



## RHS LEVEL 2 CERTIFICATE IN HORTICULTURE

**Wednesday 17 February 2010**

**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** State **FOUR** distinct differences between monocotyledons and dicotyledons.

**2**

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

- i) 'variety';
- ii) 'cultivar'.

**2**

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**Q3** a) State the meaning of:

- i) 'petiole';
- ii) 'lamina'.

b) State **ONE** function of **EACH** of the above.

**2**

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**Q4** Define, in relation to plant reproduction:

- i) 'pollination';
- ii) 'fertilisation'.

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**Q5** State **TWO** factors that influence the transpiration rate and indicate the effect of an increase in the level of **EACH** factor, using the table below.

2

Factor	Increase/decrease in transpiration rate

**Q6** State **TWO** effects of auxin on plant growth.

2

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**Q7** Define **EACH** of the following terms:

- i) 'grafting';
- ii) 'budding'.

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**Q8** State **TWO** benefits and **TWO** limitations of propagation by seed.

2

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**Q9** List, using the table below, a **NAMED** hardy plant example for **EACH** of the cutting types indicated and state the season in which they are to be taken.

2

Cutting type	Named plant example	Season
Softwood		
Hardwood		
Leaf-bud		
Root		

Marks

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- Q10** List **FOUR** factors that influence the successful germination of vegetable seeds in the open ground.

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- Q11** a) Name **TWO** plants that are suitable to form a hedge to protect a vegetable or fruit garden.
- b) State **TWO** advantages of using the plants named in a) for this purpose.

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- Q12** Describe the control of **TWO NAMED** weeds in a **NAMED** vegetable crop.

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**Q13** Define **EACH** of the following terms in relation to planning a garden:

- i) 'proportion';
- ii) 'scale'.

**2**

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**Q14** a) Define the term 'unity' in relation to garden planning.

- b) Give **ONE** example of how unity can be achieved by the choice of materials in a garden design.

**2**

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**Q15** List **TWO** formal and **TWO** informal features of garden styles.

**2**

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## RHS LEVEL 2 CERTIFICATE IN HORTICULTURE

**Wednesday 17 February 2010**

**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 from this section.

		Marks
<b>Q16</b>	a) Draw a large, clearly labelled diagram showing <b>TWO</b> external features of a typical dicotyledonous root tip.	<b>2</b>
	b) Describe the function of the features shown in a).	<b>2</b>
	c) Using <b>NAMED</b> plant examples, describe <b>TWO</b> root adaptations.	<b>6</b>
<b>Q17</b>	a) State the basic equation for 'respiration' in words.	<b>1</b>
	b) List <b>THREE</b> factors that limit the efficiency of plant respiration.	<b>3</b>
	c) Describe how <b>EACH</b> of the factors listed in b) influences the practices of:	
	i) seed storage;	<b>3</b>
	ii) rooting cuttings.	<b>3</b>
<b>Q18</b>	a) List <b>FIVE</b> environmental and growth factors affecting the speed and success of rooting cuttings.	<b>5</b>
	b) For <b>EACH</b> of the factors listed in a), state <b>TWO</b> practical ways of ensuring successful propagation.	<b>5</b>
<b>Q19</b>	a) Name <b>ONE</b> bush fruit and <b>ONE</b> tree fruit.	<b>1</b>
	b) For <b>EACH</b> crop named in a), give <b>ONE</b> pest and <b>ONE</b> disease commonly encountered in the United Kingdom.	<b>2</b>
	c) Describe the symptoms of <b>ONE</b> of the pests and <b>ONE</b> of the diseases given in b).	<b>6</b>
	d) State <b>ONE</b> control method for the pest and the disease named in c).	<b>1</b>

Please see over .....

- Q20** Describe how **EACH** of the following affect the choice of a site for the production of outdoor food crops:
- |      |                       |          |
|------|-----------------------|----------|
| i)   | soils;                | <b>2</b> |
| ii)  | frost susceptibility; | <b>2</b> |
| iii) | shelter;              | <b>2</b> |
| iv)  | aspect;               | <b>2</b> |
| v)   | gradient or slope.    | <b>2</b> |
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- Q21**
- |    |  |          |
|----|--|----------|
| a) | Describe <b>SIX</b> factors that need consideration during the appraisal of a site for a new garden.               | <b>6</b> |
| b) | State <b>EIGHT</b> requirements that a garden user might wish to be taken into account when planning a new garden. | <b>4</b> |

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

**17 February 2010**

### **Horticulture I**

<b>Candidates Registered</b>	1159	<b>Pass with Commendation</b>	277 (30.04)
<b>Candidates Entered</b>	922	<b>Pass</b>	383 (41.54)
<b>Absent/Withdrawn/Deferred</b>	237	<b>Fail</b>	262 (28.41)
<b>Total Candidates Passed</b>	660		

#### **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.
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 be aware that wider interpretation will not be rewarded.
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. Regrettably, some candidates quoted Imperial measurements in their answers, when required specifically to use Metric units.
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.
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 a proportion of 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. Appropriate feedback must, in any case, be provided.
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 Department and can also be found on the RHS website together with past examination papers.

### Examiners' Comments:

#### Section 1 - Short Answer Questions

#### Marks

- Q1** State **FOUR** distinct differences between monocotyledons and dicotyledons.

**2**

Most candidates were able to state the number of cotyledons, the differences in vascular tissue, parallel veins/netted veins, and number of flower parts. However, some cited long narrow leaves/rounded leaves which were not accepted as there are dicotyledons with lanceolate leaves. Fibrous roots for monocots and tap roots for dicots, again was not specific enough, needing further qualification to be fully rewarded.

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

- i) 'variety';
- ii) 'cultivar'.

**2**

Most candidates clearly understood the question and stated that a variety was a naturally occurring variation within a species, whilst a cultivar was purposely bred and maintained with human intervention.

- Q3** a) State the meaning of:

- i) 'petiole';
- ii) 'lamina'.

- b) State **ONE** function of **EACH** of the above.

**2**

The petiole was identified as the leaf stalk by most candidates and its function was stated as one of the following; responsible for transporting water/nutrients to and from the leaf; responsible for positioning the leaf blade so that it received maximum light on its surface; responsible for supporting the leaf blade. A small number of answers referred to flowers and petals.

The lamina was generally correctly identified as the leaf blade, but a disappointing number of candidates stated that it was the leaf surface, a

protective layer. Its functions were described very fully by many candidates as either being the site where photosynthesis took place or where transpiration took place.

**Q4** Define, in relation to plant reproduction:

- i) 'pollination';
- ii) 'fertilisation'.

**2**

Pollination. Most candidates correctly defined pollination as the physical transfer of pollen from stamen to stigma.

Fertilisation. The concept of the 'fusion' of the male and female gametes to produce a zygote was necessary, although it did not have to be expressed in technical terms to be fully rewarded.

**Q5** State **TWO** factors that influence the transpiration rate and indicate the effect of an increase in the level of **EACH** factor, using the table below.

**2**

<b>Factor</b>	<b>Increase/decrease in transpiration rate</b>

Most candidates used the examples of temperature and humidity which they correctly identified as increasing transpiration with an increase in temperature and decreasing it with a rise in humidity. Others cited wind speed and an increase in water in the soil with appropriate effects quoted.

**Q6** State **TWO** effects of auxin on plant growth.

**2**

Most candidates were able to answer the question well. The most common examples related to apical dominance and phototropism, followed by references to cell proliferation in stems and roots.

**Q7** Define **EACH** of the following terms:

- i) 'grafting';
- ii) 'budding'.

**2**

Grafting. Most answers accurately identified grafting as being the process of joining a scion to a rootstock, in such a way that they grow permanently together as one. The importance of cambium contact was made by some as was the fact that this was a means of vegetative propagation.

Budding. This was correctly described as a type of graft, using a scion consisting of a single growth bud.

**Q8** State **TWO** benefits and **TWO** limitations of propagation by seed.

**2**

Although many good answers to this question were seen some examples given were not of general benefits or limitations but referred to specific genera or groups of plants.

Benefits: Large numbers of propagules available in some species, benefits of F<sub>1</sub> seed, ease of storage, genetic variation/plant breeding.

Limitations: May not be true-to-type, may have to overcome dormancy, time taken to produce a mature plant.

**Q9** List, using the table below, a **NAMED** hardy plant example for **EACH** of the cutting types indicated and state the season in which they are to be taken.

**2**

<b>Cutting type</b>	<b>Named plant example</b>	<b>Season</b>
<i>Softwood</i>		
<i>Hardwood</i>		
<i>Leaf-bud</i>		
<i>Root</i>		

Full marks were achieved by many candidates. However, there was a failure to read the question with sufficient care in some cases, resulting in examples of plants which are not hardy being cited.

Softwood. Incorrect examples included some *Fuchsia* sp. or *Pelargonium* sp., (not hardy!) with a smaller number of correct answers mentioning soft growth on shrubs such as *Forsythia*. The season being given as spring or early summer.

Hardwood. Most correct answers gave a *Cornus* sp. in late autumn or winter.

Leaf-bud. Some responses correctly gave the example of a *Camellia* sp. taken in late spring or early summer and others of a suitable *Clematis* sp. taken at the same time. However, many scripts mistook leaf-bud cuttings for budding and therefore gave, incorrectly, examples such as roses.

Root. Some correct answers giving, for example, *Papaver orientale* cuttings taken at the end of the growing season or in late winter. Other candidates mistook division for root cuttings.

- Q10** List **FOUR** factors that influence the successful germination of vegetable seeds in the open ground. **2**

Most candidates scored well on this question. The list required included; temperature, moisture in soil, viable seed, aeration of soil, depth of sowing, absence of pests and diseases, and absence of weeds.

- Q11** a) Name **TWO** plants that are suitable to form a hedge to protect a vegetable or fruit garden.
- b) State **TWO** advantages of using the plants named in a) for this purpose. **2**

Some good answers were seen. However, too many candidates chose to ignore the rubric and provided only common plant names, which were not rewarded. Some good examples were given such as; *Crataegus monogyna*, *Fagus sylvatica*, *Taxus baccata*, *Buxus sempervirens*. There appeared to be some confusion between Beech and *Betula* as the latter was given as an example by several candidates.

Advantages. Some good answers relating to permeability of hedges and reduced turbulence on the leeward side. Also the benefits of creating an atmosphere where insect could fly and pollinate blossoms and attracting wildlife to the garden.

- Q12** Describe the control of **TWO NAMED** weeds in a **NAMED** vegetable crop. **2**

Unfortunately, no marks could be awarded if a crop was not identified.

The most common weeds were dandelion, couch grass, bindweed and chickweed.

Many scripts showed a lack of understanding of weed control.

Hoeing was regularly suggested for deep rooted weeds and many candidates quoted Glyphosate in inappropriate situations. Hand removal of dandelions and bindweed also showed a lack of knowledge of the nature of the weeds.

- Q13** Define **EACH** of the following terms in relation to planning a garden:
- i) 'proportion';
- ii) 'scale'. **2**

Proportion: A balanced relationship between length, breadth and height, with no one feature being too big or too small in relation to another.

Scale: The size of features and plants must relate to the size of the garden.

For example, not planting a large tree in a small garden.

A mark was also given if the answer referred to using a scale to draw a plan of a garden.

- Q14** a) Define the term 'unity' in relation to garden planning.
- b) Give **ONE** example of how unity can be achieved by the choice of materials in a garden design. **2**

A definition needed to include a reference to repetition and to elements within a design. An example is the use of complementary materials so there was a common theme.

- Q15** List **TWO** formal and **TWO** informal features of garden styles. **2**

Most candidates gave good examples in this question such as formal: clipped hedges, manicured lawns, geometric beds, limited colour and straight edges to paths; informal: curves, mixed plantings, a mixture of texture, height and colour.

Some answers just mentioned ponds which could be formal or informal depending upon their design so could not be rewarded.

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## Section 2 – Structured Questions Marks

- Q16** a) Draw a large, clearly labelled diagram showing **TWO** external features of a typical dicotyledonous root tip. **2**
- b) Describe the function of the features shown in a). **2**
- c) Using **NAMED** plant examples, describe **TWO** root adaptations. **6**

Large, clearly labelled diagrams showing two external features e.g. root cap and root hair gained full marks. Internal features were not credited. Detailed descriptions of the functions of these features, e.g. root hairs increase the surface area for uptake of water and minerals, gained the highest marks. Two root adaptations could be chosen from a wide range including root tubers, swollen tap roots, nitrogen fixing roots, aerial and prop roots, pneumatophores, mycorrhizal roots, adventitious roots in *Hedera* sp. Better candidates were able to give the full botanical name for each example and to fully describe their structure and function providing at least two points of interest. For example, root tubers are organs of perennation as are swollen tap roots (as distinct from normal tap roots) both containing starch. Prop roots in maize prevent plants blowing over and grow from nodes at the base of the stem. Aerial roots in orchids (velamen roots) have a thickened epidermis which prevents water loss but can absorb water vapour at the tip.



- Q17**
- a) State the basic equation for 'respiration' in words. **1**
  - b) List **THREE** factors that limit the efficiency of plant respiration. **3**
  - c) Describe how **EACH** of the factors listed in b) influences the practices of:
    - i) seed storage; **3**
    - ii) rooting cuttings. **3**

Candidates who gave the equation for respiration fully, including the production of energy/heat gained a full mark. Factors limiting respiration are primarily temperature, oxygen and water although carbohydrate and carbon dioxide levels were also acceptable. When describing seed storage and rooting cuttings, better candidates were able to make the link between reducing or increasing respiration by manipulating the factors listed above, rather than describing how to carry out these practices. For example, in seed storage, low levels of respiration are required to increase storage time and prevent germination. This can be done by storing dry seed at low moisture levels and low temperatures or by removing oxygen, for example, in sealed packets. For cuttings, increased respiration is needed to speed up cell division leading to the development of new roots, so increasing the temperature around the rooting area, keeping the rooting medium well aerated to supply oxygen and keeping cuttings watered to keep cells turgid and prevent damage to mitochondria are all essential.

- Q18**
- a) *List **FIVE** environmental and growth factors affecting the speed and success of rooting cuttings.* **5**
  - b) *For **EACH** of the factors listed in a), state **TWO** practical ways of ensuring successful propagation.* **5**
- a) Many candidates listed environmental factors (for example ambient temperature, light availability, and type of compost) with very few listing growth factors (for example juvenility, auxin production, use of non-flowering shoots). Most candidates were able to provide at least three factors with many being able to provide the number required. Some candidates wasted time by providing details of the factors when they were only asked for a list.
- b) This section of the question was not well answered. Few candidates were able to show that they had a thorough knowledge of the importance of juvenility, nutritional status of the stock plant, use of growth regulators, and the type of propagule chosen.

<b>Q19</b>	a) Name <b>ONE</b> bush fruit and <b>ONE</b> tree fruit.	<b>1</b>
	b) For <b>EACH</b> crop named in a), give <b>ONE</b> pest and <b>ONE</b> disease commonly encountered in the United Kingdom.	<b>2</b>
	c) Describe the symptoms of <b>ONE</b> of the pests and <b>ONE</b> of the diseases given in b).	<b>6</b>
	d) State <b>ONE</b> control method for the pest and the disease named in c).	<b>1</b>

- a) Most candidates were able to name a bush fruit and a tree fruit correctly. A few scripts incorrectly named a cane fruit and/or an ornamental apple.
- b) Most responses named an appropriate pest and a suitable disease for each of the chosen fruits.
- c) Many candidates provided symptoms for the pests and diseases named but did not describe them well. Many only gave one symptom for each and lost marks as a result. Some candidates provided consequences of the pest or disease damage and not the symptoms. A number of candidates lost marks on this section as they had named incorrect or inappropriate pests or diseases in (b) above.
- d) Most scripts named a suitable control method for the pests and diseases, provided the latter were relevant to the named crops.

**Q20** Describe how **EACH** of the following affect the choice of a site for the production of outdoor food crops:

i) soils;	<b>2</b>
ii) frost susceptibility;	<b>2</b>
iii) shelter;	<b>2</b>
iv) aspect;	<b>2</b>
v) gradient or slope.	<b>2</b>

Marks varied from very low due to lack of detail to fairly good with candidates providing a range of acceptable points. Candidates tended to describe the same points several times e.g. soil types and frost pockets. (Repetition is not rewarded). Candidates did not provide a range of points in each section of the question to gain marks.

Some candidates wasted time by describing the theory behind windbreaks and shelterbelts.

Candidates tended to make comments e.g. avoid a gradient or slope rather than how to deal with one.

**Q21** a) Describe **SIX** factors that need consideration during the appraisal of a site for a new garden. **6**

b) State **EIGHT** requirements that a garden user might wish to be taken into account when planning a new garden. **4**

a) Some candidates confused site appraisal with the client brief or site survey and lost marks.

A number of candidates failed to provide descriptions for the factors named.

A proportion of scripts failed to describe six factors.

b) Most candidates were able to provide eight requirements from a garden user.

A large number of candidates did not qualify their statements and many just listed questions and received half marks.

Some candidates confused user requirements with site appraisal as before.

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