



## RHS LEVEL 2 CERTIFICATE IN HORTICULTURE

**Wednesday 15 February 2012**  
**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/.....**

## ANSWER ALL QUESTIONS

MARKS

**Q1** State **TWO** differences between angiosperms and gymnosperms.

**2**

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**Q2** Define **EACH** of the following:

- i) diffusion;
- ii) osmosis.

**2**

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**Q3** Distinguish between **EACH** of the following terms:

- i) cross-pollination;
- ii) self-pollination.

**2**

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**Q4** List **FOUR** tissues found in a dicotyledonous leaf.

**2**

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**Q5** a) State **TWO** types of stem adaptations.

b) Name a plant example for **EACH** of the adaptations given in a).

**2**

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**Q6** State **TWO** reasons why botanical/horticultural nomenclature is important when naming plants.

**2**

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**Q7** State **TWO** reasons for propagating trees by budding or grafting.

**2**

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**Q8** State **FOUR** precautions to reduce the risk of personal injury when using knives for vegetative propagation.

**2**

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**Q9** a) Name **ONE** type of physiological seed dormancy.

b) State **ONE** method of overcoming the dormancy named in a).

**2**

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**Q10** Describe **ONE** method of supporting a **NAMED** cane fruit.

**2**

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**Q11** State **FOUR** factors to be considered when selecting a site for tree fruit production.

**2**

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**Q12** State **FOUR** considerations to be taken into account when harvesting and storing potatoes.

**2**

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**Q13** State **FOUR** physical considerations when planning a new garden.

**2**

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**Q14** List **FOUR** requirements influencing the choice of hard landscaping materials for a patio in a private garden.

**2**

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**Q15** Describe **TWO** distinct examples of the use of soft landscape materials to minimise garden maintenance requirements.

**2**

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

**Wednesday 15 February 2012**  
**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.

**Please turn over/.....**



## ANSWER THREE QUESTIONS ONLY FROM THIS SECTION

		MARKS
<b>Q16</b>	a) Define the following and give <b>ONE</b> plant example of <b>EACH</b> :	
	i) 'woody perennial';	2
	ii) 'herbaceous perennial'.	2
	b) State the internal changes that occur in a dicotyledonous stem during secondary thickening, using clearly labelled diagrams.	6
<b>Q17</b>	a) Define the term 'transpiration'.	2
	b) State the effects of the following factors on transpiration:	
	i) humidity;	
	ii) temperature.	2
	c) Describe <b>THREE</b> ways in which either humidity or temperature can be manipulated to control transpiration in a <b>NAMED</b> horticultural situation.	6
<b>Q18</b>	a) Name <b>THREE</b> common types of stem cutting used in plant propagation.	3
	b) Describe the characteristics of <b>EACH</b> type named in a).	3
	c) Describe the preparation of cuttings of a <b>NAMED</b> plant, using <b>ONE</b> of the examples identified in a).	3
	d) State a suitable propagation environment for the cuttings identified in c).	1

Please see over/.....

		MARKS
<b>Q19</b>	a) State <b>FOUR</b> benefits of adopting crop rotation.	<b>4</b>
	b) Describe using <b>NAMED</b> vegetable groups, <b>ONE</b> system of crop rotation. State the cultivation requirements over a <b>FOUR</b> year period.	<b>6</b>
<b>Q20</b>	Describe <b>EACH</b> of the following in relation to a informal garden style:	
	i) layout;	<b>2</b>
	ii) <b>THREE</b> typical features;	<b>4</b>
	iii) <b>THREE</b> types of planting.	<b>4</b>
<b>Q21</b>	a) State <b>TWO</b> reasons for carrying out a site appraisal, prior to planning a garden.	<b>2</b>
	b) Identify <b>ONE</b> risk to human health associated with <b>EACH</b> of <b>FOUR</b> <b>NAMED</b> garden features.	<b>4</b>
	c) Describe how <b>EACH</b> of the risks in b), can be minimised by careful garden planning.	<b>4</b>

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## RHS LEVEL 2 CERTIFICATE IN HORTICULTURE

**15 February 2012**

### **Horticulture I**

<b>Candidates Registered</b>	101	<b>Pass with Commendation</b>	18 (25.71%)
<b>Candidates Entered</b>	70	<b>Pass</b>	36 (51.43%)
<b>Absent/Withdrawn/Deferred</b>	31	<b>Fail</b>	16 (22.86%)
<b>Total Candidates Passed</b>	54 (77.14%)		

#### 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:

		Marks
Q1	State <b>TWO</b> differences between angiosperms and gymnosperms.	2
	Most candidates were aware of the differences between angiosperms (flowering plants) and gymnosperms (conifers, cycads, ginkgo and gnetales). Better answers suggested that the seeds of angiosperms are enclosed in an ovary during pollination while the gymnosperms have 'naked' seeds. The majority of angiosperms are insect pollinated, while most gymnosperms are wind pollinated. Another difference is in the arrangement of the vascular systems in woody plants.	
Q2	Define <b>EACH</b> of the following: <ol style="list-style-type: none"> <li>i) diffusion;</li> <li>ii) osmosis.</li> </ol>	2
	Some good answers were seen, but there was evidence of some confusion between the processes. Both relate to the spontaneous uniform distribution of dissolved or mixed molecules in a liquid or gas. Diffusion occurs when redistribution of dissolved material (the solute) takes place from a region of high concentration (in the solvent) to one of lower concentration, resulting in a uniform distribution of the solute throughout the solvent. Osmosis occurs with the spontaneous movement of solvent molecules from a solution of low solute concentration to a solution of higher concentration across a semi-permeable membrane.	
Q3	Distinguish between <b>EACH</b> of the following terms: <ol style="list-style-type: none"> <li>i) cross-pollination;</li> <li>ii) self-pollination.</li> </ol>	2
	Most candidates were able to fully distinguish between cross-pollination, where pollen is transferred between the flowers of different plants, and self-pollination, where the process is between flowers on the same plant.	

**Q4** List **FOUR** tissues found in a dicotyledonous leaf. **2**

Disappointingly few candidates were able to list four leaf tissues, for example: Epidermis, Parenchyma, Collenchyma, Xylem, Phloem etc.

**Q5** a) State **TWO** types of stem adaptations.

b) Name a plant example for **EACH** of the adaptations given in a). **2**

Some good answers were seen, but too many named adaptations which were not of the stem. Many plant examples were also vague.

Correct answers included:

- Photosynthesis - Cladodes (*Ruscus aculeatus*);
- Storage & perennation - Rhizomes (*Iris germanica*); stem tubers (*Solanum tuberosum*); corms (*Crocus chrysanthus*);
- Protection - thorns (*Rosa rugosa*);
- Climbing – petioles (*Clematis Montana*).

**Q6** State **TWO** reasons why botanical/horticultural nomenclature is important when naming plants. **2**

Most candidates showed that they were fully aware of the advantages relating to the use of botanical / horticultural nomenclature for plant naming.

These included:

- Unique identification
- Universally applicable
- Shows the relationships seen between organisms.

**Q7** State **TWO** reasons for propagating trees by budding or grafting. **2**

Many good answers were seen. Correct observations included:

- Use of rootstocks to control plant vigour
- Use of resistant rootstocks to reduce the impact of soil borne disease
- Economic use of propagation material
- May be the only practical method of propagation.

**Q8** State **FOUR** precautions to reduce the risk of personal injury when using knives for vegetative propagation. **2**

Most responses gave four correct suggestions as to how to reduce the risk of personal injury when using knives.

**Q9** a) Name **ONE** type of physiological seed dormancy.

b) State **ONE** method of overcoming the dormancy named in a). **2**

Most candidates were able to provide an outline of the phenomena associated with physiological dormancy. Better answers stated that, even if the physical conditions were suitable, some seeds fail to germinate due to the presence of chemical inhibitors and / or the embryo being not fully mature. A good proportion of responses gave a suitable method of stratification to overcome the named type of dormancy. However, the single word – stratification, was insufficient to obtain full marks.

**Q10** Describe **ONE** method of supporting a **NAMED** cane fruit. **2**

Most candidates recognised cane fruit as referring to Raspberry (*Rubus ideaus*),

Blackberry (*Rubus fruticosus*), or their hybrids. Marks were awarded in the second part of the question for credible descriptions of a suitable support system, for example tying to wires strung between posts.

- Q11** State **FOUR** factors to be considered when selecting a site for tree fruit production. **2**

Although some good answers were seen, there was a disappointing number which failed to recognise the factors to be taken into account. Correct points include:

- Access
- Previous use, (e.g. presence of pollutants, established perennial weeds)
- Depth of topsoil (30 cm minimum)
- Depth of winter water table (greater than 45 cm)
- Soil reaction ca. pH 6.5
- Presence of potential frost hollows
- Shelter for pollinating insects, better growth.

- Q12** State **FOUR** considerations to be taken into account when harvesting and storing potatoes. **2**

Most candidates indicated that they were aware of the techniques to be used to successfully keep potatoes over winter. These include:

- Store main-crop varieties only
- Lift after haulm has died back
- Lift carefully, preferably with broad tine fork
- Store only undamaged tubers, which are clean and dry
- Store in dark, cool, airy conditions.

- Q13** State **FOUR** physical considerations when planning a new garden. **2**

The majority of candidates were able to state suitable considerations. These include:

- Site access
- No excessive slopes
- Consideration to be given to the retention of existing features
- Position of services (water, gas, electricity, telephone etc.)
- Drainage requirements
- Possible microclimates.

- Q14** List **FOUR** requirements influencing the choice of hard landscaping materials for a patio in a private garden. **2**

There were some good answers, the best concentrating on hard material choice. Too many marks were lost by those candidates who chose to make planting (soft landscape) suggestions. Correct points included:

- Colour should harmonise with other features and building
- Slabs should be of size which enables a significant number to be laid in the available area
- Non slip surfaces, particularly if the patio is to north of buildings
- Traffic – foundations need to be adequate to support the expected traffic
- Cost – within client's budget
- Ease and speed of construction.

<b>Q15</b>	<i>Describe <b>TWO</b> distinct examples of the use of soft landscape materials to minimise garden maintenance requirements.</i>	<b>2</b>
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Some good answers were seen, but there seemed to be some confusion as to the scope of 'soft landscape' materials. Mulches cannot be included under this heading. Mention of features such as ground cover planting, wild flower meadows, evergreen shrubs etc. was expected.

<b>Section 2 – Structured Questions</b>	<b>Marks</b>
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<b>Q16</b>	<i>a) Define the following and give <b>ONE</b> plant example of <b>EACH</b>:</i>	
	<i>i) 'woody perennial';</i>	<b>2</b>
	<i>ii) 'herbaceous perennial'.</i>	<b>2</b>

<i>b) State the internal changes that occur in a dicotyledonous stem during secondary thickening, using clearly labelled diagrams.</i>	<b>6</b>
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- a) Most candidates were able to define the terms woody and herbaceous perennial, although some could not fully identify suitable plant examples. The following was expected:

perennial – life cycle more than 2 years.

herbaceous – does not develop woody structure / no secondary thickening.

woody – develops a woody structure / secondary thickening.

- b) Some excellent answers were seen, but there were many poor diagrams and, in some cases, confused explanations.

The following was expected:

For description of stem at start of secondary thickening:

- vascular bundles in a circle
- primary xylem on inside
- primary phloem on outside
- vascular cambium in centre.

For process of secondary thickening:

- vascular cambium / fascicular cambium produces
  - secondary xylem on inside
  - secondary phloem on outside
- cells in cortex between vascular bundles divide/become meristematic / interfascicular cambium
- join up with vascular cambium to form a ring
- continue to produce secondary xylem and phloem pushing the primary xylem and phloem to the outside.

<b>Q17</b>	<i>a) Define the term 'transpiration'.</i>	<b>2</b>
	<i>b) State the effects of the following factors on transpiration:</i>	



- i) *humidity;*
- ii) *temperature.*

**2**

- c) *Describe **THREE** ways in which either humidity or temperature can be manipulated to control transpiration in a **NAMED** horticultural situation.*

**6**

- a) Many responses showed a good understanding of the term transpiration, although in some there was confusion with respiration and even photosynthesis. Answers indicating that transpiration was a process of loss of water vapour from the plant leaves through stomata were most rewarded.
- b) Most candidates had a good grasp of the effects of environmental factors on transpiration, although too many failed to indicate if an increase in the value of the factor caused an increase or decrease in transpiration. (Increasing humidity decreases transpiration and increasing temperature increases transpiration.)
- c) Many answers failed to relate fully the ways in which horticultural practices can be used to control transpiration. The following were among those rewarded:  
Humidity:
  - Damping down in a glasshouse
  - Reducing ventilation in a glasshouse
  - Tray of water next to plants in a glasshouse or interior display
  - Humidifiers in a conservatory or interior display
  - Shelter belts or windbreaks in a field to reduce wind speed
  - Covering cuttings with plastic bag or tenting
  - Misting / fogging cuttings or tropical plants in a glasshouse or hand spraying houseplants
  - Cold frame for semi-ripe cuttings or evergreens in autumn
  - Cloches or fleece to decrease wind speed.

Temperature:

- Ventilate to allow cooler air in
- Shade including method in a glasshouse
- Fan circulation of air in a glasshouse
- Plant outside in shade e.g. wall, netting
- Place plants out of direct sunlight on a windowsill
- Place cuttings in a north facing cold frame.

- Q18** a) *Name **THREE** common types of stem cutting used in plant propagation.*

**3**

- b) *Describe the characteristics of **EACH** type named in a).*

**3**

- c) *Describe the preparation of cuttings of a **NAMED** plant, using **ONE** of the examples identified in a).*

**3**

- d) *State a suitable propagation environment for the cuttings identified in c).*

**1**

- a) Most answers identified soft, semi-ripe, and hardwood cuttings.
- b) Although many scripts correctly described the types of cutting identified in a), there was some confusion as to the age of the cutting material. The following was expected:
  - the softwood is taken from young growing tips of plants or young shoots coming up from ground level and soft in nature;
  - in semi-ripe cuttings they are taken from tips of shoots or as heeled side

shoots - the tip of the cutting may still be young but the base will be lignified (become firm, woody);

- in deciduous hardwood cuttings the shoot used is fully lignified, (firm wood) and dormant;
- in evergreens the wood is again woody.

- c) Many good explanations were rewarded, particularly those which were illustrated by clear diagrams. Something along the following lines was expected:  
Example – Hardwood – a length of last years' wood about pencil thickness is cut into a suitable length for the hardwood cutting. It will have a straight cut just below the selected bottom node (buds). The length may be between 20 and 30 cm, and a sloping cut made just above the selected top bud or buds.
- d) Most candidates gave a suitable environment, but some answers were too brief, for example 'Propagator' is insufficient in a structured answer.

**Q19 a) State *FOUR* benefits of adopting crop rotation.** **4**

**b) Describe using *NAMED* vegetable groups, *ONE* system of crop rotation. State the cultivation requirements over a *FOUR* year period.** **6**

- a) Most candidates were aware of the benefits of crop rotation including: essential to reduce problems with pests and diseases; maximum benefit from the application of fertilisers; overall benefit of cultivation for each crop; prevention of depletion of nutrients; benefits of companion planting.
- b) Groupings most frequently correctly identified were: legumes and pod crops; alliums; root and tuberous crops; brassicas. Many of the cultivation recommendations were of a general nature and were not as well rewarded as comments specific to each grouping.

**Q20 Describe *EACH* of the following in relation to a informal garden style:**

- i) *layout*; **2**
- ii) *THREE typical features*; **4**
- iii) *THREE types of planting*. **4**

Many candidates appreciated the main features of an informal garden style as for example: irregular shape; uneven slopes; no symmetry; no axis; concealed boundaries.

ii) and iii) There was some confusion between 'features' which relate to the layout and non-plant objects in the design, (for example: absence of man-made structures and materials; boundaries flow seamlessly into countryside; appearance of wild garden / nature in control; hedges informally clipped; absence of a manicured lawn), and plantings, which relate specifically to plants (for example: perennial planting; bulb displays; corm displays; native trees & shrubs).

**Q21 a) State *TWO* reasons for carrying out a site appraisal, prior to planning a garden.** **2**

**b) Identify *ONE* risk to human health associated with *EACH* of *FOUR* *NAMED* garden features.** **4**

- c) Describe how **EACH** of the risks in b), can be minimised by careful garden planning.

4

- a) Some good answers were seen, but clearly, some candidates had not encountered the term 'site appraisal' before.

Some reasons are - to determine:

- potential of site for planting;
- position of services etc.;
- access;
- microclimate;
- existing features and plantings to be retained;
- position of boundaries.

- b) Features were generally well identified, but the associated risks less so.
- c) A significant number of candidates failed to appreciate that the question related to garden planning and not garden maintenance, resulting in loss of marks.

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