



RHS Qualifications

Examination:	RHS Level 2
Unit:	Unit 1
Examination date:	June 2023

General Introductory Comments

This is the second examination in the first teaching year of the the new RHS Level 2 Certificate in the Principles of Plant Growth and Development.

The majority of candidates entered for the examination were able to provide answers to all of the questions, which is a key indicator that the paper was accessible.

Candidates responded to many questions on the paper, with thorough, and well-developed answers, that demonstrated a secure knowledge of the topic areas.

All centres are advised to ensure that candidates have been thoroughly prepared for the examination.

This report is authored by senior examiners within RHS Qualifications. Its aim is to summarise the performance of candidates and provide guidance and support to both potential candidates and the teaching staff at RHS approved centres.

Overview of Examination

Levels of demand

Questions were set at three levels of demand within this paper.

Questions that require a recall of basic factual knowledge are classified as being **low demand**.

Questions that require the recall of more technical concepts or the application of knowledge are classified as **medium demand**.

Questions that require the recall of advanced technical concepts, the application of these concepts and the integration of these concepts across topics, are classified as **high demand**.

General comments

An analysis of scripts has indicated that strong candidate responses shared many common characteristics:

- evidenced careful reading of the question
- met the requirements of the command words contained in the question
- provided responses that were fully relevant to the question
- provided responses with the necessary level of information
- were produced with clear, legible handwriting
- used appropriate technical terminology correctly
- gave full scientific names, when providing plant examples
- gave the appropriate number of responses, e.g. name two...
- successfully applied knowledge to new scenarios and situations
- evidenced planning of responses in long form answers
- integrated their long form responses into a number of relevant Topics, and Qualification-wide outcomes.

Candidates and centres are advised to review the above exemplars of good practice as they prepare for future examination series.

Section A

General comments on Section A

The forced answer questions are designed to test candidate's knowledge and understanding of the concepts covered in the 8 Topics and the 4 Qualification-wide outcomes that make up the qualification.

Section B

Each question is considered separately.

Question 1

Part a) of this question required the candidate to name two annual weeds.

Strong candidate responses included the scientific name of an annual weed.

Candidates who scored low marks in this question provided common names, rather than scientific plant names, or named perennial or biennial weeds rather than annual weed as instructed in the question.

Note: candidate responses where the scientific name was incorrectly spelled were credited with full marks.

Part b) of this question required the candidate to name two perennial weeds.

Strong candidate responses included the scientific name of a perennial weed.

Candidates who scored low marks in this question provided common names, rather than scientific plant names, or named annual or biennial weeds rather than perennial weed as instructed in the question.

Note: candidate responses where the scientific name was incorrectly spelled were credited with full marks.

In part c) of this question candidates were asked to state three advantages of weeds in sustainable gardens. Correct candidate responses included:

- creation of habitat
- provision of pollen/nectar
- creation of cover to prevent soil erosion
- provision of seed as a food source for small mammals
- provision of ground cover
- act as sacrificial plants, attracting pests from crop plants.

Incorrect candidate responses included:

- stating that weeds are resilient plants
- reduced maintenance
- weeds can be used as companion plants
- weeds can indicate that the soil is not toxic
- they demonstrate that the soil is nutrient rich.

In part d) candidates were instructed to list one way that weeds can negatively influence the establishment of new plants.

Correct candidate responses included:

- weeds can compete with garden plants for nutrition
- weeds can compete with garden plants for water
- weeds can compete with garden plants for light.

In part e) candidates were instructed to list two ways that weeds may positively influence the establishment of new plants.

Correct candidate responses included:

- Leguminous weeds provide nitrogen to aid in the establishment of new plants
- weeds can improve the soil structure, for example through the growth of their tap roots
- weeds can act as buffers from predation offering an alternative food source to local pests and wildlife
- weeds can stabilise slopes to reduce soil disturbance.

Incorrect candidate responses included:

- weeds can attract pollinating insects.
(This is incorrect as it does not relate to plant establishment)
- weeds can be chopped up and incorporated into the soil
(This is incorrect as it is not a direct way that weeds positively influence the establishment of new plants)
- making nutrient rich teas from weeds
(This is incorrect as it is not a direct way that weeds positively influence the establishment of new plants)
- weeds help genetic diversity
(This is incorrect as it does not relate to plant establishment).

Question 2

Part a) of this question required candidates to explain the difference between the term soil texture, and soil structure.

Many candidates failed to gain the full mark allocation through:

- Gaps in knowledge relating to soil texture and soil structure
- A lack of technical language in responses
- Confusion between the terms 'soil texture' and 'soil structure'

Candidates who correctly defined the terms soil texture and soil structure, using appropriate technical language gained full marks.

Part b) required candidates to explain three ways in which the development of a Soil Management Plan could aid the effective management of the soil's organic matter content.

This part of the question revealed significant gaps in candidate knowledge relating to the use of Soil Management Plans. Other candidates gained low marks by failing to relate their knowledge of Soil Management Plans to the effective management of the soil's organic matter content indicating poor examination technique.

Candidates who scored high marks were able to demonstrate a knowledge of the importance of Soil Management Plans (SMP) as a tool. Strong candidate responses included:

- the SMP would allow for the measurement of the soil organic matter level
- this measurement would create a benchmark
- the measurement would allow for monitoring of interventions and the measurement of their effectiveness
- the SMP would allow for the setting up of targets
- the SMP could inform procurement of organic matter, or the setting up of on-site composting
- the SMP can inform cultivation windows to suggest the most effective time for the application of organic matter as part of this process.

Three marks were allocated as individual marks for the basic way in which the development of a Soil Management Plan could aid the effective management of the soil's organic matter content. The remaining three marks were available for developed points and explanations.

Poor candidate responses did not:

- directly reference Soil Management Plans
- reference the management of the soil's organic matter content
- relate to the question, e.g. explaining other factors impacting on soil management.

Question 3

This question started with a brief scenario being set.

‘A new garden is being planted in Autumn 2023.’

Part a) required candidates to state two maintenance tasks that should be undertaken in the first 12 months after planting.

Correct candidate responses included:

- weed control
- pruning
- monitoring of health status
- monitor soil moisture levels.

It is noted that few candidates stated the monitoring of soil moisture levels.

Part b) required the candidate to explain how the concept of Best Practice can be used to ensure that these tasks are undertaken effectively.

This part of the question required the candidate to integrate their knowledge of plant establishment with the Qualification-wide outcome of Best Practice. This part of the question also indicated gaps in teaching and candidate understanding relating to the concept of Best Practice. As this is one of the four Qualification-wide outcomes, centres and candidates are advised to ensure they are fully familiar with this concept.

Strong candidate responses were based on reviewing the concept of Best Practice, explaining how the findings of trials work are adopted by leading gardens, which disseminate their findings to inform horticultural practice.

Candidates scoring the maximum mark allocation were able to relate this concept to the maintenance of soil moisture, sustainable planting practices and weed control.

Candidates who limited their answer to the repetition of the points from section a) or who related their responses to ‘good gardening’ gained low or no marks.

Question 4

This question required candidates to name one piece of legislation that relates to Equality and Diversity within professional Horticulture.

Candidates who correctly stated the Equality Act of 2010 gained the full mark available.

Part b) contained a short scenario, and asked candidates to explain why age groups should not be stated within job advertisements.

Candidates who correctly stated that age is a protected characteristic within the Equality Act of 2010, and therefore cannot be used as a discriminator when creating job advertisements gained full marks.

The second section of part b) asked candidates to list three other protected characteristics.

Candidate responses that included any of the eight remaining protected characteristics were credited full marks.

- Disability
- Gender reassignment
- Marriage and civil partnership
- Pregnancy and maternity
- Race
- Religion or belief
- Sex
- Sexual orientation

Where candidates used different words to express these points they were credited with full marks.

Part c) required candidates to state two advantages of 'inclusive cultures'.

Correct candidate responses included:

- increased engagement
- improved creativity
- improved performance
- better decision making

Some candidates stated that such cultures were more inclusive scored no marks, as the term inclusive culture was within the stem of the question.

Question 5

This question required the candidate to discuss the survival advantages that an annual life cycle offers to plant species.

Candidates who scored highly stated:

- an annual life cycle allows the plant to overwinter
- an annual life cycle allows the plant to survive unfavourable conditions
- an annual life cycle provides the potential for mutations
- an annual life cycle provides seedling vigour.

Candidates who developed their answers with examples, or who discussed how these advantages impact on the survival of the species were awarded additional marks as developed points.

Candidates who scored low marks:

- discussed the differences between hardy and half hardy annuals
- did not relate their answer to plant species
- gave generic points that were not specific to annual life cycles.

Part b) required candidates to state two ways in which climate change could affect the successful cultivation of a named ornamental annual plant in a garden setting.

Candidates scoring high marks:

- named appropriate annual ornamental plants
- stated that summer droughts could lead to restricted growth, leading to plant failure
- insufficient vernalisation could take place, due to rising temperature, leading to plants failing to germinate.

Candidates who scored low marks:

- named perennial plants, rather than annual plants
- failed to link their points to specific, documented, impacts of climate change
- gave incorrect answers.

Question 6

Many candidates gained high marks in this question, having correctly identified the value of Award of Garden Merit (AGM) status when specifying plants as required in part a).

Correct responses included:

- excellent for a wide range of conditions
- good constitution
- reasonably pest and disease resistant
- available
- Stable in form and colour.

Some candidates failed to gain the full mark allocation, as their responses included general comments, for example, 'they do well'. Other incorrect responses included 'they will perform well in any soil' which is incorrect.

Part b) of this question required the candidate to state what was meant by the term 'clonal selection'

The majority of candidates were able to correctly define the term 'clone', however the application of clones into clonal selection schemes was not widely understood, indicating a gap in teaching.

Question 7

This question related to iron deficiency in plants.

Part a) required candidates to explain how an iron deficiency can affect the appearance of the leaves of plants. Correct responses included, interveinal chlorosis, and in more severe cases the loss of chlorophyll leading to white leaves.

Part b) continued the theme of the question by asking candidates to name one plant that can commonly show these symptoms.

Candidates who scored the full mark named a suitable plant using its scientific name.

Part c) allowed candidates to demonstrate a deeper level of knowledge, asking them to suggest why this deficiency could occur.

Correct candidate responses included:

- incorrect soil pH for the plant species
- leaching of iron out of the soil
- irrigation with hard water (water with high levels of calcium) when growing calcifuge plants.

The final part of question 7, part d) required the candidate to state why iron is important for plant growth.

Correct candidate responses included reference to the role of iron in the manufacture of chlorophyll within the plant. Other possible answers included the role of iron as a catalyst in processes such as photosynthesis.

Section C

Section C candidate responses are graded against the assessment ladder, which is on the next page of this report. Candidates and centres are advised to review the ladder as this indicates how the assessment decisions are made, when grading long form responses.

Candidate performance in Section C ranges from those candidates who:

- were prepared to produce long form responses
- were taught to logically answer questions
- shared horticultural knowledge that is both relevant to the question and at a good standard of detail

through to candidates who:

- were not prepared for the production of long form responses.
- produced responses that were only partially relevant to the question
- provided responses that were lacking in technical content and detail.

In addition to the assessment ladder candidate responses are also reviewed against the criteria set out below:

Indicative content

- Strength of response.
- Integration.
- Horticultural knowledge.

Strength of response:

Strong candidate responses:

- developed a logical argument to answer the question
- drew on reliable information sources
- were relevant to the question
- expressed clarity of thought
- demonstrated knowledge of horticultural practices.

Integration:

Candidate responses should integrate with other relevant areas of the syllabus.

Assessment ladder (for information)

Band	Mark range	Summary	Description
4	12 - 15	Fully developed (Total)	<p>A highly detailed, comprehensive, fully relevant response, addressing all aspects of the question</p> <ul style="list-style-type: none"> <input type="checkbox"/> No irrelevant or incorrect material or observations at the top end of the mark range: otherwise only very minor errors/omissions (which do not detract from an otherwise strong response) <input type="checkbox"/> Full integration/clear links demonstrated with other appropriate topics as required: a holistic approach <input type="checkbox"/> Advanced current professional horticultural knowledge/principles demonstrated (and evidence of advanced material beyond the specification at the top end of mark range) <input type="checkbox"/> Consistent use of correct and appropriate technical language.
3	9 - 11	Mainly developed (Solid)	<p>A reasonably detailed and fairly comprehensive response, with mostly relevant observations, addressing most of the key elements of the question</p> <ul style="list-style-type: none"> <input type="checkbox"/> Some minor evidence of irrelevant or incorrect material or observations (in what is otherwise a good response), with occasional lack of detail/omissions at times <input type="checkbox"/> Secure evidence of some appropriate integration with other topics but some linked topic areas are occasionally overlooked or incorrect associations are made: a partially holistic approach <input type="checkbox"/> Current professional horticultural knowledge/principles demonstrated most of the time, with occasional errors, but largely appropriate explanations and application <input type="checkbox"/> Correct and appropriate technical language demonstrated most of the time, with some minor errors.
2	6 - 8	Rudimentary (Basic)	<p>A largely basic response with some relevant observations, addressing some key elements of the question</p> <ul style="list-style-type: none"> <input type="checkbox"/> Some significant evidence of irrelevant or incorrect material and frequent lack of detail, with some key areas overlooked <input type="checkbox"/> Occasional evidence of correct integration with other topics, but many areas are overlooked and incorrect associations made: little evidence of a holistic approach <input type="checkbox"/> Current professional horticultural knowledge/principles demonstrated some of the time, but with frequent errors, and only basic explanations or application <input type="checkbox"/> Correct and appropriate technical language only partially demonstrated but limited. Some key errors.
1	0 - 5	Undeveloped (Unsatisfactory)	<p>A largely poor response with few relevant observations, addressing few of the key elements of the question</p> <ul style="list-style-type: none"> <input type="checkbox"/> Material is largely irrelevant or incorrect and lacking in any detail, with many key areas overlooked <input type="checkbox"/> No, or very little evidence of correct integration with other topics, with many areas overlooked and incorrect associations made: no evidence of a holistic approach <input type="checkbox"/> No or little evidence of current professional horticultural knowledge/principles demonstrated, with poor or incorrect explanations or application <input type="checkbox"/> Little (if any) technical language demonstrated. Often incorrect. Key errors.

Question 1

This question required candidates to discuss, using their knowledge of Plant Science, Sustainability, and Best Practice, the advantages that Garden Health Plans offer the horticulturist.

When grading candidates, markers took account of either breadth or depth of knowledge, crediting candidates who gave narrower, but highly detailed answers with the equivalent mark as candidates who discussed a wider range of considerations.

Candidates who scored marks in the higher bands considered a wide range of relevant factors, these included:

- defining Integrated Pest Management (IPM)
- defining Garden Health Plans
- established the advantages of Garden Health Plans over IPM
 - the inclusion of a range of abiotic factors, e.g. wind
 - the inclusion of nutrient status of the root environment
 - the inclusion of local factors that could influence pest outbreak
 - the impact of other factors, for example the significance of plants within historic landscapes
- the impact of plant science, for example the impact of plant morphology/anatomy on pests
- the impact of plant health, for example specific plant health risks to species, the potential of the spread of pests, the impact of the presence of alternate host plants
- the impact of sustainability, the tolerance of pest populations, the concept of pests as part of food webs, and the concept of right plant right place to mitigate/reduce risks to plant health
- the application of Best Practice, including the application of latest findings regarding Research and Development, along with the application of techniques practiced in leading gardens.

Candidates who scored marks in the lower bands tended to make general comments, which lacked in detail and technical content.

Question 2

This was a popular question with candidates.

This question required candidates to describe how the environmental impact of a project (the ordering of plants for landscape design project) can be reduced by applying sustainable thinking.

When grading candidates, markers took account of either breadth or depth of knowledge, crediting candidates who gave narrower, but highly detailed answers with the equivalent mark as candidates who discussed a wider range of considerations.

Candidates who scored marks in the higher bands considered a wide range of relevant factors, these included full discussions relating to the different factors that could reduce the environmental impacts relating the specification of plant material for projects, to include:

- application of right plant right place in determining plant species to eliminate the need for soil amelioration
- impact of local sourcing on carbon footprints
- impact of smaller plant sizes on water footprints
- impact of local production on the local economy, (three pillars of sustainability)
- impact of recycled pots/plastic free production systems on waste
- the positive impacts of specifying bare root plants for planting
- impact of specifying plants that are produced in peat free growing media
- impact of specifying organic production techniques
- considering the timing of planting/deliveries to reduce the need to force plant material/reduce irrigation requirements.

Candidates who scored marks in the lower bands tended to make general comments, which lacked in detail and technical content. Candidates who discussed planting techniques, scored lower marks as these comments were not relevant to the ordering of plants.

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Question 3

This question required candidates to define the process of photosynthesis, to explain how different environmental factors can be optimised to maximise photosynthesis in named horticultural settings. Candidates were also required to discuss how a changing climate could impact on the process of photosynthesis.

The later part of the question required the candidate to draw on their knowledge of sustainability and climate change, along with their knowledge of plant science and apply this combined knowledge to the scenario. This part of the question was poorly answered by many candidates.

When grading candidates, markers took account of either breadth or depth of knowledge, crediting candidates who gave narrower, but highly detailed answers with the equivalent mark as candidates who discussed a wider range of considerations.

Candidates who scored marks in the higher bands considered a wide range of relevant factors, these included:

- An accurate explanation of the process of photosynthesis
- A horticultural situation, that was appropriate to the candidate response was named
- The methods of maximising photosynthesis could include:
 - CO₂ enrichment in protected structures to 1000ppm
 - ensuring adequate water supply
 - ensuring adequate light transmission in glasshouses
 - the use of supplementary lighting in glasshouses
 - the use of blue/red LED lighting systems
 - the management of relative humidity
 - the provision of heat in protected growing environments
- The impact of a changing climate to include:
 - increased periods of drought, limiting water availability
 - increased CO₂ levels to benefit photosynthesis
 - increased light levels to increase photosynthesis (reduced cloud cover)
 - increased storms/weather events, which damage plant structures, remove leaves and branches and so reduce photosynthesis
 - increased wind, reducing stomatal opening, thus reducing photosynthesis.

Candidates who scored marks in the lower bands tended to make general comments, which lacked in detail and technical content, or did not fully consider the full requirements of the question.

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Question 4

This question required candidates to describe the different staking and support systems that could be used in a given scenario. Candidates were then required to evaluate the support systems against a range of criteria to include sustainability, plant establishment and plant health.

When grading candidates, markers took account of either breadth or depth of knowledge, crediting candidates who gave narrower, but highly detailed answers with the equivalent mark as candidates who discussed a wider range of considerations.

Candidates who scored marks in the higher bands considered a wide range of relevant factors, these included:

- consideration of a range of appropriate staking and support systems that were appropriate to the scenario 'a range of trees and climbing plants growing in a walled garden'.
- evaluation of support systems against sustainable criteria to include:
 - transport implications, i.e. canes being transported from China
 - the use of plastics
 - the use of FSC certified timber (or other equivalent schemes)
- evaluation of plant establishment criteria to include:
 - reduced wind rock
 - reduced movement of plants in the soil
 - enabling the establishment of strong root systems
- evaluation of plant health criteria to include:
 - potential plant health risk from wood and other materials
 - reduced air movement from placement/positioning/design of structures

Candidates who scored marks in the lower bands tended to make general comments, which lacked in detail and technical, content, or did not fully evaluate the plant supports against the range of criteria as required by the question.