

L3 Lead Examiner Report 2001

January 2020

**L3 BTEC Nationals in Agriculture; Countryside
Management; Forestry and Arboriculture;
Horticulture: Plant and Soil Science**

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A grade boundary is where we set the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade, at Distinction, Merit and Pass.

Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the external assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries – this means that they decide what the lowest possible mark is for a particular grade.

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Variations in external assessments

Each external assessment we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries for each assessment, because then it would not take accessibility into account.

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Plant and Soil Science 20066K

Grade	Unclassified	Level 3			
		N	P	M	D
Boundary Mark	0	11	23	38	53

Introduction

January 2020 was the first opportunity learners had to take this externally assessed element of the Plant and Soil Science unit. This forms part of the new specification, many centres had been involved with the previous (QCF) specification for a number of years which included internally assessed assignments. The move to an exam based format means that teaching teams have needed to prepare learners in a different way for assessment.

Introduction to the Overall Performance of the Unit

As identified above, this is the first opportunity for learners to be assessed within this unit. The format follows the Sample Assessment Material (SAM) closely which has enabled this material to be suitable examination preparation.

Whilst responses from learners showed there had been good coverage of the unit content within the centres in many cases responses was at a too superficial level and sometimes lacked understanding of the significance of the command verbs (Explain, Describe etc).

The structure of this paper allows learners to write specific comments in some questions, others provide opportunities to write in a more extended manner. These questions (6 or 8 marks), are marked according to the level of response i.e. the quality of the answer rather than merely the number of accurate points made. This allows for the development of key concepts and ideas.

Individual Questions

This section considers each question on the paper, providing examples of popular learner responses and a brief commentary on why they achieved their marks within the mark scheme. This section should be considered with the live assessment material.

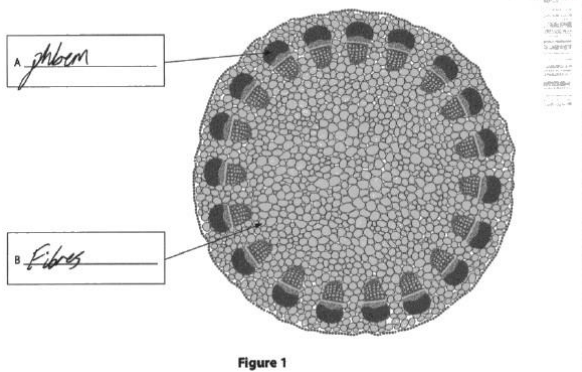
Question 1

Q1 (a)

The opening question of the paper proved to be surprisingly challenging for many learners despite being a topic which would have also been studied earlier in their academic career. The style of question was identical to those within the published Sample Assessment materials (SAMs). 2 marks were available.

1 Figure 1 shows a cross-section of a dicotyledon stem.

(a) Label structures A and B in Figure 1.



1 mark

The learner has successfully identified the phloem within the cross section however many incorrectly labelled this as xylem. The use of the word 'fibres' was not sufficiently accurate to be given a mark. The expected response was 'parenchyma'.

Q1 (b)

Another accessible question, learners were required to state two functions of the xylem. The command verb 'give' meant that simple statements were required without further explanation of description.

(b) Give **two** functions of xylem in a plant.

(2) **2** Q01b

- 1 Transports water through plant
- 2 Transports nutrients through plant

2 marks

The learner has clearly identified two distinct functions, many others correctly stated its role within the mechanical support of the plant.

(b) Give **two** functions of xylem in a plant.

(2) **0** Q01b

- 1 Xylem stores water for the plant.
- 2 Xylem helps keep the plant's moisture.

0 marks

While the learner in this response clearly understands there is a link between xylem and water the function is related to transportation rather than storage.

Q1 (c)

This question proved to more challenging to many learners. Many failed to accurately read the question and stated other differences within the plant rather than the flower.

(c) State how a monocotyledon flower is different in structure to a dicotyledon flower.

(2)2 Q01c

- 1 monocot flower parts are a multiple of 3 while dicot flower parts are a multiple of 4 or 5
- 2 dicot flowers allow entomophilous pollination while monocot are anemophilous

2 marks

The learner correctly identified the typically arrangement of monocotyledon flower parts in 3s and dicotyledons in 4s or 5s. Whilst the learner has abbreviated the key terms they were still considered to be clearly communicated.

(c) State how a monocotyledon flower is different in structure to a dicotyledon flower.

(2)0 Q01c

- 1 monocotyledon has a singular main vascular bundle while the dicot has multiple in the stems and branches in the leaves
- 2 monocot starts life with a singular leaf while dicot starts with 2 leaves

0 marks

This response has failed to note that the question needed to focus on the flower structure. Other characteristics were not given credit.

Q1 (d)

This question required a deeper response. The command word 'Explain' requires learners to provide a more developed answer. The focus of this question is on the understanding of the purpose and adaptations of plant structures for food storage.

(d) Explain **two** ways plant structures are adapted to store food.

(4) Q01d

1 TUBERS ATTACHED TO THE ROOTS CAN STORE FOOD IN THE FORM OF STARCH THAT CAN BE USED IN FUTURE GERMINATION

2 BULBS STORE FOOD OVER THE WINTER AND THE FOOD IS USED TO REGROW THE FLOWERING BODY IN THE SPRING

3 marks

The learner has successfully named two adapted storage organs (tubers and bulbs). The link to the tuber being an adapted root was credited but there was link for the bulb (adapted leaves).

(d) Explain **two** ways plant structures are adapted to store food.

(4) **0** Q01d

1 The leaves of a plant are storages of food & energy
 with some species ~~have~~ having ~~leaves~~ ^{sleshy} leaves for storing
 water ~~&~~ food.

2 Roots are storages for food ~~leaves~~

0 marks

This response fails to relate their response to the adaptation of the plant structures i.e.. how is the root adapted? Similarly there is no detail of the adaptation of the leaves. There is also confusion between the storage of water which was not required within the question.

Q1 (e)

This question required learners to analyse how plant storage structures enable asexual reproduction. Most responses showed an understanding of the term 'asexual' although the depth of responses would indicate that the requirements of the instruction to 'analyse' was less well understood. Often responses were too superficial in their content.

(e) Analyse how plant storage structures are used in asexual reproduction.

(6) 4 Q01e

Rhizomes form lateral roots under ground and from this food store new shoots come up from the lateral root as a new plant. an example of this is ginger. since they create new shoots from their root systems they do not need to cross-pollinate as they can create new plants from itself. this is good as these plants do not have to rely on others to reproduce however there is less variety and more mutation/diseases to transfer from one growth to the next as they are created by a direct connection.

4 marks

This level of response question allowed the learner to provide an extensive answer. They describe rhizomes and their orientation within the soil and also gives an example. It also provides a benefit of asexual reproduction but much of the later text does not directly answer the question posed. The response could be improved by being more focussed on the specific question posed and by providing details of other storage organs and how this reproduction might take place.

(e) Analyse how plant storage structures are used in asexual reproduction.

(6) 0 Q01e

It's stored in the stigma of the plant and is fertilized by the stigma

0 marks

This response does not relate to asexual reproduction. If this was correctly stated, it would still score poorly as there is no detail or analysis within the answer.

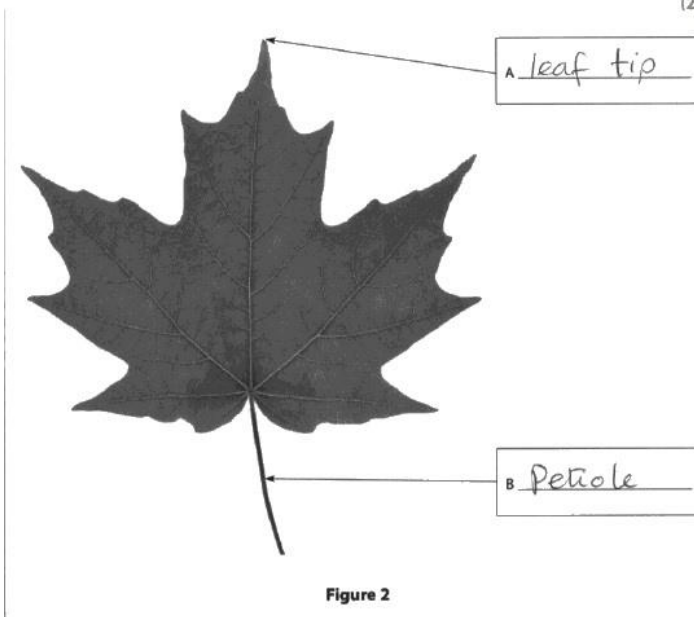
Question 2

Q2 (a)

Another question requiring the identification of plant structures, this time externally. This question mirrors those present within the Sample Assessment Materials (SAMs), and proved to be accessible to many learners. There was a correlation between the successes in achievement with the centre which would suggest differences within the depth the topic had been studied.

2 (a) Figure 2 shows the structure of a leaf.
Label areas A and B on this leaf.

(2) 2 Q02a



2 marks

Both structures clearly identified, the use of the term apex was also credited for leaf tip.

2 (a) Figure 2 shows the structure of a leaf.
Label areas A and B on this leaf.

(2) 0 Q02a

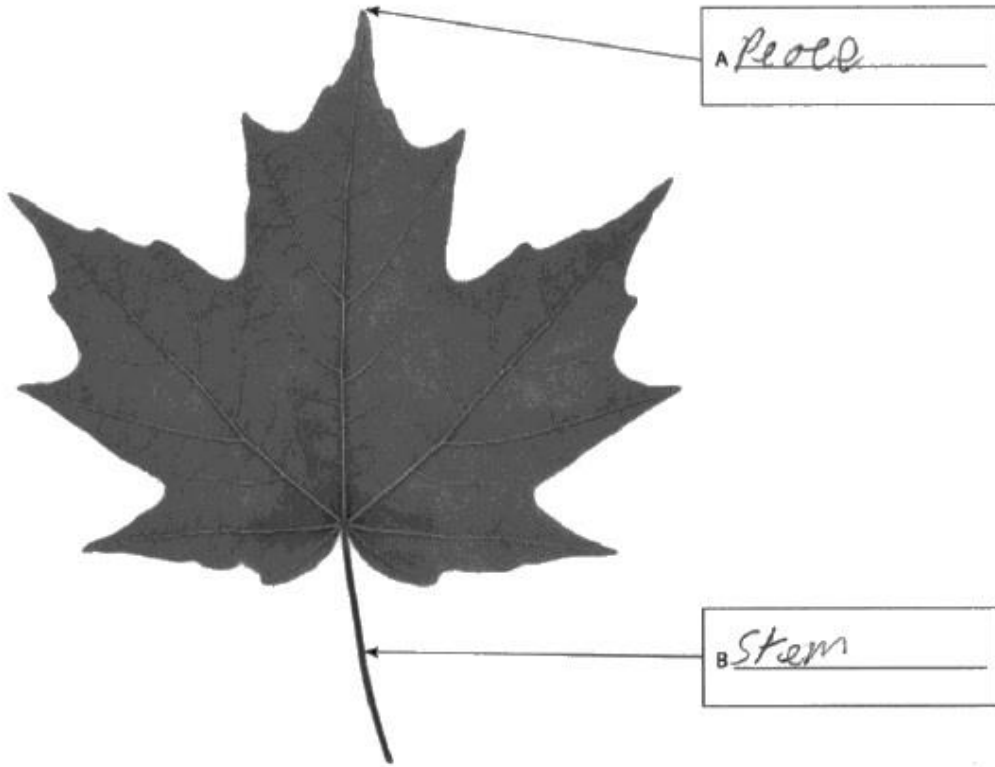


Figure 2

0 marks

Many learners used the incorrect term 'stem' to describe the leaf petiole.

Q2 (b)

This proved to be surprisingly challenging for this cohort of learners. The unit specification lists a small number of plants, of which *Ilex* (Holly) is one. Some responses were very generic and could be applied to any or many leaves and were not particularly specific to *Ilex*, these more generic comments were not given credit.

(b) Describe the characteristics of an *Ilex* leaf.

(4) 4 Q02b

Ilex is holly. The leaf has multi form which can change through a process called methylation - this means ~~the~~ higher leaves are smooth edged, while lower leaves that are attached by grazing animals are prickly. The leaf is slightly twisted, causing snow to drop off rather than settle. The leaf is also thick & dark green as typically found in evergreens. It also provides dense shade to suppress competition on the ground. The surface is waxy.

4 marks

This learner clearly understands that they are required to describe a holly leaf. Their response goes further than would normally be expected with a description of the different morphology of leaves at different points within the plant. The response provided aspects of explanation for the characteristics rather than simply a description.

(b) Describe the characteristics of an *Ilex* leaf.

(4) 0 Q02b

An *Ilex* leaf is palmate, so it ~~is~~ has a larger surface area than most plants but because of its large leaf structure it loses a lot of water.

0 marks

This response shows little understanding of an *Ilex* leaf, the description is perhaps motivated by the image in Q2 (a) but does not adequately describe a holly. Marks were available for items such as the spines, the glossy appearance and the dark colour for example.

Q2 (c)

This question requires the learner to 'explain'. The layout helpfully provides a framework to encourage two distinct factors. There are many different factors which could be named, each gaining one mark with an additional mark in each case for the development of the answer.

(c) Explain **two** factors affecting mineral absorption by plant roots.

(4) Q02c

- 1 The soil pH affects absorption - at high & low pH nutrients become locked into non soluble forms & so can't be absorbed
- 2 Water is required as nutrients must be soluble to be absorbed. If the water contains too much nutrients osmosis cannot occur (ie fertilizer burn) due to the high concentration outside the root (a concentration gradient is required)

4 marks

This learner has provided two distinct factors, each with a development/explanation. The response also starts to describe the impact of too many nutrients which was not needed in this case to gain maximum marks.

(c) Explain **two** factors affecting mineral absorption by plant roots.

(4) **2** Q02c

1 The pH of the soil will vary the nutrients that can be absorbed

2 water is another because the minerals attach themselves to water particles

2 marks

Like the previous example, this learner has identified both pH and water which were both worthy of credit, but the lack of explanation limited the number of marks gained.

Q2 (d)

Another level of response question, providing the opportunity for 6 marks. The scenario provided a number of different angles for the learner to approach their answer. The main issues would be linked to the high water content, the impact this would have on soil temperature and the availability of oxygen within the soil. Some responses did not appear to identify their answers should be linked to a spring sown crop.

(d) The weather during the spring has been cold, with a period of snow and frost.

Discuss the impact this weather will have on the establishment and success of a spring sown crop in a field.

(6)6 Q02d

The ground will be cold which will delay or even prevent germination. Snow layers reduce the light which can also delay or prevent germination. The cold will reduce kinetic energy in chemical reactions, which slows any growth of seedlings. Frost may also damage or kill new seedlings due to ice crystal damage in cells. A snow layer reducing light levels will also lower ~~any~~ levels of photosynthesis which slows seedling growth. The soil may be hard, making a crop difficult to sow.

6 marks

Whilst not the most extensive response, this learner has identified the impact on the speed of germination as well as the risk to young seedlings included reduced growth. The detail within the response meets the descriptors of a level 3 level response. Others may have scored a similar mark by addressing different issues.

(d) The weather during the spring has been cold, with a period of snow and frost.

Discuss the impact this weather will have on the establishment and success of a spring sown crop in a field.

(6) 1 Q02d

The yield would have a lower outcome and what does establish it will take alot longer to do so, the would be damaged foliage and roots as well.

1 mark

A response with a lack of detail. The learner has correctly identified that yield/growth may be limited but have failed to provide any detail of why growth processes or germination will be impacted. The layout of the paper is also designed to encourage the learner to write in more detail by the number of lines allocated to the answer.

Question 3

Q3

This is an example of an 8 mark question, which again is assessed on a level of response basis but provides the opportunity to credit more detailed answers. Teachers are reminded that the mark scheme includes indicative content and it is not essential for learners to cover the full range of the items listed.

This example required learners to use information from across the unit content to make a comparison between different production methods, namely field grown compared to container grown. Many learners focussed on the ability to specify or control the characteristics of the potting compost whereas other identified how a pot would limit root growth.

Weaker responses failed to connect with the command verb 'discuss' and provided unsupported statements.

- 3 Some plants are grown in containers using a potting compost, while others are field grown.

Discuss the advantages and disadvantages of using potting compost rather than growing plants in a field.

The potting compost can be directly made for the plant you are growing with the correct NPK ratios for example it may have less Nitrogen and more Phosphorus for whilst the seed is growing and when its likely to be repotted it can have a different set of nutrient levels more defined to a slightly older plant. Field grown plants will have to be more Hardy as there is a higher chance of getting an infection or disease in uncontrollable soil. The field grown plant has to mostly fend for itself getting nutrients and water from what's already there. Unfortunately potted plants rely much more on human help and if you forget to water your plant you may be dooming it. There is less space for a plant to grow in a pot and this may make it slightly more manageable and possibly live longer than if it was in a field if the conditions are correct there is a higher success rate with pot grown plants

(8) 8 Q03

(Total for Question 3 = 8 marks) 8

8 marks

A detailed response covering a number of key themes with some justification and importantly making a comparison between the two growing media. The inclusion of the observation about the risk to pest and disease is a useful addition.

- 3 Some plants are grown in containers using a potting compost, while others are field grown.

Discuss the advantages and disadvantages of using potting compost rather than growing plants in a field.

~~///~~ The supply of nutrients will become limited ^{(8) 2 p03}
when grown in a container.
That being said, the plant is less vulnerable to harsh
conditions that the ~~///~~ environment. ~~///~~

2 marks

Whilst the allocation of marks is not directly linked to the number of points made. This response makes two distinct observations although there is a lack of comparison. The second point about container plants are subject to less harsh conditions needs greater clarification but implies that the learner may consider the plant itself is growing in a protected environment which is in fact not always the case for container grown plants.

Question 4

Q4 (a)

Following the format of the Sample Assessment Materials, the first part of this question required the learner to complete the boxes in the table. There was quite a variance in the understanding of the differences in plant structure to facilitate different types of pollination. In this case the focus was on the characteristics of pollen grains. While it was clear that some learners were well prepared, other responses seemed to use the printed information as their stimulus and tried to state the opposite.

- 4 The table below shows the characteristics of two types of plant reproductive system.
 (a) Complete the table by writing the missing information in the correct boxes.

(2) 2 Q04a

	Plant A	Plant B
Pollination type	Entomophilous/insect	Passive / wind
Petals	Large and/or colourful	Insignificant
Pollen type	Sticky and bulbous	Lightweight and separate
Pollen amount	Small amount	Large amount

Table 1

2 marks

This response has achieved both marks. Whilst the stimulus material includes the two alternative names for the pollination type this was not expected in the learner response, where one would be sufficient for credit. The stickiness/ clumping nature of pollen from insect pollinated plants is a characteristic to enable more efficient attachment to the insect.

4 The table below shows the characteristics of two types of plant reproductive system.

(a) Complete the table by writing the missing information in the correct boxes.

(2) 0 Q04a



	Plant A	Plant B
Pollination type	Entomophilous/insect	 LOW
Petals	Large and/or colourful	Insignificant
Pollen type	 Heavy	Lightweight and separate
Pollen amount	Small amount	Large amount

Table 1

0 marks

This response was not sufficiently accurate to gain any mark. Heavy is the opposite of lightweight but does not adequately describe the pollen type listed. Anemophilous/ wind pollination are terms specifically listed within the specification unit content.

Q4 (b)

This question proved to be challenging for many learners, many failed to understand the nature of the question and wrote about the benefits of cross pollination linked to genetic diversity, others confused the cross pollination with insect pollination, forgetting that wind pollinated plants would also cross pollinate. Few stated the importance of the positioning of the stamens and stigma to reduce self-pollination or indeed the impact of pollen incompatibility.

(b) State **two** features of a cross-pollinating plant. (2) 0 Q04b

1 colourful petals

2 most of the time herbaceous

0 marks

This response has stated a feature of insect pollination (colourful petals), the second response is also factually incorrect.

Q4 (c)

Learners were asked to explain one advantage. This requires a suitable development of the statement they have made to obtain both marks for this question. The majority of those responding correctly identified the mechanism of self-pollination compared to cross pollination.

(c) Explain **one** advantage of self-pollination.

(2) 2 Q04c

plants of a similar type are not required to be near. A plant can establish and spread from a single established point.

2 marks

This response has correctly identified the lack of need for other plants within an area and the fact that it would be possible for establishment to take place in a location as a result. Whilst not the strongest response, it did provide development of the basic idea.

(c) Explain **one** advantage of self-pollination.

(2) 0 Q04c

Both the male and female reproductive organelles are in the same flower and easier for pollination.

0 marks

The statement that both male and female flower parts are in the same flower is not unique to self-pollinated plants. There is a lack of explanation to support the point made.

Q4 (d)

Again, this question required learners to provide an explanation, something that was not always readily identified within the cohort. Many responses identified two valid ways of increasing pollination but lacked explanation. Methods that increased wind pollination were as equally valid as those which increase insect pollination.

(d) Explain **two** ways an area of land can be managed to increase plant pollination levels.

(4) 4 Q04d

1 To introduce more pollinators to the area by for example setting up a bee hive near the plants.

2 To stop using chemicals which are harmful to pollinators such as insecticides and pesticides.

4 marks

Two clear, distinct methods, with additional detail. Whilst the explanation for method 1 is not strong it was still considered.

(d) Explain **two** ways an area of land can be managed to increase plant pollination levels.

(4) 0 Q04d

1 To turn the soil while adding a good quality minerals that helps the pollination growth

* A good clean air in your area, so not in a high residential area.

0 marks

Two methods are listed with additional detail, but neither will directly link to an increase in plant pollination. Learners need to ensure they are precise in the question they are addressing.

Q4 (e)

This 6 mark level of response question was attempted by the majority of learners. As with other questions of this style, it provides the opportunity to bring together and apply a range of concept from the unit content. This question looks at the impact of water holding capacity on crop yield. Most responses identified the impacts of water-logging although less commented upon the impacts of too little water.

Some learners wrote in detail on the impact of a water-logging on the soil biota and the subsequent impacts on yield.

As with other questions of this type the mark scheme provides indicative content and it is not expected that learners will cover all of this range.

(e) The soil in a field has a low water holding capacity.

Analyse how this water holding capacity impacts the yield of a crop.

(6) 6 004e
crops who do not like waterlogged soil will not fair well here if it is over-watered or heavy rain occurs. leaching is also highly likely to effect the nutrient availability the plant will get as it will be dragged away through the soil horizons. If the soil becomes water logged plants may loose access to nutrient and will have to go through ~~soil~~ anaerobic respiration which results in ethanol production and less plants food for plants. Crop yields here are likely to be low unless the crop is flood resistant. Seeds may not germinate as there will be no oxygen and they be too wet they need to be damp not soaked. Soil ~~improvement~~ improvement will be needed

6 marks

This is an example of a well developed answer, meeting the criteria for level 3 and awarded 6 marks. The response focusses on water-logging but considers different impacts such as leaching and anaerobic respiration. There is a good link to germination which will impact on future yield.

(e) The soil in a field has a low water holding capacity.

Analyse how this water holding capacity impacts the yield of a crop.

(6)1 Q04e

The plant won't be able to hold the amount of water which it needs.

1 mark

This response is very basic and has not taken the opportunity to use the space allocated on the question paper. There is a link to the water requirement of a plant but this has not been connected to the properties of the soil. This was a low level response gaining 1 mark.

Question 5

Q5 (a)

A very accessible question, requiring the learner to provide a benefit of adding organic matter to the soil. Importantly the provision of plant nutrients is already mentioned which requires learners to state another benefit.

Most completed responses were correct, the most common error was to state the addition of plant nutrients.

5 Organic matter provides plant nutrients to the soil.

(a) Give **one** other benefit to the soil when using organic matter.

(1) 1 Q05a
It encourages invertebrates to thrive which helps aerate the soil.

1 mark

A good and less commonly seen benefit, organic matter would encourage soil aeration through the increase in soil invertebrates.

5 Organic matter provides plant nutrients to the soil.

(a) Give **one** other benefit to the soil when using organic matter.

(1) 0 Q05a
It is better for the environment.

0 marks

This response is too generic therefore no mark awarded.

Q5 (b)

In common with the Sample Assessment Materials (SAMs) this question requires the learner to form an opinion based on the data in the table. This stimulus material enabled a larger number of learners to create an answer. Many correctly identified the key data, the most common error being the confusion between phosphorus and potassium.

The table below shows the nutrient analysis of three fertilisers.

Fertiliser	% N	% P	% K
A	0.7	0.3	0.6
B	4.0	2.5	2.3
C	3.5	18.0	0

Table 2

(b) Give **one** reason why fertiliser C is most suitable when planting new trees.

(1) 1 Q05b

Phosphorous is good for root systems & fertilizer C has a high % of phosphorous

1 mark

This learner has correctly identified that phosphorus (as phosphate) is beneficial in the root development of a plant. They have linked the data in the table to its use within the plant.

The table below shows the nutrient analysis of three fertilisers.

Fertiliser	% N	% P	% K
A	0.7	0.3	0.6
B	4.0	2.5	2.3
C	3.5	18.0	0

Table 2

(b) Give **one** reason why fertiliser C is most suitable when planting new trees.

(1) **0** Q05b

Because it has a high potassium and nitrogen to help with vegetational growth.

0 marks

This response incorrectly names the element as potassium, does not link it to root development. Fertiliser C is also not the highest in nitrogen content.

Q5 (c)

This question links to the risk of overapplication of fertiliser. Importantly learners were asked to describe the effects. This was a well understood topic although the weakness in some responses was the lack of application of the active verb (describe).

(c) Describe the effects of the overapplication of a fertiliser on a plant.

(2) 2 Q05c

Fertilizer burn may occur where osmosis is ~~drop~~ disrupted due to high concentration of nutrients outside roots (a ~~high~~ low to high gradient is required). The effects of this are yellowing of lower leaved, brown/blackening a rot of roots a leaf drop. Tips & margins of leaves become brown. Yields are reduced due to slowed growth of plants

2 marks

A well developed response showing an understanding of the topic mentioning both the impact on osmosis and the symptoms that is likely to be seen in the plant (root death, browning of leaves)

(c) Describe the effects of the overapplication of a fertiliser on a plant.

(2) 0 Q05c

It could cause change of the soil pH and also could make it lack a different nutrient.

0 marks

There is insufficient development of either of these concepts to enable the awarding of marks at this level. In both instances there is a lack of description too.

Q5 (d)

The plant and soil science unit names a few specific examples of irrigation systems within its unit content. This question sought to test understanding of this part of the syllabus. The requirement to complete a table mirrors a similar question within previously published materials. Two marks were available, a good number of responses correctly identified drip irrigation from its description although a description of ebb and flow irrigation proved to be more challenging.

(d) The table below shows two methods of irrigation for plants.

Complete the table by writing the missing information in the correct boxes.

(2) Q05d

Method of irrigation	Description of technique	Disadvantage
drip feeder	Watering each plant separately through micro tubes	Tubes are easily blocked
Ebb and flow	level of water in tank or tray containing plants is raised & lowered	Diseases spread through the irrigation to all plants

Table 3

2 marks

The learner correctly identified drip irrigation (the word 'feeder' was ignored in this case). The description of Ebb and Flow is basic but sufficiently distinctive and accurate to relate this technique.

(d) The table below shows two methods of irrigation for plants.

Complete the table by writing the missing information in the correct boxes.

(2) 1 Q05d

Method of irrigation	Description of technique	Disadvantage
drip	Watering each plant separately through micro tubes	Tubes are easily blocked
Ebb and flow	all plants through small tube	Diseases spread through the irrigation to all plants

Table 3

1 mark

The learner correctly identified drip irrigation which was given a mark. The description of Ebb and Flow did not describe the technique.

Q5 (e)

Four marks were available in this question. Two marks were awarded for the naming of two relevant factors, two for the linked descriptions. While a topic that would have been covered by many learners in their lower levels of study, there were a significant number of responses that did not have the key basic concepts linked to the rate of transpiration.

(e) Describe **two** factors affecting the rate of transpiration.

144 Q05e

1 Relative humidity with temperature and air flow - these can change evaporation at the leaf.

2 Potassium levels - a deficiency in potassium can cause stomata to not open properly, reducing transpiration

Potassium being required to allow cells to become turgid - without potassium they can't & so stomata stay shut.

4 marks

Two relevant and distinct factors have been identified. In each case the factor is linked to a suitable description of how this will affect the rate of transpiration. In this case the learner has added additional notes linked to a word. This was considered in the awarding of marks.

(e) Describe **two** factors affecting the rate of transpiration.

(4) 2 Q05e

1 The temperature

2 the wind

2 marks

This response states two relevant factors, however there is no description of either. This limited the learner to two marks.

Q5 (f)

A 6 mark level of response question allowing learners to apply a range of inter-related concepts. Many learners were able to provide a mark-worthy response although many showed a lack of depth and fell short of the command verb 'analyse'.

(f) Analyse the impact of light availability on plant growth. (6) 5 Q05f

low light availability will generally mean less energy for chloroplasts to split hydrogen from oxygen in photosynthesis. This hydrogen is needed to combine with carbon to create sugars, so the plant would create less food for itself. This would reduce the sugars available in respiration, meaning less new growth and reproduction in the plants.

high levels of light would have the opposite effect, ^{on sugar produced} though translocation mostly happens at night, so may be reduced. Translocation is the transportation of water and nutrients about the plant structure, which is required for growth.

5 marks

This response shows a good understanding of the key issues and has provided a level of analysis and evaluation which meets the level descriptors for level 3. While this is an extremely good response there are some additional elements which could be added to gain maximum marks. Some responses for example, also referred to light quality or the day-length in their responses which are also relevant to plant growth. In both of these cases a change in the light spectrum or duration could impact on flowering or nodal distance.

(f) Analyse the impact of light availability on plant growth.

(6) 1 Q05f

IF there isn't enough light the plant won't ~~do enough~~ do enough
photosynthesis

1 mark

A response with little detail, the learner has linked light to photosynthesis but does not develop the implications of this on plant growth as requested in the question.

This learner was awarded 1 mark.

Question 6**Q6**

The final question on the paper was an 8 mark level of response question. This is a common format for papers within this series. There are numerous factors which affect soil health. The mark scheme lists a large number of factors and, in common with other level of response questions, full coverage is not expected. Higher level responses will either write about some factors in significant detail or could provide information on a wide range of factors in less detail.

6 It is good practice to maintain soil health.

Discuss the factors that affect soil health.

^{(B)6 Q06}
The pH of soil affects its health. If too acidic it reduces the effectiveness of bacteria to ~~to~~ convert nitrogen from the air and to also break down organic matter (and so doesn't release the nutrients). If ~~to~~ either too high or too low nutrients are also locked in non-soluble forms (particularly phosphorus) and so aren't available to plants.

Compaction and poor aeration affects soil health, reduces the ability for plants to process glucose aerobically.

Low nutrient levels can be caused by leaching or over harvesting of crops which also leads to poor soil health.

Excessively sandy soils allow leaching easily a poor water retention.

Addition of organic matter can improve health - it adds nutrients, improves soil structure, improves water retention

6 marks

This learner response shows a good level of knowledge and has discussed some different factors such as soil pH, compaction and the proportion of different soil particles. The early part of the response shows a good knowledge of the science behind soil health, the latter part of the response is a little weaker, a greater development of these factors who have enabled the learner to gain a greater mark.

6 It is good practice to maintain soil health.

Discuss the factors that affect soil health.

(8)1 Q06

Dead or fallen leaves ~~also~~ return nutrients into the soil,
~~also~~ dead ~~also~~ invertebrates also do this, as ~~do~~ deceased
animals, fecal matter, carcasses, etc.

1 mark

A very basic response although a valid factor. The response is accurate but could easily develop the concept of the nitrogen/ nutrient cycle which has been introduced. There are many factors which affect soil health which have been overlooked within this response. The number of lines available within the paper for the response gives an indication of the volume of information which is expected from the learner.

Summary

There are some key messages which would assist learners in future papers. These include:

- Learners should pay attention to the active verbs of the questions, this will help direct the level and depth of the required response.
- A focus on the specific requirements of the question- many responses included less relevant information.
- Be confident in the accurate labelling of internal and external plant structures.
- Be able to describe the characteristics of the named plants listed within the unit specification.
- Clarity in the key features and plant adaptations of different pollination methods.
- Ensure more detailed responses include reference to appropriate scientific processes where relevant.
- Practice the level of response based questions which are a key feature of this paper and require the development of techniques to plan and present a coherent answer.
- Access the published Sample Assessment Materials for practice and familiarity with the layout and content of this style of paper. Examples are available [here](#).

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