium spp.

**Q5** Define the following terms in relation to roots: **2**

<b>Adventitious</b>	
<b>Lateral</b>	
<b>Tap</b>	
<b>Fibrous</b>	

A very well answered question, with only very few replies missing essential details:

Correct answers included:

Adventitious: A root which develops on some plant part other than an existing root.

Lateral: A sideways growing root, often arising from a tap root.

Tap: A single large root, which develops in response to gravity, and often supports lateral roots.

Fibrous: Many roots growing from stem bases, for example grasses.

**Q6** Define the following:

- i) 'apical bud';
- ii) 'adventitious bud'.

**2**

- i) Most responses correctly identified an apical bud as the embryonic or undeveloped stage of growth located at branch tips.
- ii) Some confusion was shown between 'axillary' and 'adventitious' buds, the latter arising in stems when the former are absent.

**Q7** State **THREE** specific conditions required for the successful germination of seeds of half-hardy annual plants.

**2**

Many good answers were seen. However it was expected that a suitable temperature range would be specified (for example 15 - 20 degrees Celsius) rather than 'warmth' or 'high'. Additional marks were assigned for mention of high relative humidity, continued availability of water, or a well oxygenated environment achieved by the use of composts with good aeration.

**Q8** a) Define the term 'simple layering'.

b) **NAME ONE** plant that is usually propagated in this way.

**2**

Most candidates were able to give good answers, which included some reference to the process by which plants can be encouraged to produce adventitious roots by bending a stem to touch the ground, or be covered with soil. Very varied plant examples were given, reflecting the wide range of woody plants which may be propagated using this technique.

**Q9** State **THREE** factors which should be taken into account when harvesting the seed of **ONE NAMED** woody perennial plant.

**2**

Unfortunately, some answers failed to name a specific plant, meaning that they received no marks. Correct scripts, gave factors such as: ripe seed, undamaged seed, moisture level ca. 15%, to take into account.

**Q10** Complete the table below to show how the waste materials listed can be dealt with in **FOUR** different environmentally friendly ways.

**2**

<b>Waste Material</b>	<b>Treatment</b>
<i>Annual weed</i>	
<i>Plastic pots and other containers</i>	
<i>Plastic bags</i>	
<i>Woody prunings</i>	

A very well answered question, with most candidates being fully aware of recycling, either in the garden, or through local council schemes. Use of old

plastic bags to cover seedlings did seem a trifle extreme, as did burning everything – which was suggested by a small minority. Marks were lost by a few candidates who failed to name four **different** means of disposal.

- Q11**     *State **TWO** benefits of double digging a vegetable plot.*     **2**

Many candidates failed to distinguish between double and single digging, and therefore, did not fully identify the benefits of cultivating in this way. Answers covering the following points were expected:

Process: Digging the soil to two spits (spade depths), to approx. 60cm. Each layer to be kept separate and not mixed.

Benefits: Increases the depth of cultivation to encourage efficient root penetration, improved drainage etc.

- Q12**     *Define the term ‘intercropping’ and give **ONE NAMED** example of a crop used.*     **2**

A well answered question, with two crops mentioned, maturing at different speeds. A few scripts confused terms and described successional cropping. Correct definitions were along the lines of: Two different crops planted in alternate rows, with one or more rows of an earlier maturing crop between two rows of more slowly growing plants. Examples include: Lettuce and gladioli; lettuce and cauliflower; runner beans and lettuce or carrots.

- Q13**     *List **FOUR** potential hazards relating to boundaries that should be assessed when planning a garden.*     **2**

Unfortunately, many candidates chose to relate hazards to the health of plants, which was not rewarded, in contrast to those relating to people. Examples include: Damaged walls, insecure fence posts, overgrown shrubs (particularly those with thorns), damaged boundaries which give people and/or animals unintended access.

- Q14**     *Define the term ‘triangulation’ in relation to surveying a garden.*     **2**

Some answers showed a full understanding of the term ‘triangulation’. However most scripts indicated two fixed points – for example the corners of a house, but did not show an appreciation of the principle that the lengths of three sides of a triangle need to be known in order to fix the position of an object on a plan.

- Q15**     *List **FOUR** user requirements that might be considered when preparing a basic garden plan.*     **2**

A well answered question, with only a few candidates referring to soils and aspects, rather than user requirements as listed in the syllabus. Acceptable items included: recreation, ornamentation, food production or utility.

## Section 2 – Structured Questions

## Marks

**Q16** a) Describe **FIVE** differences between a gymnosperm and a angiosperm.

5

b) Using **NAMED** plant examples, state **FIVE** reasons why it is important to use botanical nomenclature in horticulture.

5

a) Most candidates who attempted the question were able to describe two or at the most three differences, and therefore forfeited marks for the remaining two or three.

A selection from the following was expected:

Angiosperms	Gymnosperms
Flowers	No flowers – cones
Seeds enclosed in an ovary	'Naked' seeds
May be insect pollinated	Wind pollinated
Animal dispersal (in many cases)	Wind dispersal
Many different habitats	Xerophytic habitats
Evergreen and deciduous	Usually evergreen
All life cycles	Usually trees and woody shrubs
No resin	Resin
Xylem vessels and tracheids	Only tracheids
Double fertilisation	Single fertilisation

b) Most candidates were able to state five reasons why it is important to use botanical nomenclature, with correctly written examples:

- Plant can be identified exactly (*Ranunculus repens*)
- Same plant can have different common names (*Caltha palustris*)
- Different plants may have the same common name (Bluebell - *Hyacinthoides non-scripta* and *Campanula rotundifolia*)
- There may not be a common name (*Rhododendron ponticum*)
- Universal language (*Camellia sinensis*)
- Gives information about the plant (*Alchemilla mollis* – 'mollis' = 'softly hairy')
- Shows relationships between plant groups (e.g. most *Clematis* are climbers).

**Q17** a) List **SIX** components of a typical plant cell.

3

b) Describe the function of **FOUR** of the components listed in a).

4

c) Describe the role of plant meristems and state the location where they are found.

3

a) Most candidates were able to correctly list six examples from:

- Cell wall
- Cell membrane
- Vacuole
- Cytoplasm



- Nucleus
- Mitochondria
- Chloroplast

b) Most responses gave good descriptions of the functions of four of the components listed in a). However the role of the vacuole in the control of turgor and waste storage was less fully appreciated in some cases.

c) A pleasing number of scripts showed a good understanding of plant meristems, particularly in growing tips and roots. However there was less clarity about other meristems, and the processes of secondary thickening.

- Q18**
- |    |  |          |
|----|--|----------|
| a) | State <b>FOUR</b> benefits of propagating plants from seed.  | <b>2</b> |
| b) | State <b>FOUR</b> limitations of propagating plants from seed.                                     | <b>2</b> |
| c) | Describe how <b>TWO</b> of the limitations stated in b) may be overcome in horticultural practice. | <b>6</b> |

The benefits and limitations of propagating plants from seed were well understood by the majority of candidates:

Benefits (a)	Limitations (b)
May be only viable method	Not suitable for hybrids – variability
Large quantities of propagules	'Disease (eg 'damping off')
Easy transport	Possibility of 'dormancy'
Breeding new hybrids	Seed may not be available
Relatively cheap to produce	Relatively slow to produce flower / crop

c) Many candidates described the use of F<sub>1</sub> hybrids to obtain crop uniformity. The techniques used to counter the effects of dormancy were also well covered. Techniques to avoid 'damping off' featured well, and the use of vegetative propagation to overcome some of the limitations was also chosen.

- Q19**
- Describe the advantages to the plant propagator of **EACH** of the following techniques:
- |      |   |          |
|------|---|----------|
| i)   | leaving shrub seed outdoors over winter;      | <b>2</b> |
| ii)  | sanding seeds with hard seed coats;           | <b>2</b> |
| iii) | use of virus free mother plants for cuttings; | <b>2</b> |
| iv)  | use of juvenile growth for cuttings;          | <b>2</b> |
| v)   | grafting.                                     | <b>2</b> |

Many well presented and accurate answers were submitted to this question.

- |     |  |
|-----|--|
| i)  | The principles of seed scarification were well understood and recorded by most candidates. |
| ii) | Scarification principles and practices were clearly described in the majority of scripts.  |

- iii) The importance of selecting propagation material from virus free mother plants, to avoid forward transmission, was usually well understood.
- iv) The presence of high levels of auxin in juvenile plant material was generally emphasised as leading to ready rooting of cuttings made from new growth.
- v) The process of grafting was not mentioned as a commonly used process used in plant propagation. It was more associated with the control of plant size, particularly in the case of top fruit trees.

**Q20** Describe **ONE** method of cultivation for an outdoor tomato crop using **EACH** of the following headings:

- i) *plant propagation;* **3**
  - ii) *plant nutrition;* **2**
  - iii) *plant support;* **2**
  - iv) *harvesting;* **1**
  - v) **ONE** pest and **ONE** disease of the crop. **2**
- 
- i) Most candidates correctly described the whole propagation process from seed to plant in a protected environment, prior to establishment out of doors. Marks were lost where descriptions lacked detail, for example of temperatures required, composts to use, or the process of potting on.
  - ii) The need for nutrition was well understood, and described, in a majority of scripts. Liquid feeding during fruit initiation and development was well covered, with the reasons for the use of high potash fertilisers. Ground preparation was less well described, few candidates mentioning the introduction of organic matter prior to planting, or to the use of base fertilisers.
  - iii) The support and training requirements of the crop were covered well in most scripts.
  - iv) Judgement as to when to pick individual fruit or complete trusses was well covered, although there was less clarity as to the techniques used to avoid damage to fruit and/or the plant.
  - v) The descriptions of pests and diseases affecting the crop were variable in quality. The most common organisms cited were: two spotted mite, tomato blight, botrytis, white fly, and tobacco mosaic virus.

**Q21** Describe **FIVE** factors to consider when planning a garden for **EACH** of the following uses:

- i) *plant collections;* **5**
- ii) *wildlife.* **5**

Although some excellent responses were seen to this question, many were disappointing, as they failed to demonstrate an ability to apply general principles to specific design requirements.

- i) A wide variety of explanations were offered as to what might be needed to establish plant collections. However, the importance of choosing suitable microclimates, display facilities, labelling, explanatory information, recording systems, and grouping to show botanic and other relationships were not well covered. General comments about soils, pH, aspect, shelter belts, and shade were made in some responses, but the need for easy access was neglected by most candidates.
- ii) More concrete responses were provided concerning typical wildlife factors.

Comparisons were generally well stated, with good examples concerning water features, habitat provision for both insects and larger animals, and plant diversity in the form of hedges, nectar production, and availability of seeds and fruit.

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