

Mark Scheme (FINAL)

January 2021

BTEC Level 3 Nationals in
Agriculture, Countryside Management,
Forestry and Arboriculture; Horticulture

Unit 2: Plant and Soil Science

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- All marks on the mark scheme should be used appropriately.
- All marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if a candidate's response is not worthy of credit according to the mark scheme.
- Where some judgment is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt about applying the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed-out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Phonetic spelling should be accepted.

BTEC Next Generation Mark Scheme Template

Plant and Soil Science Unit 2 V1 Jan 2021

Question Number	Answer	Mark
1a	A: Ovary B: Pedicel	2

Question Number	Answer	Mark
1b	Award one mark for any of the following, up to a maximum of two marks. <ul style="list-style-type: none">• attracts insects / pollinators (1)• protection of stamens / stigma / fertile parts (1)• support for fertile parts of the flower (1)	2

Question Number	Answer	Mark
1c	Award one mark for any of the following, up to a maximum of two marks. <ul style="list-style-type: none">• thick testa/seed coat (1)• incorrect temperature (1)• lack of moisture (1)• immature seed (1)• chemical inhibition/ germination inhibitors (1)• season (1)	2

Question Number	Answer	Mark
1d	<p>Award one mark for identification and one mark for appropriate expansion, up to a maximum of four marks.</p> <ul style="list-style-type: none"> • Pollen is light (1) easier to be blown by wind (1) • Large amounts of pollen (1) increases chance of reaching stigma (1) • Stamens held outside the flower (1) increases access to wind currents (1) • Stigma held outside the flower (1) to catch pollen as it passes (1) • Lack of nectar / scent / reduced petals (1) no need to attract insects (1) • Flowers often small/inconspicuous developed before foliage (1) so this does not interfere with the circulation of wind around the flowers (1) • Stigma often large/sticky (1) so it catches pollen as it passes (1) <p>Accept any other appropriate response.</p>	4

Question Number	Answer	Mark
1e	<p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some / all of the indicative content but should be rewarded for other relevant answers.</p> <p>Responses may include the following:</p> <ul style="list-style-type: none"> • increased air temperatures / warmer weather • increase in soil temperature • many seeds have a minimum germination temperature • regular rainfall • enables seed to be hydrated • water needed for germination • reduced water table (compared to winter) • increased air spaces in soil 	6

	<ul style="list-style-type: none"> • oxygen needed for respiration • increased soil temperature will increase microbe activity – needed for the breakdown of testa in some seeds. <p>Do not accept responses unrelated to germination in the spring.</p>	
Level	Descriptor	
0 0 marks	No rewardable material.	
1 1–2 marks	<ul style="list-style-type: none"> • Demonstrates isolated knowledge and understanding, there be major gaps or omissions. • Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question. • Limited analysis which contains generic assertions rather than interrelationships or linkages. 	
2 3–4 marks	<ul style="list-style-type: none"> • Demonstrates some accurate knowledge and understanding, with few minor omissions / any gaps or omissions are minor. • Breaks the situation down into component parts and some of the points made will be relevant to the context in the question. • Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained. 	
3 5–6 marks	<ul style="list-style-type: none"> • Demonstrates mostly accurate and thorough / detailed knowledge and understanding. • Breaks the situation down into component parts and most of the points made will be relevant to the context in the question. • Displays a well-developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner. 	

Question Number	Answer	Mark
2a	X – Photosynthesis Y – Combustion	2

Question Number	Answer	Mark
2b	<p>Award up to four marks for a description that makes reference to the following.</p> <ul style="list-style-type: none"> • breakdown of dead animal / plant / organic material (1) • named example of decomposing organism (1) • decomposition, a combination of actions of animals, bacteria and fungi (1) • releases carbon dioxide into the atmosphere (1) • through a process of respiration (1) <p>Accept any other appropriate response including annotated diagrams.</p>	4

Question Number	Answer	Mark
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2c	<p>Award one mark for identification and one mark for appropriate expansion, up to a maximum of four marks.</p> <ul style="list-style-type: none"> • Number of leaves (1) increased area to lose water (1) • Wind speed (1) affects evaporation from leaf surface (1) • Light levels (1) stomata open when photosynthesis occurs (1) • Air temperature (1) higher temperatures increases rate of evaporation (1) • Lack of turgidity in plant (1) stomata closed when lack of water – less water loss / water uptake (1) • Humidity (1), increase in humidity causes transpiration decrease (1) <p>Accept any other appropriate response.</p>	4
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Question Number	Answer	Mark
2d	<p>Answers will be credited according to the learner’s demonstration of knowledge and understanding of the material using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some / all of the indicative content but should be rewarded for other relevant answers. Responses may include the following:</p> <ul style="list-style-type: none"> • larger leaf area increases the capture of sunlight • thinner leaves (such as some ferns) allow light penetration to all cells in the leaf • reduced or sunken stomata (to reduce transpiration) might reduce photosynthesis as water becomes a limiting factor • waxy leaf cuticles may reduce the rate of transpiration • young leaves photosynthesise more efficiently than older leaves • deciduous trees will not photosynthesise in winter • plants with reduced leaves (such as cacti) may mean stems are the main area of photosynthesis. 	6

	<ul style="list-style-type: none"> • variegated / coloured leaves may be less efficient at photosynthesising • needles have a continuous presence and photosynthesise in winter if conditions are appropriate/sufficient 	
Level	Descriptor	
0 0 marks	No rewardable material.	
1 1–2 marks	Demonstrates isolated elements of knowledge and understanding presented in an unstructured format. Generic statements may be presented rather than linkages being made so that lines of reasoning are unclear or rarely supported through the application of relevant evidence from the context.	
2 3–4 marks	Demonstrates mostly accurate knowledge and understanding. There is some structure to the response. Some occasional linkages present so that lines of reasoning are mostly clear and partially supported through the application of relevant evidence from the context.	
3 5–6 marks	Demonstrates accurate and thorough knowledge and understanding presented in a clear and logical format. Comprehensive linkages evidenced so that lines of reasoning are clear and concise, and well supported.	

Question Number	Indicative content	Mark
3	<p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers.</p> <p>Responses may include the following:</p> <p>Physical / mechanical weathering:</p> <ul style="list-style-type: none"> • caused by frost / ice • freezing water splits rocks as water expands • glaciers wear down rocks as they move down valleys • caused by heat • expansion of rocks causes splitting • caused by water • constant erosion by streams / tides wears away rocks breaking off small fragments as others hit them • caused by wind • particles carried in the air and collide with other rocks <p>Chemical weathering:</p> <ul style="list-style-type: none"> • caused by carbonic acid • carbonic acid is a combination of carbon dioxide and water • acid rain is a source of chemical weathering • some rock minerals dissolved/leach • carbonic acid chemically changes some rock minerals • oxygen in the air causes oxidation of some minerals 	8
Level	Descriptor	
0 0 marks	No rewardable material.	
1 1–3 marks	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions. • Few of the points made will be relevant to the context in the question. • Limited discussion which contains generic assertions rather than considering different aspects and the relationship between them. 	

2 4–6 marks	<ul style="list-style-type: none">• Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions.• Some of the points made will be relevant to the context in the question, but the link will not always be clear.• Displays a partially developed discussion which considers some different aspects and some consideration of how they interrelate, but not always in a sustained way.
3 7–8 marks	<ul style="list-style-type: none">• Demonstrates mostly accurate and detailed knowledge and understanding.• Most of the points made will be relevant to the context in the question, and there will be clear links.• Displays a well-developed and logical discussion which clearly considers a range of different aspects and considers how they interrelate, in a sustained way.

Question Number	Answer	Mark
4a	(Change soil texture) – Low (1) (Construct sloping ground) – High (1)	2

Question Number	Answer	Mark
4b	Award one mark for any of the following, up to a maximum of two marks. <ul style="list-style-type: none"> • use of limestone (1) • increase the amount/ volume of sand / grit (1) • incorporation of organic matter (1) • cultivation of soil (1) Accept any other appropriate responses.	2

Question Number	Answer	Mark
4c	Award one mark for identification and one mark for appropriate expansion, up to a maximum of two marks. <ul style="list-style-type: none"> • increases space for water (in ditch) (1) lowers water table (1) • (water course) transports water away (1) reduces volume of water in area (1) • allows water to move through soil (1) as water moves to the lowest point (1) • improves water run-off (1) reduces time for infiltration (1) Accept any other appropriate responses.	2

Question Number	Answer	Mark
4d	<p>Award one mark for identification and one mark for appropriate expansion, up to a maximum of four marks.</p> <ul style="list-style-type: none"> • Large machines need large spaces to manoeuvre (1) ditches would inhibit movement (1) • Large machines are heavy (1) creates greater soil compaction / reduces effectiveness of land drains (1) • Large machines can use larger attachments (1) reduces tyre track / allows mole drainage / aeration in rest of land (1) <p>Accept any other appropriate response.</p>	4

Question Number	Answer	Mark
4e	<p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some / all of the indicative content but should be rewarded for other relevant answers.</p> <p>Responses may include the following:</p> <ul style="list-style-type: none"> • greater likelihood of air spaces • greater levels of oxygen in the soil • oxygen needed for respiration • therefore a greater number of soil organisms • improved root growth • deeper root growth • less risk of nutrient leaching / improved nutrient availability • greater soil fertility • improved / faster nutrient recycling • machines will cause less compaction 	6
Level	Descriptor	

0 0 marks	No rewardable material.	
1 1–2 marks	<ul style="list-style-type: none"> • Demonstrates isolated knowledge and understanding, there be major gaps or omissions. • Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question. • Limited analysis which contains generic assertions rather than interrelationships or linkages. 	
2 3–4 marks	<ul style="list-style-type: none"> • Demonstrates some accurate knowledge and understanding, with few minor omissions / any gaps or omissions are minor. • Breaks the situation down into component parts and some of the points made will be relevant to the context in the question. • Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained. 	
3 5–6 marks	<ul style="list-style-type: none"> • Demonstrates mostly accurate and thorough / detailed knowledge and understanding. • Breaks the situation down into component parts and most of the points made will be relevant to the context in the question. • Displays a well-developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner. 	

Question Number	Answer	Mark
5a	<ul style="list-style-type: none"> Plant nutrients derived from natural / living sources (1) <p>Do not accept: does not contain chemicals.</p>	1

Question Number	Answer	Mark
5b	<ul style="list-style-type: none"> provides higher levels of nitrogen (1) provides higher levels of phosphorus (1) meets the nutrient requirements of the plants (1) <p>Accept any other appropriate response.</p>	1

Question Number	Answer	Mark
5c	<p>Award up to two marks for a description that makes reference to:</p> <p>Formulation method (1)</p> <p>Application method relevant to the formulation (1)</p> <p>Approved rate / according to instructions on product (1)</p>	2

Question Number	Answer	Mark
5d	<ul style="list-style-type: none"> Potassium (1) Reduced leaf growth / chlorosis in older leaves / whiptail in brassicas (1) 	2

Question Number	Answer	Mark
5e	<p>Award one mark for identification and one mark for appropriate expansion, up to a maximum of four marks.</p> <ul style="list-style-type: none"> • incorrect soil pH (1) plant roots unable to function efficiently (1) • presence / lack of other nutrients (1) roots need the presence / absence of some nutrients to uptake nutrients efficiently (1) • lack of water (1) plant is not transpiring, limiting the uptake and transport of nutrients (1) • too much water / root death (1) plant roots unable to uptake nutrients in solution (1) • pest / disease attack reducing root (1) less surface area for water / nutrient uptake (1) • soil too saline (1) water will move out of roots by osmosis / water uptake (1) <p>Accept any other appropriate response.</p>	4

Question Number	Answer	Mark
5f	<p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some / all of the indicative content but should be rewarded for other relevant answers. Responses may include the following:</p> <ul style="list-style-type: none"> • organic matter improves soil fertility • increases the biotic component of the soil • increases the depth of topsoil • allows greater coverage of soil by plants • plant roots reduce the risk of soil erosion • roots increase the level of infiltration • biotic component increases the effectiveness of the nitrogen and carbon cycles • organic matter helps to buffer / balance soil pH 	6

	<ul style="list-style-type: none"> • decomposition of organic matter reduces risk of plant / animal diseases • improved soil structure for optimal drainage / nutrient retention. 	
Level	Descriptor	
0 0 marks	No rewardable material.	
1 1–2 marks	<ul style="list-style-type: none"> • Demonstrates isolated knowledge and understanding, there be major gaps or omissions. • Breaks the situation down into component parts and a few of the points made will be relevant to the context in the question. • Limited analysis which contains generic assertions rather than interrelationships or linkages. 	
2 3–4 marks	<ul style="list-style-type: none"> • Demonstrates some accurate knowledge and understanding, with few minor omissions / any gaps or omissions are minor. • Breaks the situation down into component parts and some of the points made will be relevant to the context in the question. • Displays a partially developed analysis which considers some interrelationships or linkages but not always sustained. 	
3 5–6 marks	<ul style="list-style-type: none"> • Demonstrates mostly accurate and thorough / detailed knowledge and understanding. • Breaks the situation down into component parts and most of the points made will be relevant to the context in the question. • Displays a well-developed and logical analysis which clearly considers interrelationships or linkages in a sustained manner. 	

Question Number	Indicative content	Mark
6	<p>Answers will be credited according to the learner's demonstration of knowledge and understanding of the material using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some / all of the indicative content but should be rewarded for other relevant answers.</p> <p>Responses may include the following:</p> <ul style="list-style-type: none"> • examples of named soil alternatives • advantages and disadvantages of alternatives <p>To include:</p> <ul style="list-style-type: none"> • cost comparison • nutrient content • nutrient holding capacity • availability of material • environmental impact • consistency / reliability of material • increase in yield • decrease in disease incidence • additional storage facilities needed • need for staff training to use effectively 	8
Level	Descriptor	
0 0 marks	No rewardable material.	
1 1–3 marks	<ul style="list-style-type: none"> • Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions. • Few of the points made will be relevant to the context in the question. • Limited discussion which contains generic assertions rather than considering different aspects and the relationship between them. 	
2 4–6 marks	<ul style="list-style-type: none"> • Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions. • Some of the points made will be relevant to the context in the question, but the link will not always be clear. • Displays a partially developed discussion which considers some different aspects and some consideration of how they interrelate, but not always in a sustained way. 	
3 7–8 marks	<ul style="list-style-type: none"> • Demonstrates mostly accurate and detailed knowledge and understanding. • Most of the points made will be relevant to the context in the question, and there will be clear links. 	

	<ul style="list-style-type: none">• Displays a well-developed and logical discussion which clearly considers a range of different aspects and considers how they interrelate, in a sustained way.
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ALWAYS LEARNING

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