Pearson
BTEC

Examiners' Report

Lead Examiner Feedback

January 2022

Pearson BTEC Nationals

In Agriculture; Countryside Management;

Forestry and Arboriculture; Horticulture:

Unit 2: Plant and Soil Science 20066K

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January 2022

Publications Code 20066K_2201_ER

Grade Boundaries

What is a grade boundary?

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.

When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

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.

Grade boundaries for this, and all other papers, are on the website via this link:

http://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

Awarding BTEC qualifications in 2022

Ofqual has set out their plans for awarding qualifications in 2022 and intend to return to a normal, pre-pandemic, approach to grading standards over by 2023. They have confirmed that 2022 will be a transition year, to reflect that we are in a pandemic recovery period and students' education has been disrupted.

Our guiding principle and approach to awarding BTEC qualification results in 2022 will be to ensure parity in relation to the approach being taken for GCSE and A level learners. BTEC courses have a different structure and design to academic qualifications - BTECs are modular qualifications (with assessments taking place throughout the course) compared to GCSEs and A levels which are linear (assessed and awarded at the same time at the end of the year), and therefore our approach needs to be different

In 2022 we will return to the usual method of calculating BTEC qualification results, however adaptations including, U-TAGs and reduced internal assessment, are in place to provide a comprehensive package of support for students.

The basis of our awarding approach to BTECs this year is to ensure it is as fair as possible for all learners. We will use a range of evidence to set grade boundaries for the external units. Part of this evidence will be to closely monitor learner performance in all assessments that contribute to learners' final qualification grade, to ensure parity with A level and GCSEs.

Further information can be found on our website and via our Social Media channels.

20066K – Unit 2 – Plant Soil & Science

Grade	Unclassified	Level 3			
		N	P	M	D
Boundary Mark	**0**	**10**	**20**	**36**	**52**

Introduction

January 2022 has allowed students to take this externally assessed element of the Plant and Soil Science unit. The impact of the pandemic has meant that this has been the first time that many centres have prepared candidates for the external assessment in this format. Teaching teams need to assist their candidates in developing effective examination technique.

Many of these centres have significant experience in delivering the unit content within the context of the assignment-driven assessment model common within the QCF specification but are less familiar with this style of assessment.

External assessment opportunities for this unit are available in January and June of each academic year.

Introduction to the Overall Performance of the Unit

The format of this assessment follows the Sample Assessment Material (SAM) closely which has enabled centre to assist their candidates in their preparation. Many candidates required additional support with appropriate examination technique, the use of past papers and the SAM should assist in this respect.

While candidates may have had knowledge of a topic, their failure to address the command verb (explain, analyse, describe, etc.) sometimes limited their potential mark.

The structure of this paper allows students 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. Centre should remind candidates to focus on the scientific principles and use scientific language even when describing a task they are familiar with on a practical level.

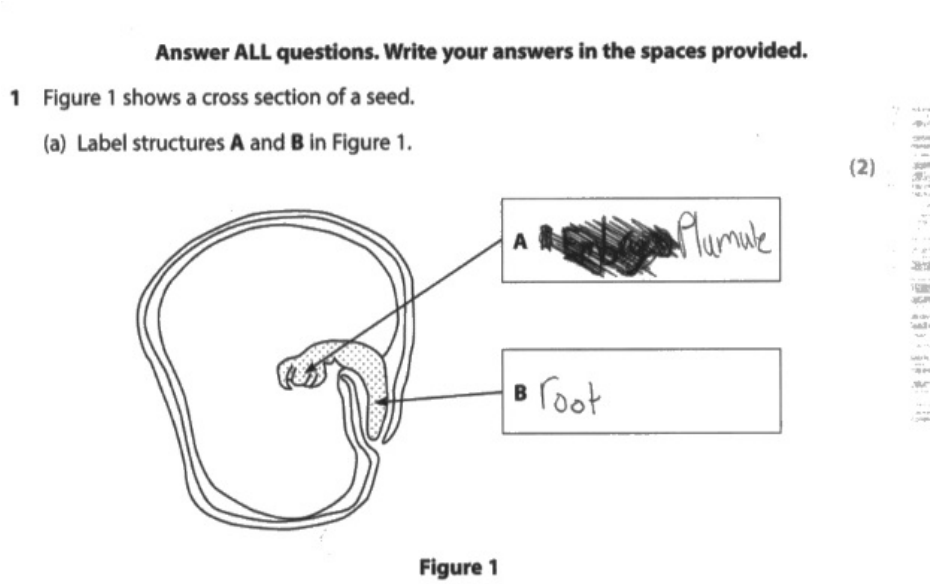
Many students had difficulty in correctly using scientific terms in a suitable context and were not able to describe key processes in any detail. It may be that the timing of their examination entry into this series may not be allowing them sufficient teaching time to be fully prepared for the questions.

Individual Questions

Question 1

Q1 (a)

The opening question of the paper followed a similar style to previous published materials. This proved to be surprisingly challenging for many students despite being a topic which which would have also been studied earlier within their academic career. 2 marks were available.



Answer ALL questions. Write your answers in the spaces provided.

1 Figure 1 shows a cross section of a seed.

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

(2)

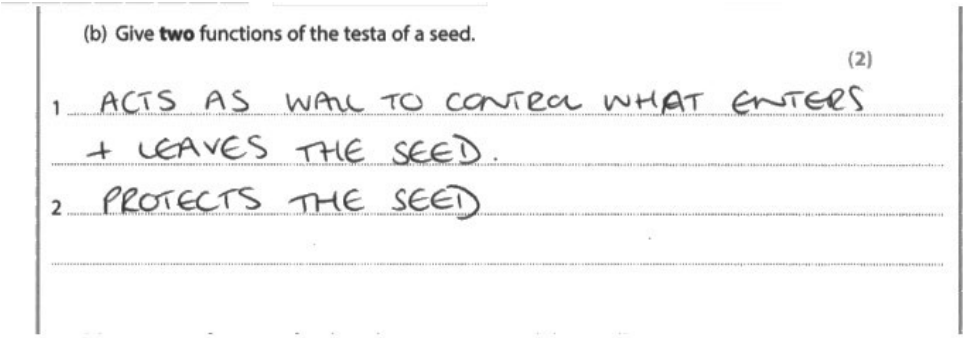
Figure 1

This response gained 1 mark

The candidate has successfully identified the plumule but was not given credit for 'root' as it was expected that candidates at this level should use the correct scientific word 'radicle' which is specifically listed within the unit specification.

Q1 (b)

Another seed-based question. The active verb within the question was 'give' suggesting the candidate could provide a short response.


(b) Give **two** functions of the testa of a seed.

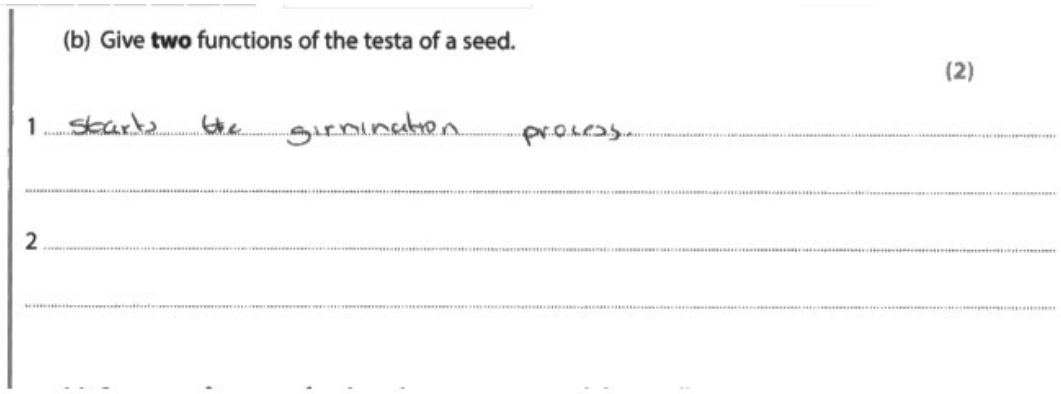
(2)

1 ACTS AS WALL TO CONTROL WHAT ENTERS + LEAVES THE SEED.

2 PROTECTS THE SEED

The response gained 2 marks

The student has identified two distinct functions. Whilst the mark scheme expected the mention of water within the first statement, this was considered to be sufficient in this context. The other most common response related to the control of seed dormancy.


(b) Give **two** functions of the testa of a seed.

(2)

1 starts the germination process.

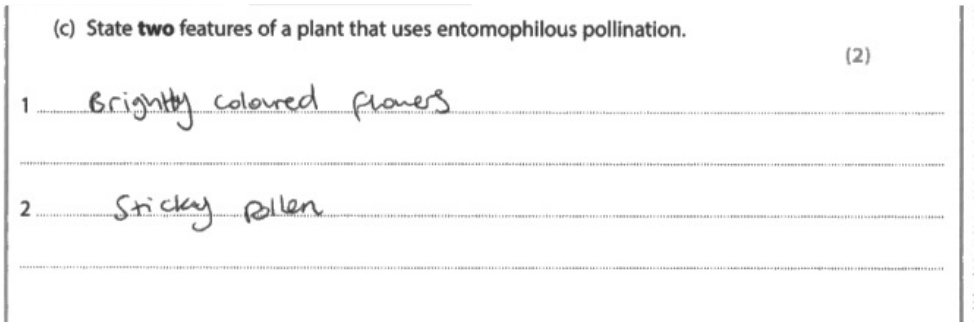
2

This response gained 0 marks

While the student in this response understands there is a link between the testa and germination the response does not clearly state what the link is.

Q1 (c)

This question proved to more challenging to many students who were unfamiliar with the term entomophilous and did not connect this to insect pollination.

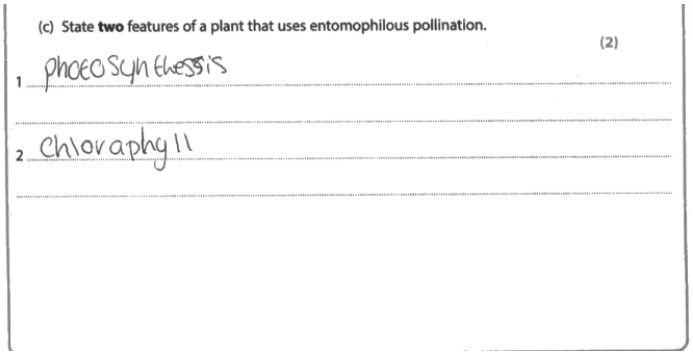

(c) State **two** features of a plant that uses entomophilous pollination. (2)

1 Brightly coloured flowers

2 Sticky pollen

This response gained 2 marks

This student correctly identified that colourful flowers would attract insects. Sticky pollen would allow transfer to other flowers. The responses, although brief were in sufficient depth to be given credit.


(c) State **two** features of a plant that uses entomophilous pollination. (2)

1 photosynthesis

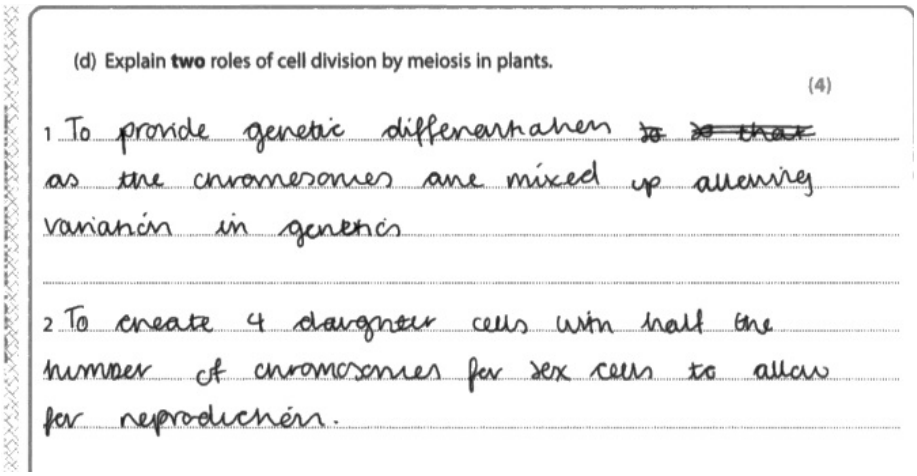
2 chloraphyll

0 marks

This response has failed to answer the question. The response would suggest that whilst they have knowledge of plant based terminology they have not been prepared for a question on pollination. This was a fairly common scenario within this cohort.

Q1 (d)

Following the same pattern as previous papers and the sample assessment materials, this question required a deeper response. The command word 'Explain' requires students to provide a more developed answer. It was clear that the topic of meiosis was not clearly understood by many candidates, often confusing the process with mitosis.



(d) Explain **two** roles of cell division by meiosis in plants.

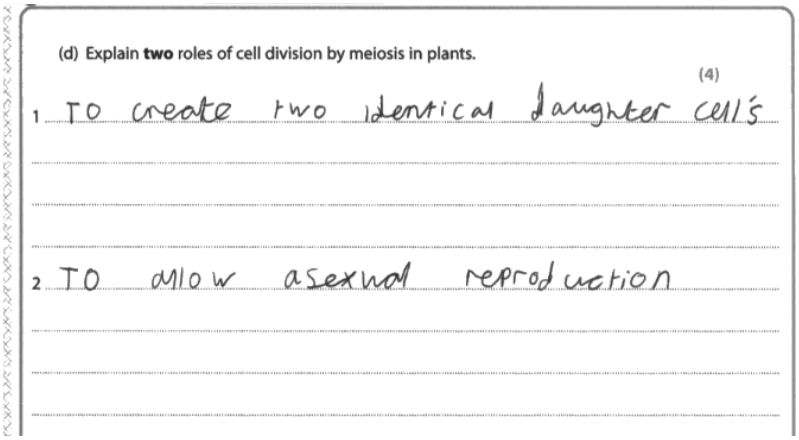
(4)

1 To provide genetic differentiation ~~to~~ ~~so that~~ as the chromosomes are mixed up allowing variation in genetics

2 To create 4 daughter cells with half the number of chromosomes for sex cells to allow for reproduction.

This response gained 3 marks

The student has successfully named two roles of the process. The additional mark in each case is for the development (explanation) of these statements. This has been completed in the first role but needed more detail in the second role.



(d) Explain **two** roles of cell division by meiosis in plants.

(4)

1 TO create two identical daughter cells

2 TO allow asexual reproduction

This response gained 0 marks

This response relates to cell division and shows there is a link to reproduction but is not accurate in its statements.

Q1 (e)

This question requires a longer, more detailed response and is marked according to its level of response. This means the examiner is looking for the completeness of the response rather than merely according to the number of points made. In this situation the question looked at the advantages and disadvantages of self-pollination. A number of responses confused pollination with seed dispersal, responded in a superficial way or failed to look and both benefits and drawbacks.

(e) Discuss how self-pollination impacts on a plant's ability to survive.

(6)

Self pollination is a great way to ensure the success of pollination in plants. Self pollinating plants (such as: green peas, tomatoes) are not relying on the presence of pollinating insects, birds or mammals or certain abiotic factors such as wind or rain, etc. This way the plant ensures a better chance of pollination and seed production under unfavourable conditions (lack of pollinators). Well adapted plants also ensure a great genetic inheritance of the species, however in the long run this could restrict [redacted] their adaptation to climate change or disease resistance as it restricts their genetics to [redacted] exchange with other specimens of their kinds. Self pollinating plants have a better chance to produce higher yield as they rely on themselves to pollinate and produce fruit + seeds. Pollen doesn't need to travel long distances and does not "get lost".

(Total for Question 1 = 16 marks)

This response gained 4 marks

Referring back to the level descriptors within the mark scheme, this response met the description within level 2 most accurately. Whilst the candidate has written extensively and provided examples, there is a level of repetition and a failure to focus on the disadvantages this strategy may cause. This has resulted in the response being one-sided in its approach,

(e) Discuss how self-pollination impacts on a plant's ability to survive.

(6)

If there is a self-pollination plant then it'll be difficult for it during winter months as it may struggle to pollinate. The plant relys on pollination so if the plant struggled to pollinate itself then it'll cause problems for plant. Having a self-pollinating plant helps the plant survive as it is not reliant on bees as bees could struggle to pollinate the plant.

(Total for Question 1 = 16 marks)

This response gained 1 mark

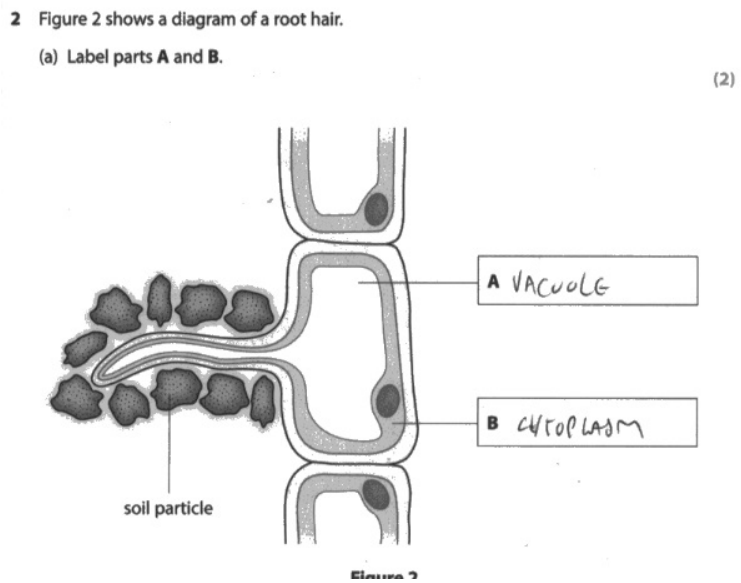
This response contains a lot of irrelevant information and does not adequately explain why self-pollination would be an issue for the plant. The identification that there is not a reliance on bees was sufficient to gain some credit. The level 1 descriptor describes the quality of this response.

Question 2

Q2 (a)

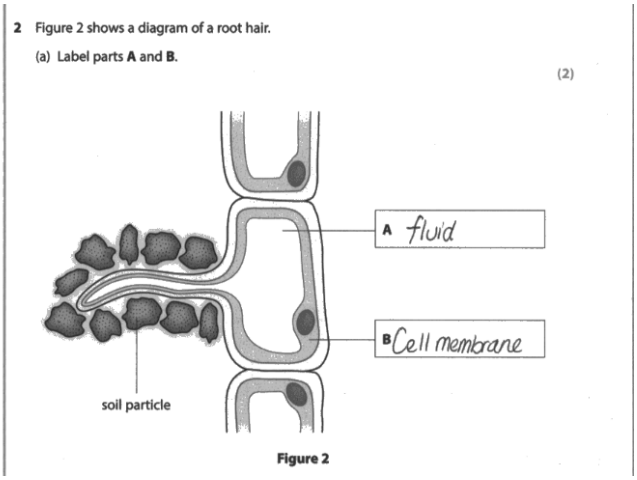
This question mirrors the style contained within the Sample Assessment Materials (SAMs) and other published papers and proved to be accessible to many learners. There was a greater level of engagement with this question compared to the similar style question in 1a.

The most common error was to incorrectly label part B as the cell wall.



This response gained 2 marks

Both structures clearly identified, allowance was made for incorrect spelling of these terms.

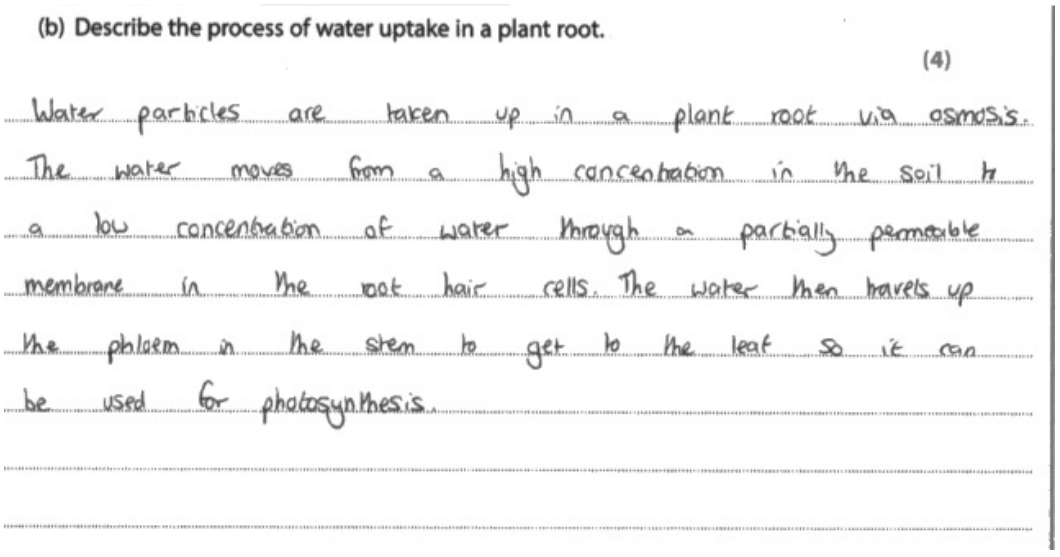


This response gained 0 marks

Many students incorrectly labelled B as cell membrane or cell wall. Fluid was also considered not to be sufficiently specific for the level of this qualification.

Q2 (b)

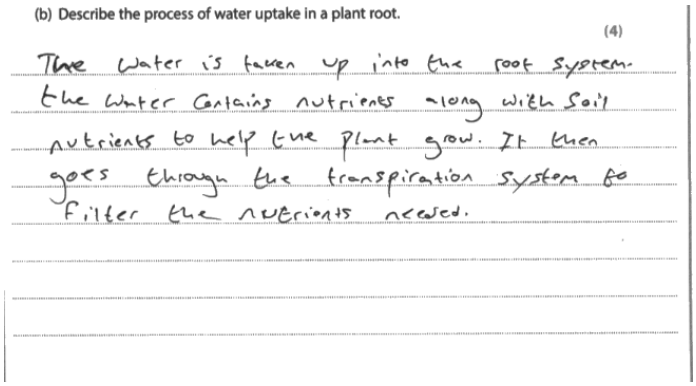
A question requiring a description of water uptake. It was expected that responses should be able to bring together their knowledge of water uptake, osmosis and the influence of the xylem and transpiration pull.



This response gained 4 marks

This student clearly understands the overall process with appropriate mention of root hairs and naming osmosis; both of which were given credit. The description of the high concentration of water is unusual- it is expected the reference should be to the concentration of salts. The reference to partially

permeable membrane was given credit (as semi-permeable) although the response incorrectly refers to transport in the phloem.



(b) Describe the process of water uptake in a plant root.

(4)

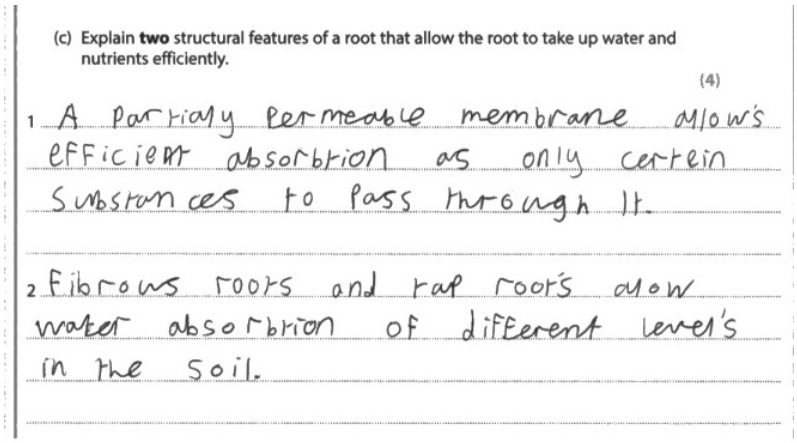
The water is taken up into the root system. the water contains nutrients along with soil nutrients to help the plant grow. It then goes through the transpiration system to filter the nuetrients needed.

This response gained 0 marks

This response shows little understanding of water uptake. The reference to transpiration was deemed to be too vague. Similarly, there is not indication how the roots take up the water. The mention of nutrients is irrelevant to this question.

Q2 (c)

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



(c) Explain **two** structural features of a root that allow the root to take up water and nutrients efficiently.

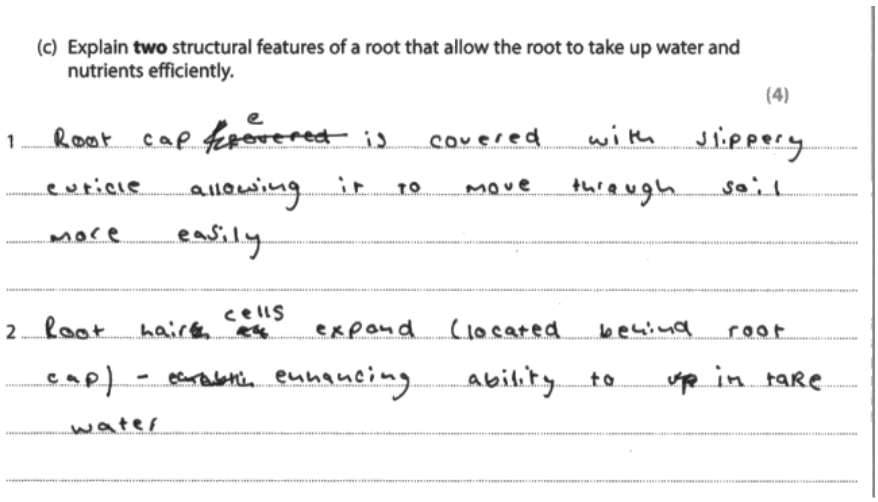
(4)

1 A partialy permeable membrane allow's efficient absorbtion as only certain substances to pass through it.

2 fibrous roots and tap roots allow water absorbtion of different level's in the soil.

This response gained 4 marks

This student has provided two distinct feature, each with a development/ explanation which is required for the second linked mark. The reference to the type of root system was deemed to be sufficiently close to the mark scheme.



(c) Explain **two** structural features of a root that allow the root to take up water and nutrients efficiently.

(4)

1 Root cap ~~covered~~ is covered with slippery cuticle allowing it to move through soil more easily

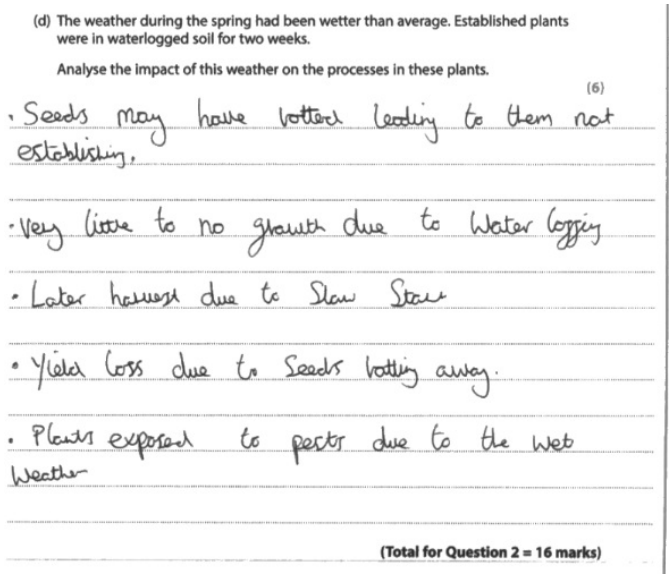
2 Root hairs cells expand (located behind root cap) - ~~enable~~ enhancing ability to up in take water

This response gained 1 mark

This response identifies the role of the surface area of root hairs although lacks further development. The root cap itself is not linked to water and nutrient uptake.

Q2 (d)

Another level of response question, providing the opportunity for 6 marks. The scenario provided a number of different angles for the student to approach within 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. It is expected that this should provide a stimulus to reference these issues from a scientific basis.



(d) The weather during the spring had been wetter than average. Established plants were in waterlogged soil for two weeks.

Analyse the impact of this weather on the processes in these plants.

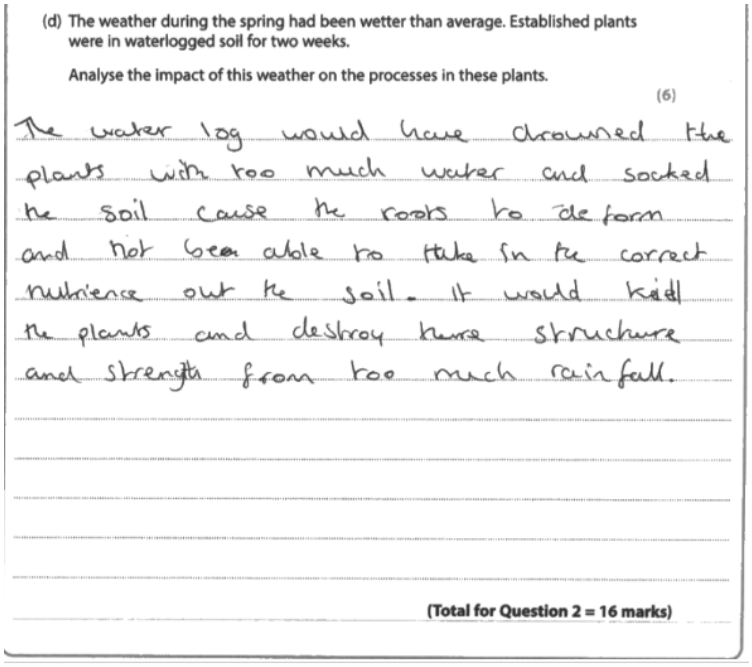
(6)

- Seeds may have rotted leading to them not establishing.
- Very little to no growth due to water logging
- Later harvest due to slow start
- Yield loss due to seeds rotting away.
- Plants exposed to pests due to the wet weather

(Total for Question 2 = 16 marks)

This response gained 4 marks

This response references a range of issues but is limited in its scope. As a result when referring to the level descriptors this appears to link most accurately to level 2. A level 3 response would typically include a greater reference to the scientific processes involved.



(d) The weather during the spring had been wetter than average. Established plants were in waterlogged soil for two weeks.

Analyse the impact of this weather on the processes in these plants.

(6)

The water log would have drowned the plants with too much water and socked the soil cause the roots to de form and not been able to take in the correct nutrience out the soil. It would kill the plants and destroy there structure and strength from too much rain fall.

(Total for Question 2 = 16 marks)

This response gained 1 mark

A response with a lack of detail. The student has correctly identified potential for leaching of nutrients however the reference to the plant 'drowning' was not considered to be appropriate language for a qualification at this level. The

layout of the paper is also designed to encourage the student to write in more detail by the number of lines allocated to the answer.

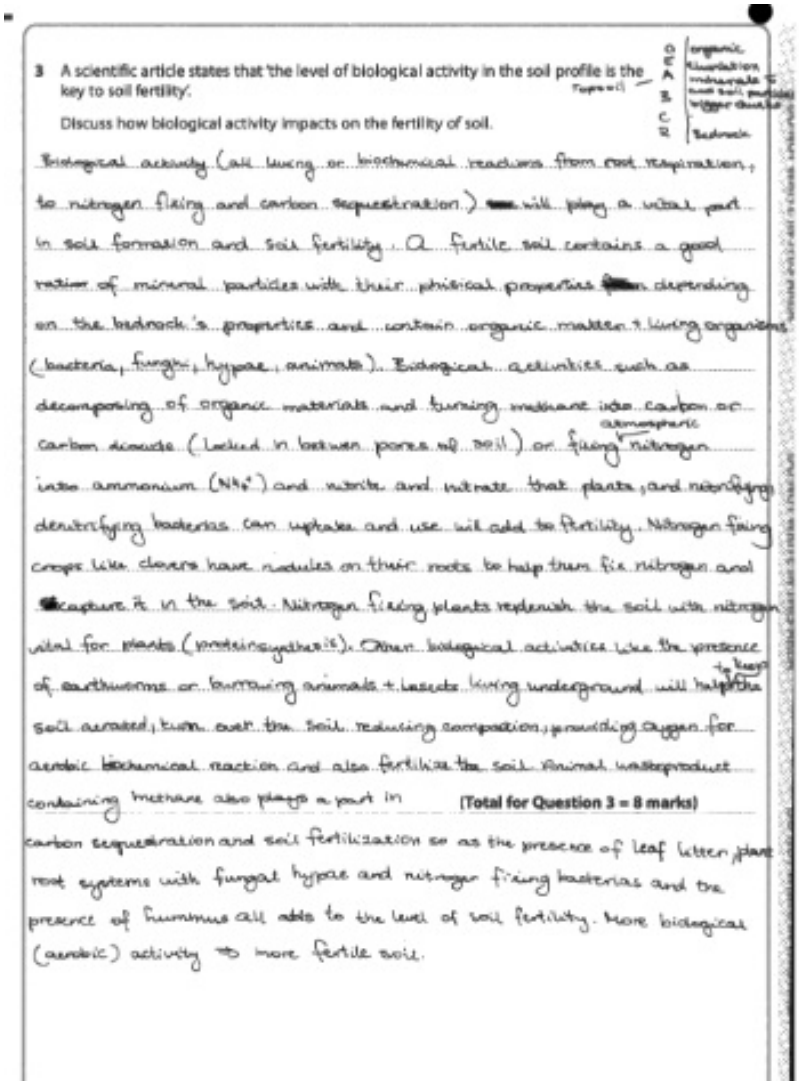
Question 3

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 students 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 students 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 A scientific article states that 'the level of biological activity in the soil profile is the key to soil fertility'.

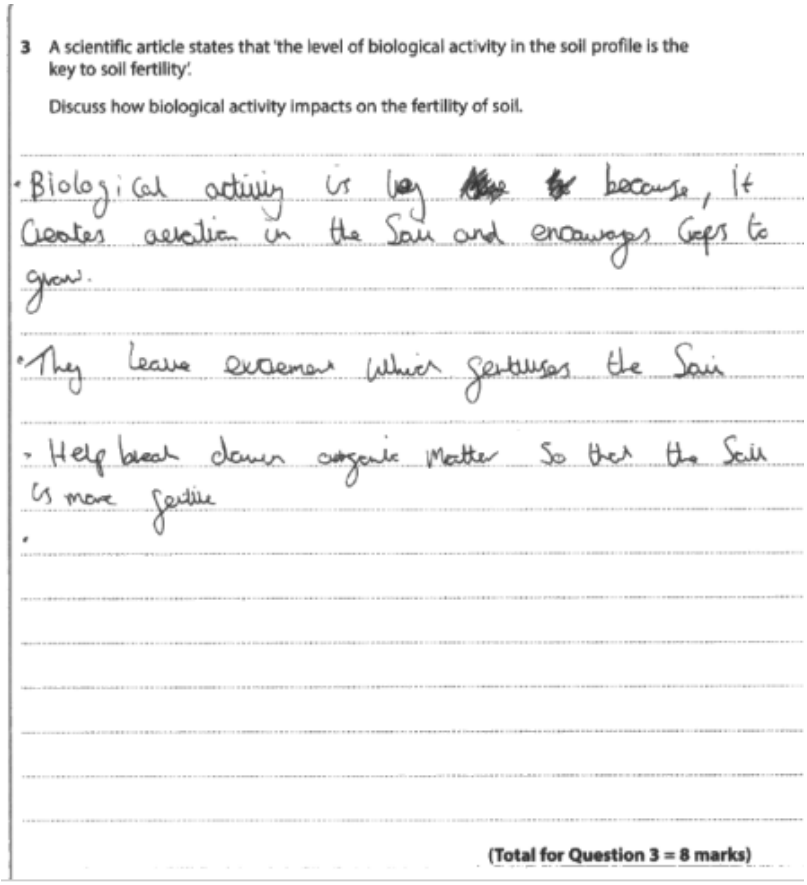
Discuss how biological activity impacts on the fertility of soil.

Biological activity (all living or biochemical reactions from cell respiration, to nitrogen fixing and carbon sequestration) will play a vital part in soil formation and soil fertility. A fertile soil contains a good ratio of mineral particles with their physical properties depending on the bedrock's properties and contain organic matter + living organisms (bacteria, fungi, hypae, animals). Ecological activities such as decomposing of organic materials and turning methane into carbon or carbon dioxide (locked in between pores of soil) or fixing atmospheric nitrogen into ammonium (NH_4^+) and nitrite and nitrate that plants, and nitrifying denitrifying bacterias can uptake and use will add to fertility. Nitrogen fixing crops like clovers have nodules on their roots to help them fix nitrogen and capture it in the soil. Nitrogen fixing plants replenish the soil with nitrogen vital for plants (proteinsynthesis). Other biological activities like the presence of earthworms or burrowing animals + insects living underground will help to keep the soil aerated, turn over the soil, reducing compaction, providing oxygen for aerobic biochemical reaction and also fertilize the soil. Animal waste product containing methane also plays a part in carbon sequestration and soil fertilization so as the presence of leaf litter, plant root systems with fungal hypae and nitrogen fixing bacterias and the presence of hummus all adds to the level of soil fertility. More biological (aerobic) activity = more fertile soil.

(Total for Question 3 = 8 marks)

This response gained 7 marks

A detailed response covering a number of key themes and demonstrating planning. The response is detailed and applies scientific principles. The content of the mark scheme is indicative of the types of information that could be included. It is not intended, even at level 3 to include all these items.



3 A scientific article states that 'the level of biological activity in the soil profile is the key to soil fertility'.

Discuss how biological activity impacts on the fertility of soil.

- Biological activity is key because, it creates aeration in the soil and encourages crops to grow.
- They leave excrement which fertilises the soil
- Help break down organic matter so that the soil is more fertile

(Total for Question 3 = 8 marks)

This response gained 1 mark

Whilst the allocation of marks is not directly linked to the number of points made. This response makes some observations although these are low level. When the work is compared to the level descriptors in the mark scheme, the quality is consistent with level 1 and is lacking in detail hence placed at the lower end of the range.

Question 4

Q4 (a)

Following the format of the Sample Assessment Materials, the first part of this question required the student to complete the boxes in the table. This question tested the candidate's understanding of the general characteristics of monocotyledonous and dicotyledonous plants. Most scripts showed that this question had been attempted, many using the existing table to inform their answers.

4 The table shows the characteristics of two types of plant.

(a) Complete the table to include the missing information.

(2)

	Monocotyledon	Dicotyledon
Leaf vein structure	Parallel veins	Net Veins
Number of flower parts	Pairs of 2 or 3	Typically multiples of 4 or 5
Number of cotyledons	One	Two
Root type	Adventitious, usually fibrous	Tap rooted, may be fibrous

This response gained 2 marks

This response has achieved both marks. It is clear this candidate knew the typical vein structure, Whilst the candidate had included two numbers of flower parts (to match the other information in the table), the mark was awarded for the inclusion of 3.

4 The table shows the characteristics of two types of plant.

(a) Complete the table to include the missing information.

(2)

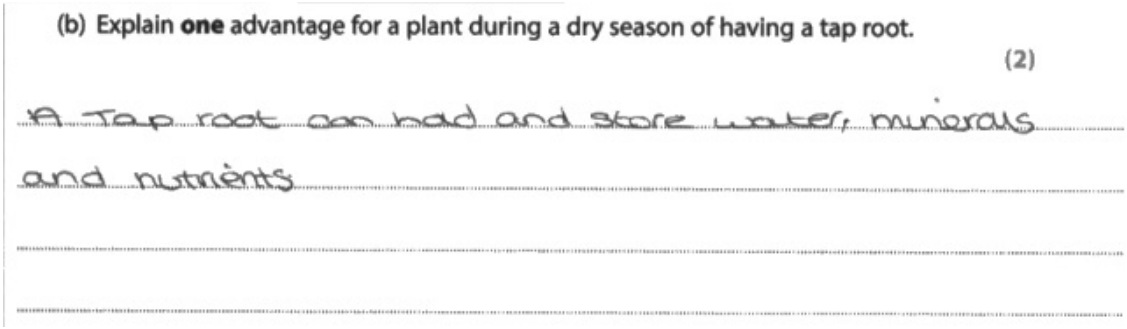
	Monocotyledon	Dicotyledon
Leaf vein structure	Parallel veins	Vertical veins
Number of flower parts	Small flowers form individually	Typically multiples of 4 or 5
Number of cotyledons	One	Two
Root type	Adventitious, usually fibrous	Tap rooted, may be fibrous

This response gained 0 marks

This response was not sufficiently accurate to gain credit. The candidate has attempted to use the cues in the table to form their answer, but in both cases they were unsuccessful.

Q4 (b)

This question used the command verb 'Explain'. The mark scheme awarded one mark for the identification of a relevant advantage and a further mark for the development of the response. Whilst many understood what a tap root was, they were not always able to articulate how this would be beneficial in a try season.

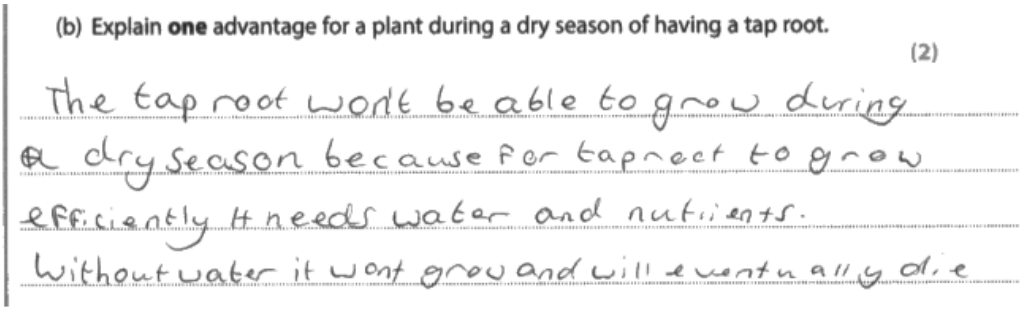

(b) Explain **one** advantage for a plant during a dry season of having a tap root.

(2)

A Tap root can hold and store water, minerals and nutrients

This response gained 1 mark

This answer identified that a tap root would allow for the storage of water and nutrients, but was not awarded a the second mark for expanding how this would be of benefit to the plant (survival in harsh conditions)


(b) Explain **one** advantage for a plant during a dry season of having a tap root.

(2)

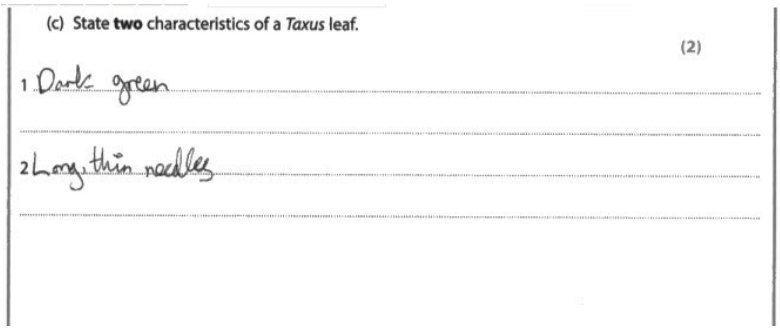
The tap root wont be able to grow during a dry season because for tap root to grow efficiently it needs water and nutrients. Without water it wont grow and will eventually die

This response gained 0 marks

This response does not identify why the tap roots is an advantage. It identifies that water and nutrients are needed by the plant but does not identify that the tap root is able to store these.

Q4 (c)

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


(c) State **two** characteristics of a *Taxus* leaf.

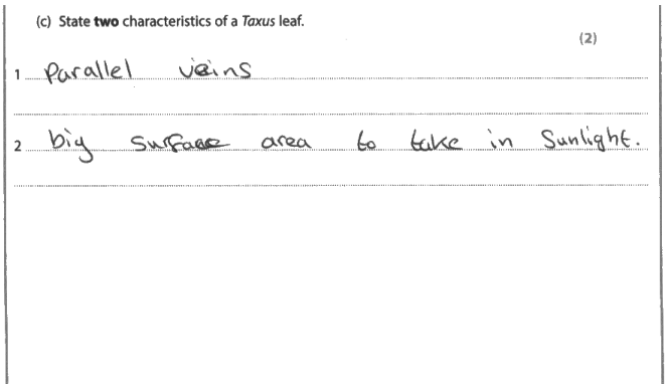
(2)

1 Dark green

2 Long thin needles

This gained 2 marks

This response correctly identified two distinct characteristics of a *Taxus* leaf. The command verb is 'state' meaning that the level of detail provided is sufficient to gain the marks.


(c) State **two** characteristics of a *Taxus* leaf.

(2)

1 Parallel veins

2 big surface area to take in sunlight.

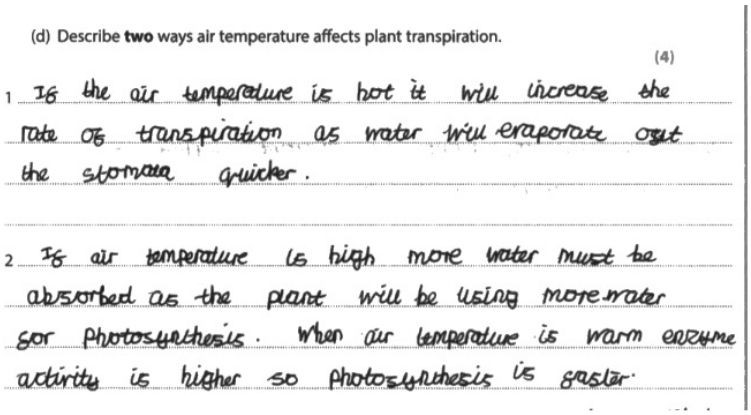
This response gains 0 marks

The response has tried to information for the previous question as information to complete this however the lack of this type of link between questions means that it is expected that the information should already be known by the candidate. Large surface area was not considered to be a distinctive characteristic of this leaf.

Q4 (d)

A question many within the cohort found more challenging. This question required an understanding of how the change in one condition had an impact on the interaction between other plant processes. It was relatively rare for responses to show an understanding of this interaction, some weaker students merely stated the reverse effect as the second way rather than something distinct.

The command verb 'describe' meant that full marks required a suitable development of the two ways stated.



(d) Describe **two** ways air temperature affects plant transpiration.

(4)

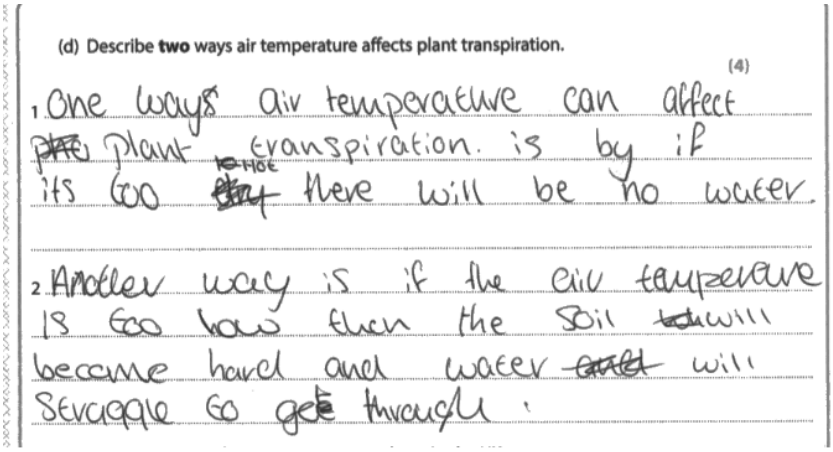
1 If the air temperature is hot it will increase the rate of transpiration as water will evaporate out the stomata quicker.

2 If air temperature is high more water must be absorbed as the plant will be using more water for photosynthesis. When air temperature is warm enzyme activity is higher so photosynthesis is faster.

This response gained 4 marks

Two clear, distinct methods, with additional detail. In the first example there is a good link between the impact of an increase in air temperature, causing evaporation and increase in transpiration.

The second way shows good understanding of the increase in rate of photosynthesis and enzyme activity.



(d) Describe **two** ways air temperature affects plant transpiration.

(4)

1 One ways air temperature can affect ~~plant~~ plant transpiration. is by if its too ~~they~~ there will be no water.

2 Another way is if the air temperature is too low then the soil ~~to~~ will become hard and water ~~can't~~ will struggle to get through.

This response gained 0 marks

Two ways are listed with some additional detail, but neither are technically correct. An increase in air temperature does not necessarily mean there will no water available. In the second way stated, it is presumed the description of the soil becoming 'hard' may relate to the ground being frozen. The link to transpiration is not clear.

Q4 (e)

This 6 mark level of response question was attempted by the majority of students.

As with other questions of this style, it provides the opportunity to bring together and apply a range of concept from the unit content, in this case to provide the correct growing conditions for a prescribed crop plant. This is a scenario that would be seen in all specialisms of the land based qualifications.

In this situation there were two main issues to address- the reduction in soil pH and the requirement for high rainfall.

It is expected that candidates would address the issues of how to address these issues in a fertile soil suitable for the crop plant.

Many responses focussed on one aspect and therefore did not answer the full question. There as a general misunderstanding of the role of lime in the soil.

(e) A land owner is planning to grow tea plants in the UK.

Tea plants need a fertile soil with a pH of 5.5 to 6.5 and high rainfall.

Describe how a neutral (pH 7) soil could be managed to provide the correct conditions to maximise production.

(6)

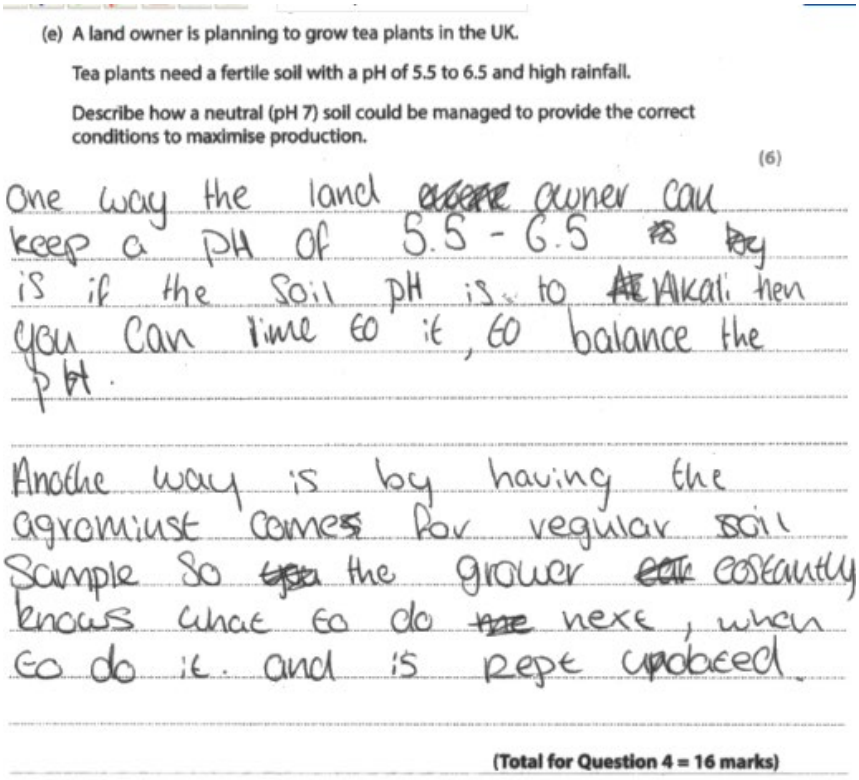
To make a neutral pH soil have a pH of 5.5 to 6.5 you need to make it more acidic. This can be done by applying a & fertiliser including sulfer to the ground to lower the pH. Also adding an amonium based fertiliser will provide the plants with the nutrients they need, keeping the soil fertile* Amonium based fertilisers also tend to produce hydrogen (H^+) ions which make soil more acidic. Another way to increase acidity is by putting animals on the ground. Urea from the animal will acidify the soil.

(Total for Question 4 = 16 marks)

*and maximising production.

This response gained 3 marks

In this script there is a good knowledge of the methods that could be used to reduce the pH of the soil (acidify it). The fertiliser choice is appropriate as is the application of sulfur. The response does not address the requirement for high rainfall however, it would be expected that the response would include some reference to supplementary irrigation. As a result the response is limited in the mark achieved.



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(6)

One way the land owner can keep a pH of 5.5 - 6.5 is if the soil pH is to Alkali then you can lime it, to balance the pH.

Another way is by having the agronimist comes for regular soil sample so the grower essentially knows what to do next, when to do it. and is repeated.

(Total for Question 4 = 16 marks)

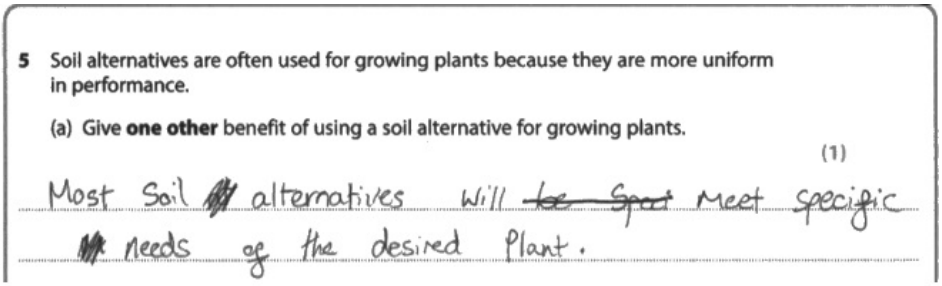
This response gained 1 mark

This response is very basic and was given credit for the testing of the soil to monitor conditions. Using the stimulus material, there has been a recognition of the need to change the soil pH but the recommendation to use lime is incorrect as this would make the soil more alkaline. There is no mention of a method to address the requirement for high rainfall.

Question 5

Q5 (a)

Linked the theme of controlling the growing environment, this question, albeit only one mark, proved challenging for many candidates respond correctly.



5 Soil alternatives are often used for growing plants because they are more uniform in performance.

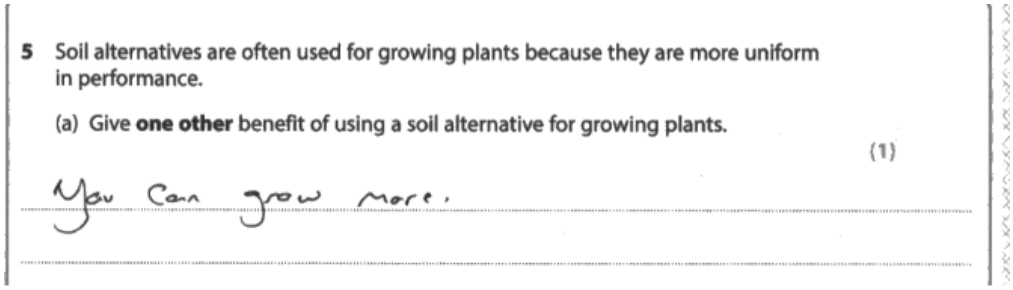
(a) Give **one other** benefit of using a soil alternative for growing plants.

(1)

Most Soil alternatives will ~~be Spoil~~ meet specific needs of the desired Plant.

This response gained 1 mark

A valid response, helping to provide specific growing conditions for the target plant. Other common themes included the reduced chance of pests or diseases. The command verb 'give' did not require further explanation.



5 Soil alternatives are often used for growing plants because they are more uniform in performance.

(a) Give **one other** benefit of using a soil alternative for growing plants.

(1)

You can grow more.

This response gained 0 marks

This response is too generic to be worthy of credit.

Q5 (b)

In common with the Sample Assessment Materials (SAMs) this question requires the student to form an opinion based on the data in the table. This stimulus material enabled a larger number of students to create an answer and gain the mark.

The table shows the properties of three materials that may be used as alternatives to soil.

	Total porosity %	Air-filled porosity %	Water holding capacity %
Coconut coir	80	13	40
Rock wool	96	11	91
Sand	35	7	15

(b) Give **one** reason why rock wool would be best for drip irrigation systems.

(1)

It has the highest water holding capacity.

1 mark

This student has correctly identified the link to a high water holding capacity. Some responses also quoted the data but this was not required to gain the mark in this situation.

Q5 (c)

Linking to the theme in parts a and b, this question required a demonstration of the benefits of trickle drip irrigation. This is a common method for controlling water use, particularly in more intensive growing situations. The response should include a description (the command verb).

(c) Describe how using drip irrigation reduces the amount of water used on crops.

(2)

Irrigation reduces the amount of water used on the crops as the water is recyable and is using the correct amount needed for the plant and using the irrigation the water go striaght on the ~~soil~~ soil around the plant which soak in a doesnt evaporated.

This response gained 2 marks

The clarity of the response helps to demonstrate the knowledge gained and highlights that the correct amount of water is applied and there are also opportunities for recycling water supplies. These are common reasons for the use of this technique in more arid climates.

(c) Describe how using drip irrigation reduces the amount of water used on crops.

(2)

It reduces it because it only drips slowly so the plants will not have a high yeild and compacton wont be made. as well as water logging

This response gained 0 marks

There is insufficient detail as to how a slow drip would use less water. The inclusion of yield and compaction are irrelevant to this question.

Q5 (d)

The plant and soil science unit contains a few specific techniques or methods within the specification. The completion of this table is designed to test this specialist knowledge.

Whilst many candidates are familiar with liquid formulations the use of prills is not such common knowledge and proved to be the more challenging item within the table.

(d) The table below compares some different formulations of fertilisers.

Complete the table to include the missing information.

(2)

Formulation type	Speed of action	Method of application
Granule	Medium	Fertiliser spreader
Liquid	fast	Sprayer
Prill	Fast to medium	~~spreadect~~ spreaded

This response gained 2 marks

The candidate correctly identified the speed of action to be fast (or quick) the inclusion of application terms within the table could have acted as a guide for

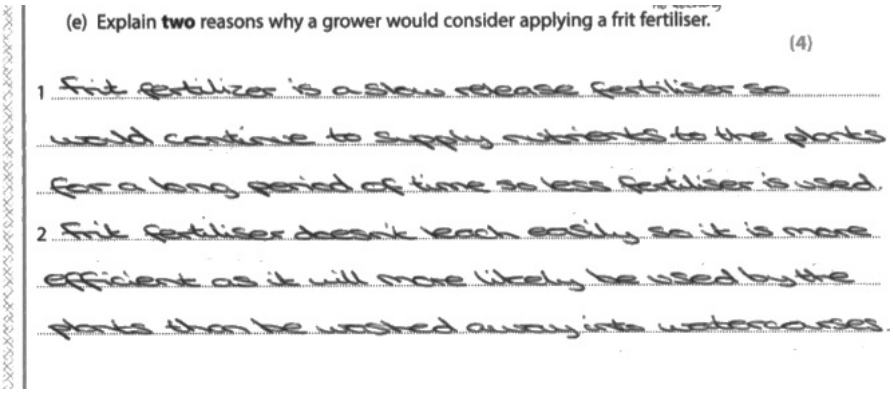
the other box. In this case the precise wording was not used but was given credit

Q5 (e)

Four marks were available in this question. The characteristics of fertilisers such as frits are specifically listed within the specification although knowledge of this specialist formulation was not well understood.

Whilst many responses focused on the speed of action, perhaps prompted by the table in part d, relatively few wrote about the precision and potential reduction in drift/ leaching.

The command verb 'explain' means that marks are available for appropriate development of an statement.



(e) Explain **two** reasons why a grower would consider applying a frit fertiliser.

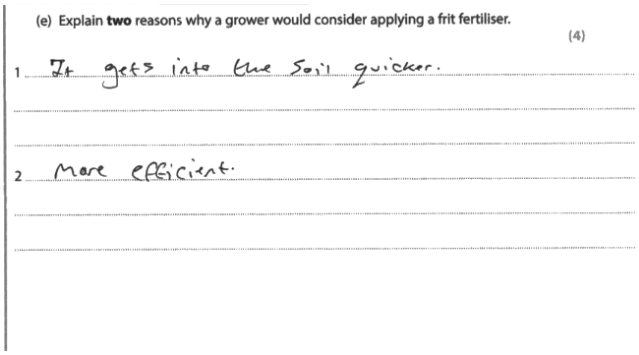
(4)

1 frit fertilizer is a slow release fertiliser so would continue to supply nutrients to the plants for a long period of time so less fertiliser is used

2 frit fertiliser doesn't leach easily so it is more efficient as it will more likely be used by the plants than be washed away into watercourses

This response gained 2 marks

While many frit fertilisers are slow release, it is not always the case so this cannot be classified as a valid reason. The response does identify the potential to reduce leaching due to the greater precision.



(e) Explain **two** reasons why a grower would consider applying a frit fertiliser. (4)

1 It gets into the soil quicker.

2 More efficient.

This response gained 0 marks

While two reasons are provided, they are both very generic and needed greater clarification. It is not clear whether the efficiency relates to the application or the uptake.

There was no explanation within either statement.

Q5 (f)

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

In this situation there was scope to describe the impact of eutrophication on water bodies. Many responses alluded to this but failed to provide suitable detail.

The indicative mark scheme provided numerous different potential mark points, but even at level 3 it is not expected that these will all be covered.

(f) Analyse the impact of fertiliser leaching on the environment.

(6)

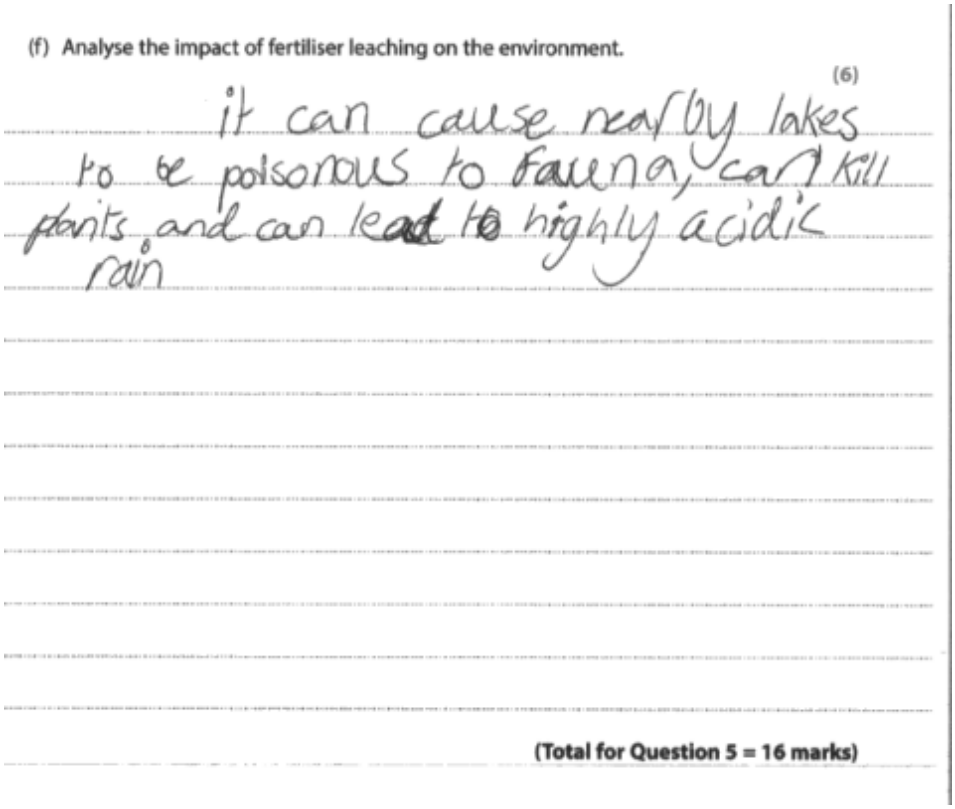
Fertiliser leaching has damaging impacts on the environment because it can cause areas of soil where it accumulates to become acidified and kill off any plants growing in that soil due to much harm from a strong concentration of fertiliser. Eutrophication can also occur, whereby fertiliser leaches into water courses of stagnant water and the abundance of nutrients, mostly nitrogen and phosphorus, cause algae to grow rapidly, and create algae blooms on the surface of the water. This blocks sunlight from reaching plants below so they die off as they are unable to photosynthesize. When the algae blooms die, decomposers break them down and respire, depleting the water of oxygen. This makes fish and other organisms unable to survive so the ecosystem is killed. Overall, fertiliser leaching is detrimental to the environment.

(Total for Question 5 = 16 marks)

This response gained 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.

The script refers to the process of eutrophication and provides some detail although this could be developed further. The response also identifies that plants in the soil could be damaged by the accumulation of fertilisers, although again the opportunity to develop the impact has been missed.



(f) Analyse the impact of fertiliser leaching on the environment.

(6)

it can cause nearby lakes to be poisonous to fauna, can kill plants and can lead to highly acidic rain

(Total for Question 5 = 16 marks)

This response gained 1 mark

A response with little detail, the student has identified the impact on plants in lakes but lacks any development. The quality of work meets the level 1 descriptors within the mark scheme.

This student was awarded 1 mark.

Question 6

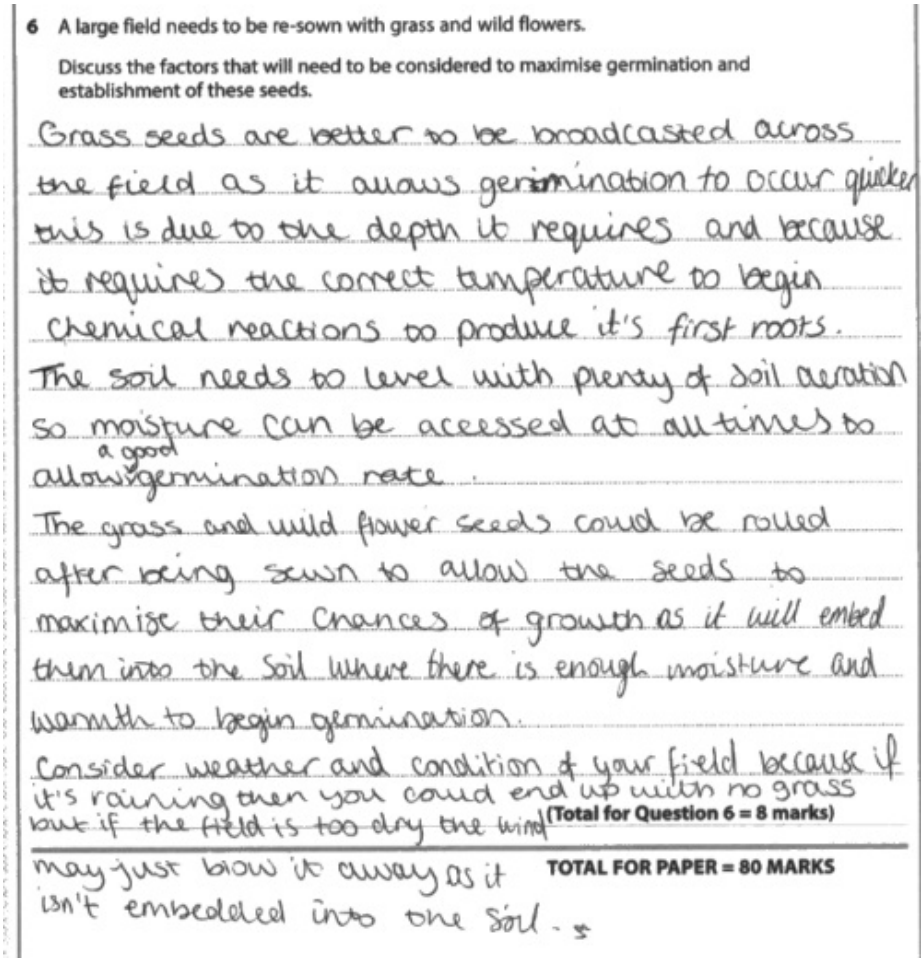
Q6

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 seed germination- both in the environmental conditions and also the factors affecting seed dormancy.

Candidates often wrote enthusiastically on the subject, clearly relying on their own practical experiences. Some provided significant detail on soil tilling methods for example but potentially missed the focus of the question.

Best responses were able to demonstrate good plant and soil science knowledge within this practical application.

As with other level of response questions, full coverage of the points listed within the mark scheme is not expected. Stronger responses could either write about some factors in significant detail or could provide information on a wide range of factors in less detail.



6 A large field needs to be re-sown with grass and wild flowers.

Discuss the factors that will need to be considered to maximise germination and establishment of these seeds.

Grass seeds are better to be broadcasted across the field as it allows germination to occur quicker this is due to the depth it requires and because it requires the correct temperature to begin chemical reactions to produce it's first roots. The soil needs to level with plenty of soil aeration so moisture can be accessed at all times to allow a good germination rate. The grass and wild flower seeds could be rolled after being sown to allow the seeds to maximise their chances of growth as it will embed them into the soil where there is enough moisture and warmth to begin germination. Consider weather and condition of your field because if it's raining then you could end up with no grass but if the field is too dry the wind may just blow it away as it isn't embedded into the soil.

(Total for Question 6 = 8 marks)

TOTAL FOR PAPER = 80 MARKS

This response gained 5 marks

This student response shows a good level of knowledge and has discussed some different factors. The early part of the response shows an acknowledgement of the role of temperature although falls short of providing detail on many other scientific factors. As a result this best fits the level 2 descriptor in the mark scheme.

6 A large field needs to be re-sown with grass and wild flowers.

Discuss the factors that will need to be considered to maximise germination and establishment of these seeds.

you would need to plow the field and roll it and leave to settle then drill the seeds. you need to make sure to keep pests such as rabbits, deer and pigeon of the field to ensure it germinates and establishes it self.

(Total for Question 6 = 8 marks)

This response gained 1 mark

A very basic response although a valid factor (protect against pests). The response is accurate in terms of process but does not provide any information as to thy this is done. The response does not explain how these practices will maximise germination and establishment.

Summary

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

- Students 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.
- Be aware of the inter-relationships between different plant and soil processes.
- Clarity in the benefits and limitations of different pollination methods.
- Ensure more detailed responses include reference to appropriate scientific processes where relevant rather than just practical instructions
- 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.

Centres should also ensure that their assessment and delivery plans for the course provides sufficient time for the recommended guided learning hours to have been delivered prior to entry for the examination. It is perceived that the level of scientific knowledge shown by some candidates would indicate that did not yet have sufficient teaching input to perform well in this January series.