



RHS LEVEL 2 CERTIFICATE IN HORTICULTURE

Wednesday 23 June 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	Do not write in this margin
Q1	Define the terms: i) herbaceous perennial; ii) half-hardy annual.	2	
		
Q2	State the function of EACH of the following: i) the root cap; ii) root hairs.	2	
		
Q3	State the function of the following tissues: i) phloem; ii) xylem.	2	
		

Q4 a) Define the term 'dioecious'.

b) Name **ONE** dioecious plant.

2

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Q5 State **TWO** characteristics of **EACH** of the following:

- i) wind pollinated plants;
- ii) insect pollinated plants.

2

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Q6 For **TWO** of the functions listed, complete the table below in relation to stem adaptations/modifications.

2

Function	Name of stem adaptation/modifications	Named plant example
Food storage		
Vegetative reproduction		
Defence		

Q7 State **TWO** benefits of vegetative plant propagation.

2

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Q8 State how **FOUR** different environmental factors affect the successful rooting of stem cuttings.

2

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Q9 a) Identify **TWO** different methods of propagating herbaceous perennials.

b) Give **TWO** different plant examples, **ONE** for **EACH** propagation method stated in a).

2

	Propagation method	Plant example
1		
2		

Marks

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Q10 List **FOUR** factors to be considered when selecting a site for outdoor food production.

2

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Q11 List in sequence, **FOUR** cultivation tasks required between growing seasons to prepare a seedbed for outdoor vegetable production.

2

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Q12 a) Define 'successional sowing'.

b) Name **ONE** crop that can be successional sown.

2

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Please turn over

Q13 List **FOUR** soil related factors to be appraised when planning a new garden.

2

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Q14 Identify **FOUR** considerations when choosing a site for a conservatory.

2

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Q15 State how the choice of plants to form a hedge is influenced by **EACH** of the following requirements:

- i) unity;
- ii) low maintenance.

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 23 June 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
Q16	a) Define juvenility in relation to flowering.	1
	b) Describe TWO horticultural practices where juvenile growth is useful, giving NAMED examples for EACH practice.	4
	c) Draw a large, clearly labelled diagram showing the structure of a typical dicotyledonous flower.	5
Q17	a) Define the terms:	
	i) 'photosynthesis';	
	ii) 'transpiration'.	2
	b) List FOUR external features of a typical leaf.	4
	c) Describe how TWO of the features listed in b) vary between plants, using TWO different NAMED examples for EACH .	4
Q18	a) List FOUR requirements for successful germination of seeds.	2
	b) Define the terms:	
	i) 'physical seed dormancy';	
	ii) 'physiological seed dormancy'.	2
	c) Describe ONE method of overcoming the following types of seed dormancy:	
	i) 'physical';	3
	ii) 'physiological'.	3

Please see over

- Q19** a) State **THREE** distinct ways in which the following can be carried out in an environmentally sustainable manner:
- i) propagating vegetables from seed started in containers; **3**
 - ii) weed control in the fruit garden; **3**
 - iii) pest management in the vegetable plot. **3**
- b) State **TWO** reasons for adopting environmentally sustainable practices in the fruit and vegetable garden. **1**
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- Q20** a) Define the term 'unity' in relation to garden planning. **2**
- b) Draw labelled sketch plan(s) to show how 'unity' can be achieved using **FOUR** of the following:
- i) 'rhythm';
 - ii) 'proportion';
 - iii) 'texture';
 - iv) 'colour';
 - v) 'balance'. **8**
-
- Q21** a) Identify **TWO** risks to consider when planning a garden for **EACH** of the following:
- i) use of water in ponds; **2**
 - ii) choice of plants; **2**
 - iii) hard landscape materials. **2**
- b) Describe how **TWO** of the risks identified in a) can be reduced. **4**

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RHS LEVEL 2 CERTIFICATE IN HORTICULTURE

23 June 2010

Horticulture I

Candidates Registered	1628	Pass with Commendation	600 (44.58%)
Candidates Entered	1346	Pass	499 (37.07%)
Absent/Withdrawn/Deferred	282	Fail	247 (18.35%)
Total Candidates Passed	1099 (81.65%)		

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 be 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. 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 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 the terms:

- i) *herbaceous perennial*;
- ii) *half-hardy annual*.

2

Some excellent answers were received, however there was some confusion shown in others.

- i) A key phrase defining an herbaceous perennial is 'non-woody'. Unfortunately this was not included in many answers. Candidates often mentioned dying down to the ground in winter. However, some herbaceous perennials are evergreen.
- ii) Most answers correctly defined half-hardy annuals as plants grown as if they had a life span of one growing season, and which are not frost-hardy. A significant number of candidates wrongly stated that these plants were frost tolerant to - 5 degrees Celsius, or less.

Q2 State the function of **EACH** of the following:

- i) *the root cap*;
- ii) *root hairs*.

2

This question was answered well with the majority of candidates

identifying the protective function of the root cap and the root hairs'
function of increasing the area of root available for water absorption.

Q3 State the function of the following tissues:

- i) *phloem*;
- ii) *xylem*.

2

This question was answered well with only a very tiny minority confusing the two tissues. Some answers were very full and showed a thorough knowledge of the subject. Phloem tissue carries carbohydrates in solution from the green (chlorophyll containing) parts of the plant to other tissues. Xylem conveys water and dissolved mineral nutrients from the roots to the remainder of the plant.

Q4 a) Define the term 'dioecious'.

b) Name **ONE** dioecious plant.

2

Most candidates accurately defined the term 'dioecious' often quoting 'two households'. The usual example given was *Ilex aquifolium*, although there were some interesting other examples. Unfortunately, some candidates misread 'dioecious' and described 'deciduous' plants whilst others confused 'dioecious' with 'monoecious' plants.

Q5 State **TWO** characteristics of **EACH** of the following:

- i) *wind pollinated plants*;
- ii) *insect pollinated plants*.

2

Many good answers were seen, although some candidates confused pollination with seed dispersal – dandelions (*Taraxacum officinale*) for example. Some incorrectly stated that all monocotyledons were wind pollinated.

Q6 For **TWO** of the functions listed, complete the table below in relation to stem adaptations/modifications.

2

Function	Name of stem adaptation/modifications	Named plant example
<i>Food storage</i>		
<i>Vegetative reproduction</i>		
<i>Defence</i>		

Most candidates gave examples of potatoes (*Solanum tuberosum*) for food storage; strawberries (*Fragaria x ananassa*) for vegetative reproduction and Rose family (e.g. *Rosa canina*) for thorns and thus defence. Only two examples were required (the first two were taken if three were given). Some answers suggested modified roots rather than stems.

Q7 State **TWO** benefits of vegetative plant propagation. **2**

The majority of candidates correctly stated that the resulting plants would be a clone of the parent. The second reason varied from cheaper (not acceptable) to quicker, without giving a comparison (also not accepted), whilst others correctly stated that the method would be quicker than producing from seed as the juvenile phase would be by-passed.

Q8 State how **FOUR** different environmental factors affect the successful rooting of stem cuttings. **2**

Some good responses were seen. However, a key word in the question was 'how', and unfortunately, many candidates failed to read the question correctly. Many listed the factors well but failed to state why they were important. Expected responses included: high humidity preventing transpiration from cuttings; high basal temperature for rapid cell division and root production; relatively low aerial temperature reducing transpiration; frequent ventilation / air movement preventing germination of fungal spores and subsequent disease.

Q9 a) Identify **TWO** different methods of propagating herbaceous perennials.
b) Give **TWO** different plant examples, **ONE** for **EACH** propagation method stated in a). **2**

	Propagation method	Plant example
1		
2		

This question gave plenty of scope for candidates to show their knowledge and whilst many gave good examples there were those who weren't accurate; some misread the term 'herbaceous perennials' and gave examples of woody plants. Others showed a good knowledge of those subjects which can be propagated by root cuttings, and those reproduced by division.

Q10 List **FOUR** factors to be considered when selecting a site for outdoor food production. **2**

Most candidates ably listed four factors, including topsoil depth, soil pH, the presence of shelter, absence of frost hollows, lack of shade, presence of perennial weeds, previous land use etc.

Q11 List in sequence, **FOUR** cultivation tasks required between growing seasons to prepare a seedbed for outdoor vegetable production. **2**

This was not answered well, with a distinct lack of understanding of fundamental soil preparation practices. Some candidates did well

(presumably those who had direct experience of vegetable growing), but most were confused over the sequencing of operations (it did not matter when the sequence started so long as it followed on). Many answers, for example, gave digging followed by sowing a green manure, followed by digging again and then adding organic matter. Basic cultivation practices should be well understood at this level.

Q12 a) Define 'successional sowing'.

b) Name **ONE** crop that can be successional sown.

2

Generally answered well with a clear understanding of the subject, lettuce, carrots and peas being popular examples. Some candidates mentioned early, mid-season and late varieties as a means of producing a succession in addition to sowings at regular intervals. Unfortunately, there were no bonus marks for this extra information.

Q13 List **FOUR** soil related factors to be appraised when planning a new garden.

2

Answered well with most candidates listing such things as structure, texture, pH, drainage or soil depth. Some ran out of examples and so lost marks.

Q14 Identify **FOUR** considerations when choosing a site for a conservatory.

2

There were some good responses. Unfortunately however, many candidates failed to indicate how the site for a conservatory should be chosen. However many responses included relevant points such as: light requirements – south facing or otherwise; not being overshadowed; levels; suitable access to the house. Others dwelt too much on details of possible plants to be grown or of where the services might be found, and accordingly were not rewarded.

Q15 State how the choice of plants to form a hedge is influenced by **EACH** of the following requirements:

- i) unity;
- ii) low maintenance.

2

The answers were very variable:

- i) There was misunderstanding over the term 'unity' (a design in which the components relate to each other harmoniously to create one whole) and where it applied. It was in relation to the rest of the garden and not just to the hedge.
- ii) 'Low maintenance' was better understood, but again the examples cited were not always appropriate.

Section 2 – Structured Questions

Marks

- Q16**
- | | | |
|----|---|---|
| a) | Define juvenility in relation to flowering. | 1 |
| b) | Describe TWO horticultural practices where juvenile growth is useful, giving NAMED examples for EACH practice. | 4 |
| c) | Draw a large, clearly labelled diagram showing the structure of a typical dicotyledonous flower. | 5 |

a) Nearly all candidates understood that juvenility is the period of growth when plants are not yet able to flower.

b) Many possible horticultural practices where juvenility is an advantage were described. These included:

- Use of young/non-flowering growth for softwood stem cuttings which root more easily;
- Pruning of deciduous hedges to retain leaves in winter;
- Coppicing, stooling or pollarding to produce ornamental leaves or good stem colour;
- Cultivation of leafy vegetables to prevent bolting;
- Stooling to produce material which roots well from layers, budding using vegetative buds;
- Pruning to prevent flowering in formal hedges.

Better responses linked the practices with the advantages of juvenility and gave appropriate plant examples.

c) Diagrams were generally well drawn and comprehensively labelled.

- Q17**
- | | | |
|----|--|---|
| a) | Define the terms:
i) 'photosynthesis';
ii) 'transpiration'. | 2 |
| b) | List FOUR external features of a typical leaf. | 4 |
| c) | Describe how TWO of the features listed in b) vary between plants, using TWO different NAMED examples for EACH . | 4 |

a) A definition was all that was required here, so long descriptions of photosynthesis and transpiration were unnecessary. Definitions of photosynthesis must include all the factors in the photosynthetic equation including sunlight energy, chlorophyll and oxygen as a waste product. The photosynthetic equation is perfectly acceptable provided it is given in words to show that the candidate understands the meaning of the symbols. Better candidates appreciated that transpiration relates only to the loss of water vapour from the leaves and other plant surfaces and not to movement of water through the plant.

b) Four external leaf features were generally identified well (e.g. petiole, lamina, midrib and veins, margin, epidermis and cuticle, stomata, leaf hairs). Listing was sufficient for full marks rather than a full description.

c) Better responses chose features from the list in (b) and gave full

descriptions of two plants using suitable examples in which the feature contrasted e.g. twining petioles and absent petioles (sessile leaves). Several candidates wrongly quoted *Quercus petraea* which has sessile acorns, not leaves.

- Q18** a) List **FOUR** requirements for successful germination of seeds. **2**
- b) Define the terms:
- i) 'physical seed dormancy';
 - ii) 'physiological seed dormancy'. **2**
- c) Describe **ONE** method of overcoming the following types of seed dormancy:
- i) 'physical'; **3**
 - ii) 'physiological'. **3**

a) The requirements for successful seed germination were generally well known. Better candidates gave 'a suitable temperature' rather than 'heat' or 'warmth'. Other requirements included oxygen / air, moisture, viability and, in some cases, light. Compost / soil etc. is not a requirement – seeds can germinate without these.

b) The causes of physical dormancy e.g. a hard seed coat preventing uptake of water and oxygen and restriction of the embryo, and physiological dormancy e.g. presence of germination inhibitors or immature embryos, were well understood and full definitions were rewarded. Many candidates included methods for breaking dormancy here rather than in part (c).

c) Better candidates gave detailed descriptions of suitable methods and provided only ONE method, as asked, for each type of dormancy rather than a whole list for which they could not be credited marks.

- Q19** a) State **THREE** distinct ways in which the following can be carried out in an environmentally sustainable manner:
- i) propagating vegetables from seed started in containers; **3**
 - ii) weed control in the fruit garden; **3**
 - iii) pest management in the vegetable plot. **3**
- b) State **TWO** reasons for adopting environmentally sustainable practices in the fruit and vegetable garden. **1**

- a) The best scripts explained fully the practice itself and its alternatives giving examples:
- i) e.g. biodegradable containers made from compressed paper, for example, are more sustainable than plastic containers which do not degrade.
 - ii) e.g. mulching with bark chips, for example, reduces weed growth so less herbicides are needed.

iii) e.g. attracting predators into the garden, for example planting flowers to encourage lacewings which eat aphids, reduces the need for pesticides (see (ii) above).

- b) Better answers were more detailed e.g. home grown lettuce reduces food miles so reducing the carbon footprint, or avoiding chemical usage reduces the risk of contaminating food so could be better for health.
Vague statements like 'organic methods are better for the environment' did not gain marks.

Q20	a) Define the term 'unity' in relation to garden planning.	2
	b) Draw labelled sketch plan(s) to show how 'unity' can be achieved using FOUR of the following:	
	i) 'rhythm';	
	ii) 'proportion';	
	iii) 'texture';	
	iv) 'colour';	
	v) 'balance'.	8

Answers to this question, when chosen, were generally disappointing. Sketches were generally poor or absent.

In part (a) the concept of unity was often not fully understood as a design in which the components relate to each other harmoniously to create one whole.

In part (b) better candidates could explain each heading in relation to unity in the design rather than just describing what was meant by balance, texture etc. and show the concept on the plan rather than just drawing a general garden design.

- i. Rhythm – the repetition of objects, surfaces, colours, or materials in the landscape to bring about a sense of unity.
- ii. Proportion – the relationship between width, height and depth of objects in the landscape, to obtain a unified whole.
- iii. Texture-when light strikes a surface, the size of any shadows formed depends on the roughness of the surface. The bigger the shadows, the bigger the contrast between light and dark, and the courser the texture.
- iv. Colour – unity can be achieved by repetition and use of complementary colours.
- v. Balance – The objects in a design should have equal visual weight on each side of the picture.

Q21	a) Identify TWO risks to consider when planning a garden for EACH of the following:	
	i) use of water in ponds;	2
	ii) choice of plants;	2
	iii) hard landscape materials.	2
	b) Describe how TWO of the risks identified in a) can be reduced.	4

a) Some good answers were seen but many candidates had difficulty clearly identifying the risks. For example, better responses would mention that the risk with water usage in ponds is that children could drown rather than just 'children falling in'. Similarly describing paving as slippery did not attract full marks whereas carrying this through to say that slipperiness can lead to falling and injury did. Another example was candidates who mentioned spiny plants but failed to add that the risk was scratching, injury to skin, hand or eyes.

b) Good detail was needed for full marks, for example, a pond can be made safe with a range of methods not just one, such as a rigid grid (not netting) to cover and prevent children falling in, a barrier such as a fence to keep children out, using an alternative such as a bubble fountain and making the pond visible so children can be supervised. Candidates should gauge the depth of their answers from the marks allocated.

Many candidates mixed up parts (a) and (b) in the text.

Risks were to *humans only*, not to animals, pets or plants in the garden.

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