



## RHS LEVEL 2 CERTIFICATE IN HORTICULTURE

**Wednesday 22 June 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	Do not write in this margin
<b>Q1</b>	a) Define the term 'respiration'.		
	b) Name <b>TWO</b> factors that influence respiration.	2	
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<b>Q2</b>	State <b>TWO</b> visible differences between typical monocotyledon and dicotyledon leaves, when seen without magnification.	2	
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	.....		
<b>Q3</b>	a) Define the term 'fruit'.		
	b) State <b>ONE NAMED</b> example of <b>EACH</b> of the following types of fruit:		
	i) succulent;		
	ii) dehiscent.	2	
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Please see over .....

Marks

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**Q4** Define the term 'phototropism'.

**2**

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**Q5** a) Define the term 'parthenocarpy'.

b) Name **ONE** plant example of parthenocarpy.

**2**

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**Q6** Describe **TWO** root adaptations and give a **NAMED** example of **EACH**.

**2**

Root adaptation	Named example

Please turn over .....

- Q7** a) Name **ONE** type of physical seed dormancy.
- b) State **ONE** method of overcoming the dormancy named in a). **2**

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- Q8** a) State what is meant by the term 'hardwood cuttings'.
- b) Name **TWO** plants propagated by hardwood cuttings. **2**

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- Q9** Give **TWO** types of leaf cuttings and give **ONE NAMED** plant propagated by **EACH** method. **2**

Type of leaf cutting	Plant

Marks

Do not  
write  
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**Q10** Name **FOUR** precautions to be taken when using hand-tools for outdoor food production.

2

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**Q11** State **TWO** methods of extending the natural growing season of a **NAMED** salad crop.

2

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**Q12** a) Describe the symptoms of an attack of a **NAMED** pest on a **NAMED** tree fruit.

b) State **ONE** control measure for the pest named in a).

2

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Please turn over .....

**Q13** State what is meant by the term ‘client brief’, in relation to garden planning.

**2**

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**Q14** a) State **ONE** style of garden design.

b) Identify **THREE** characteristics of that style.

**2**

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**Q15** State the meaning of the following terms used in garden planning:

- i) ‘movement’;
- ii) ‘balance’.

**2**

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**The Royal Horticultural Society, Wisley, Woking, Surrey GU23 6QB  
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## **RHS LEVEL 2 CERTIFICATE IN HORTICULTURE**

**Wednesday 22 June 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.

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



Answer **THREE** questions from this section.

			Marks
Q16	a)	Explain how <b>THREE NAMED</b> environmental requirements for the successful germination of seed are provided in soils and composts.	6
	b)	Describe 'epigeal' and 'hypogeal' seed germination.	2
	c)	Name <b>TWO</b> examples of <b>EACH</b> type of germination described in b).	2
Q17	a)	Define the terms 'plant growth' and 'plant development'.	2
	b)	Explain how auxins influence plant growth in <b>TWO</b> distinct horticultural practices or situations.	8
Q18	Describe how <b>EACH</b> of the following factors influence the rooting of soft wood cuttings:		
	i)	juvenility of material;	2
	ii)	nutritional status;	2
	iii)	moisture;	2
	iv)	health status;	2
	v)	temperature.	2
Q19	Describe the factors affecting the choice of cultivar for a <b>NAMED</b> tree fruit under the following headings:		
	i)	rootstocks;	4
	ii)	flowering period;	3
	iii)	pollination.	3

Please see over .....

**Q20** Describe in relation to a **NAMED** vegetable crop.

a) The meaning of the following terms:

i) 'module raising';

**2**

ii) 'direct drilling'.

**2**

b) How crop productivity may be improved by the manipulation of plant spacing and by successional sowing.

**6**

**Q21** a) With the aid of clearly labelled diagrams, describe **THREE** distinct techniques used in completing a linear survey of a garden.

**6**

b) State **ONE** method of recording the survey information on site.

**4**

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## RHS LEVEL 2 CERTIFICATE IN HORTICULTURE

22 June 2011

### Horticulture I

<b>Candidates Registered</b>	402	<b>Pass with Commendation</b>	31 (13.03%)
<b>Candidates Entered</b>	238	<b>Pass</b>	95 (39.92%)
<b>Absent/Withdrawn/Deferred</b>	164	<b>Fail</b>	112 (47.06%)
<b>Total Candidates Passed</b>	126 (52.94%)		

#### 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	a) <i>Define the term 'respiration'.</i>	
	b) <i>Name <b>TWO</b> factors that influence respiration.</i>	2

Many answers correctly defined respiration as the release of energy by the breakdown of carbohydrates, but too many confused respiration with either photosynthesis or transpiration.

Factors affecting respiration include temperature, oxygen, carbon dioxide levels and availability of water.

Q2	<i>State <b>TWO</b> visible differences between typical monocotyledon and dicotyledon leaves, when seen without magnification.</i>	2
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Most candidates were able to answer this question well, with a minority incorrectly stating general class differences rather than those specifically relating to leaves.

Monocotyledons have long strap-like leaves, parallel venation, and sides which are similar in appearance.

Dicotyledon leaves are oval or compound, with midribs and reticulate veins. Leaves often have petioles, and the lower side differs in appearance from the upper.

Q3	a) <i>Define the term 'fruit'.</i>	
	b) <i>State <b>ONE NAMED</b> example of <b>EACH</b> of the following types of fruit:</i>	
	i) <i>succulent;</i>	
	ii) <i>dehiscent.</i>	2

Good definitions of fruits as the structure developed from a flower, usually when fertilized, were given in most scripts. Examples of succulent (fleshy) fruits included Cherry etc., and dehiscent (seed releasing) fruits included Poppy and Iris.

**Q4** Define the term 'phototropism'. **2**

There were some excellent answers to this question, describing how plants grow towards a light source in order to maximise photosynthesis. A small number confused phototropism with photosynthesis.

**Q5** a) Define the term 'parthenocarpy'.  
b) Name **ONE** plant example of parthenocarpy. **2**

A few candidates missed out this question, suggesting that they didn't recognise the term, but the majority gave a good definition of parthenocarpy as the formation of fruits without fertilisation. Good plant examples were often provided, although some lost marks by not giving botanical names.

**Q6** Describe **TWO** root adaptations and give a **NAMED** example of **EACH**. **2**

<b>Root adaptation</b>	<b>Named example</b>

Unfortunately, many candidates lost marks as they just gave a single word answer which did not indicate the reason for the adaptation. E.g. Swollen root rather than enlarged root for storage. Too many answers gave potato as an example which is a stem tuber and therefore not a root adaptation.

**Q7** a) Name **ONE** type of physical seed dormancy.  
b) State **ONE** method of overcoming the dormancy named in a). **2**

A hard testa or seed coat, preventing imbibition was usually correctly given as the example, but some candidates lost marks by simply naming 'stratification', or 'scarificaton' as a type of seed dormancy, rather as methods of overcoming it. Generally, candidates were able to identify 'scarification' as a means of overcoming dormancy when a hard testa was the cause and many gave relevant plant examples to illustrate their answer.

**Q8** a) State what is meant by the term 'hardwood cuttings'.  
b) Name **TWO** plants propagated by hardwood cuttings. **2**

Although some good answers were seen, a number of candidates lost marks by failing to identify accurately the type of wood required for hardwood cuttings, as being fully lignified, current season's growth. Some examples varied widely from the plants commonly propagated by this method, such as *Salix spp.*, *Ribes spp.*, and *Cornus spp.*

**Q9** Give **TWO** types of leaf cuttings and give **ONE NAMED** plant propagated by **EACH** method. **2**

Answers were very disappointing with few candidates gaining full marks. The type of cutting was not accurately identified and the range of plants given as examples showed a distinct lack of knowledge. Examples such as Leaf squares – *Begonia rex*, Leaf sections – *Streptocarpus x hybridus*, and Leaf petiole – *Saintpaulia ionantha* were expected.

**Q10** Name **FOUR** precautions to be taken when using hand-tools for outdoor food production. **2**

The majority of candidates were more concerned with the safety of plants rather than people and lost marks as a result. Simple precautions such as wearing of personal protective clothing, use of sharp tools, well secured handles, training in the safe use of tools etc, were expected.

**Q11** State **TWO** methods of extending the natural growing season of a **NAMED** salad crop. **2**

A few candidates didn't name a crop and consequently were not rewarded. However, most were able to name a relevant crop and suggest methods of extending the natural season. These included: use of glass/green houses, tunnels, cloches, fleece etc., and starting under protection. Successional sowing was often mentioned, but this would not extend the natural season, and was not therefore rewarded.

**Q12** a) Describe the symptoms of an attack of a **NAMED** pest on a **NAMED** tree fruit.  
b) State **ONE** control measure for the pest named in a). **2**

There were some very good answers many naming 'codling moth' with relevant symptoms (Apples with exit hole and cavity inside with frass), and control measures (for example pheromone traps. Unfortunately, some candidates did not describe the symptoms and so lost marks.

**Q13** State what is meant by the term 'client brief', in relation to garden planning. **2**

Most candidates gave a good answer to this question, but many missed out the importance of confirming the requirements of the client in writing, to the agreed list of his/her requirements from the new design.

**Q14** a) State **ONE** style of garden design.  
b) Identify **THREE** characteristics of that style. **2**

This question was answered well with most candidates citing, for example, formal gardens in (a) with three examples in (b), for example straight paths, clipped hedges and regularly shaped beds. There were some other interesting suggestions for (a) but the three characteristics were sometimes more difficult to identify.

**Q15** State the meaning of the following terms used in garden planning:

- i) 'movement';
- ii) 'balance'.

**2**

Some good scripts were seen but confusion with other landscape terms spoiled many others.

Movement can be achieved in the garden, by providing a series of distinct focal points, encouraging the viewer to progress through the design.

Balance is achieved when the scene has objects of the similar visible size symmetrically placed to right and left of the viewer.

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## Section 2 – Structured Questions

**Marks**

**Q16** a) Explain how **THREE NAMED** environmental requirements for the successful germination of seed are provided in soils and composts.

**6**

b) Describe 'epigeal' and 'hypogeal' seed germination.

**2**

c) Name **TWO** examples of **EACH** type of germination described in b).

**2**

a) Most candidates were able to identify three environmental factors; commonly moisture, oxygen availability, and a suitable temperature. Better answers clearly related these factors to the composition of composts and to their management.

b) A majority of scripts correctly distinguished epigeal germination, where the cotyledons appear above the surface of the growing medium, and hypogeal behaviour, where the cotyledons remain below the surface during germination.

c) Examples included: Epigeal: *Phasolus vulgaris*;  
Hypogeal: *Vicia faba*.

**Q17** a) Define the terms 'plant growth' and 'plant development'.

**2**

b) Explain how auxins influence plant growth in **TWO** distinct horticultural practices or situations.

**8**

a) Plant growth – the increase in size/volume of cells, and Plant development – the changes in form resulting from growth/differentiation, were poorly described by many candidates.

b) Better responses described the role of auxins in two of the following situations:

- Seedlings on a windowsill – phototropism (auxin accumulates on dark side of stems causing differential cell expansion which results in seedlings bending towards the light);
- Pruning - apical dominance (auxin produced in the apical bud inhibits growth of lateral buds. Removal of apical bud stimulates the growth of laterals);
- 'Hormone' weed killers. (Auxin at high concentration causes excessive growth of shoots of dicots, and inhibits root action, leading to plant death.);
- Rooting cuttings - auxin in rooting compounds stimulates adventitious root production at the base of stem cuttings;
- Micropropagation – tissue culture (control of root/shoot production by adjusting the ratio of auxin to cytokinin).



**Q18** Describe how **EACH** of the following factors influence the rooting of soft wood cuttings:

- |      |                         |   |
|------|-------------------------|---|
| i)   | juvenility of material; | 2 |
| ii)  | nutritional status;     | 2 |
| iii) | moisture;               | 2 |
| iv)  | health status;          | 2 |
| v)   | temperature.            | 2 |

- i. Juvenility of cutting material was not well covered by the majority of candidates. Some understanding of the principle that the longer that a plant has been growing since it was a seedling, the more difficult it is to root from cuttings, was expected.
- ii. Nutritional status was also poorly understood. Cuttings with a low nitrogen and high carbohydrate content root more quickly and uniformly than the reverse. This can be achieved by taking cuttings from the sunny side of the plant, taking side shoots rather than growing tips, and by stock plant feeding with low nitrogen preparations.
- iii. Most candidates appreciated that cuttings need to be maintained in a turgid condition, throughout the propagation process. Stock plants should be well watered 24 hours before cuttings are taken, early in the day. Material should be kept cool in polythene bags, until being made into cuttings. Water in immediately after insertion to the cutting medium.
- iv. There was a good appreciation of the importance of making cuttings with material taken from healthy stock plants, and of hygiene in the process.
- v. The effect of temperature – particularly of bottom heat on rooting was well understood, as was the importance of keeping the shoots relatively cool.

**Q19** Describe the factors affecting the choice of cultivar for a **NAMED** tree fruit under the following headings:

- |      |                   |   |
|------|-------------------|---|
| i)   | rootstocks;       | 4 |
| ii)  | flowering period; | 3 |
| iii) | pollination.      | 3 |

- i. Most candidates were able to quote a suitable example of a fruit tree. The role of rootstocks in the control of plant vigour, size, pest and disease resistance, and in the manipulation of plant growth was well understood.
- ii. The fact that fruit trees flower over a period of some weeks was appreciated by many, and the importance of choosing cultivars which flower at the same time to ensure successful cross pollination was also well covered.
- iii. Most candidates stated that fertilisation generally requires at least two different varieties, which are compatible. Pollination can be improved by the use of wind breaks, and the introduction of pollinating insects.

**Q20** Describe in relation to a **NAMED** vegetable crop.

a) The meaning of the following terms:

- |     |                    |   |
|-----|--------------------|---|
| i)  | 'module raising';  | 2 |
| ii) | 'direct drilling'. | 2 |

b) How crop productivity may be improved by the manipulation of plant spacing and by successional sowing.

6

- a) i) & ii) Reasonable descriptions of the processes involved in raising plants in modules and by direct drilling were seen in most scripts. Better answers stated

the relative advantages and limitations of each technique, viz. - Modules –  
Advantages: plants available earlier for planting out, less root disturbance,  
prevention of spread of soil borne diseases e.g. club root of cabbages.  
Disadvantages: Need for glasshouse space, cost of extra material for modules,  
need for more care in irrigation and nutrition.

- b) The best answers included discussion of multi-seeding, intercropping, bed cultivation, staggered planting in rows, and successional planting.

**Q21** a) *With the aid of clearly labelled diagrams, describe **THREE** distinct techniques used in completing a linear survey of a garden.* **6**

b) *State **ONE** method of recording the survey information on site.* **4**

Most candidates, who attempted this question, described three methods of successfully completing a garden survey. Unfortunately there were very few adequate descriptions of how the readings can be recorded in a notebook or on a sketch pad to enable a satisfactory plan to be drawn up subsequently.

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