

**0174-32 Level 3 Advanced Technical Extended Diploma in Horticulture (720)**

**0174-006/506 Level 3 Horticulture – Theory exam (2)**

**June 2019**

1	Explain <b>three</b> benefits of applying a bulky topdressing to a lawn.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<ul style="list-style-type: none"> <li>• Promotes grass growth/health as a result of increased nutrients. (1)</li> <li>• Creates a level/even surface because slightly more topdressing is left in low points. (1)</li> <li>• Improves drainage because of the structure of the topdressing. (1)</li> <li>• If applied as part of repair or renovation work, topdressing can physically improve the soil or change physical aspects of the soil (1)</li> <li>• Improvement to soil structure because of the physical components e.g. sand/organic content. (1)</li> </ul>	One mark for any of the answers to a maximum of <b>three</b> marks.	3
2	a) Name <b>two</b> species of wild flowers that are found in spring meadows. b) State the <b>two</b> times of year when a spring flowering meadow is cut.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>a)</p> <ul style="list-style-type: none"> <li>• <i>Ranunculus acris</i> (Meadow buttercup). (1)</li> <li>• <i>Cardamine pratensis</i> (Lady smock). (1)</li> <li>• <i>Primula veris</i> (Cowslip). (1)</li> <li>• <i>Saxifraga granulata</i> (Meadow saxifrage). (1)</li> <li>• <i>Lychnis flos-cuculi</i> (Ragged Robin). (1)</li> <li>• <i>Fritillaria meleagris</i> (Snakeshead fritillary). (1)</li> </ul> <p>b) Early summer <b>and</b> early autumn. (1)</p>	<p>Accept any other suitable answers provided.</p> <p>Both times of year need to be stated to be awarded one mark.</p>	3

3	Explain <b>two</b> advantages and <b>two</b> disadvantages of creating wild flower meadows in a public park.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>Advantages:</p> <ul style="list-style-type: none"> <li>• Less maintenance once properly established. (1)</li> <li>• Lower cost once properly established. (1)</li> <li>• Improves flora and fauna biodiversity. (1)</li> <li>• Tolerant of poor soil. (1)</li> <li>• Tolerant of drought conditions. (1)</li> <li>• Improved aesthetics because of flowers replacing close-mown grass. (1)</li> </ul> <p>Disadvantages:</p> <ul style="list-style-type: none"> <li>• Can look messy when not in flower. (1)</li> <li>• Difficult to establish in terms of correct growing conditions. (1)</li> <li>• Initially more expensive to establish. (1)</li> <li>• Specialist equipment needed to cut it. (1)</li> </ul>	<p>One mark for any advantage to a maximum of <b>two</b> marks.</p> <p>One mark for any disadvantage to a maximum of <b>two</b> marks.</p>	4
4	<p>a) Name <b>four</b> flower structures.</p> <p>b) Compare the structures of insect pollinated flowers to wind pollinated flowers.</p>		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>a)</p> <ul style="list-style-type: none"> <li>• Sepals. (1)</li> <li>• Petals. (1)</li> <li>• Filament. (1)</li> <li>• Anthers. (1)</li> <li>• Stigma.(1)</li> <li>• Ovary. (1)</li> <li>• Nectary. (1)</li> <li>• Style. (1)</li> </ul> <p>b)</p> <ul style="list-style-type: none"> <li>• Insect pollinated flowers have petals that attract insects. Those of wind pollinated are typically nondescript. (1)</li> <li>• Insect pollinated flowers typically have anthers that produce relatively small quantities of pollen. Wind pollinated flowers have anthers that produce large amounts of pollen. (1)</li> <li>• Insect pollinated flowers are often cup shaped or similar. Wind pollinated flowers have fully exposed anthers. (1)</li> </ul>	<p>One mark for any of the flower structures listed to a maximum of <b>four</b> marks.</p> <p>One mark for each comparison to a maximum of <b>four</b> marks.</p>	8

	<ul style="list-style-type: none"> <li>Insect pollinated flowers often have nectaries to attract insects. Wind pollinated flowers rarely have nectaries. (1)</li> </ul>		
5	a) State <b>two</b> factors influencing the rate of respiration. b) Explain <b>two</b> advantages and <b>two</b> disadvantages of vegetative propagation.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	a) <ul style="list-style-type: none"> <li>Temperature. (1)</li> <li>Water availability. (1)</li> <li>Seasonal growth. (1)</li> <li>Oxygen availability. (1)</li> <li>Light. (1)</li> </ul> b)           Advantages: <ul style="list-style-type: none"> <li>Maintain the desirable characteristics.(1)</li> <li>Favourable genes continue in future generations. (1)</li> <li>Does not depend on external factors like pollination. (1)</li> <li>New individuals produced sexually mature faster. (1)</li> <li>The offspring are identical to the parent plant. (1)</li> </ul> Disadvantages: <ul style="list-style-type: none"> <li>New offspring may carry undesirable qualities from parents. (1)</li> <li>Offspring may be unable to withstand changing environmental conditions. (1)</li> <li>Faster maturity can cause overcrowding and stiff competition. (1)</li> <li>Reduced strength and vigour of successive generations. (1)</li> </ul>	One mark for any of the factors to a maximum of <b>two</b> marks.  One mark for any of the advantages to a maximum of <b>two</b> marks.  One mark for any of the disadvantages to a maximum of <b>two</b> marks.	6
6	State <b>two</b> methods of identifying soil texture.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<ul style="list-style-type: none"> <li>Water suspension test/jar test. (1)</li> <li>Sieving. (1)</li> <li>Feel test/hand texturing. (1)</li> </ul>	One mark for any of the methods to a maximum of <b>two</b> marks.	2

7	Summarise <b>four</b> benefits of organic matter in soil.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<ul style="list-style-type: none"> <li>• Increased Cation Exchange Capacity. (1)</li> <li>• Increased water holding capacity. (1)</li> <li>• Improved soil structure. (1)</li> <li>• Improved soil fertility. (1)</li> <li>• Reduced soil erosion. (1)</li> <li>• Improved soil fauna. (1)</li> <li>• Reduces nutrient leaching. (1)</li> </ul>	One mark for any of the benefits to a maximum of <b>four</b> marks.	4
8	a) State <b>three</b> substances that can be used to ameliorate the structure of acid clay soil. b) Summarise <b>three</b> benefits of double digging.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>a)</p> <ul style="list-style-type: none"> <li>• Organic matter. (1)</li> <li>• Lime. (1)</li> <li>• Sand/gravel. (1)</li> </ul> <p>b)</p> <ul style="list-style-type: none"> <li>• Improves drainage. (1)</li> <li>• Deepens shallow soils. (1)</li> <li>• Loosens compacted soils. (1)</li> <li>• Allows frost to break down clods. (1)</li> <li>• Buries weeds. (1)</li> </ul> <p>Incorporates organic matter. (1)</p>	<p>One mark for any of the substances to a maximum of <b>three</b> marks.</p> <p>One mark for any of the benefits to a maximum of <b>three</b> marks.</p>	6
9	State <b>four</b> common reasons for formative pruning of newly planted standard trees.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<ul style="list-style-type: none"> <li>• Balance the shape. (1)</li> <li>• Remove twin leader. (1)</li> <li>• Shorten laterals to thicken stem. (1)</li> <li>• Remove the crossing wood/branches. (1)</li> <li>• Control future growth. (1)</li> <li>• Maintain tree health. (1)</li> </ul>	<p>One mark for any of the reasons to a maximum of <b>four</b> marks.</p> <p>Accept any other suitable answer provided.</p>	4

10	<p>Peter runs a tree services company. It is early spring and a client has contacted him about a large old tree in their garden. The client does not know what species of tree it is. They are concerned about the tree toppling during stormy weather and have asked him to reduce the size of the tree by half. They would like him to apply a wound paint to any resulting wounds.</p> <p>a) Explain <b>four</b> reasons why the client's requests will need to be amended in the interest of the tree's health.</p> <p>b) Summarise an alternative pruning programme for the lime tree.</p>						
	<table border="1"> <thead> <tr> <th>Acceptable answer(s)</th> <th>Guidance</th> <th>Max mks</th> </tr> </thead> <tbody> <tr> <td> <p>a)</p> <ul style="list-style-type: none"> <li>• A tree's species should be identified before pruning as different species should ideally be pruned at different times of the year(1)</li> <li>• The extent of the pruning suggested would weaken the tree. (1)</li> <li>• Wound paints can inhibit the trees ability to compartmentalise or zone off the wound (1)/wound paints increase the risk of decay by trapping moisture behind the painted seal (1)/in some instances wound paint can be a food source for canker pathogens. (1)</li> <li>• Older trees have a reduced capacity to tolerate the potentially adverse effects of wounding. (1)</li> </ul> <p>b)</p> <ul style="list-style-type: none"> <li>• Crown reduction should not exceed 25% of the crown volume. (1)</li> <li>• Crown thinning would be more effective at reducing wind resistance. (1)</li> <li>• Ensure the cuts are positioned at the branch/bark ridge or collar. (1)</li> <li>• Leave wounds untreated for natural healing. (1)</li> </ul> </td> <td> <p>One mark for any of the reasons to a maximum of <b>four</b> marks.</p> <p>Accept any other suitable answer provided.</p>   <p>One mark for any of the reasons to a maximum of <b>four</b> marks.</p> <p>Accept any other suitable answer provided.</p> </td> <td>8</td> </tr> </tbody> </table>	Acceptable answer(s)	Guidance	Max mks	<p>a)</p> <ul style="list-style-type: none"> <li>• A tree's species should be identified before pruning as different species should ideally be pruned at different times of the year(1)</li> <li>• The extent of the pruning suggested would weaken the tree. (1)</li> <li>• Wound paints can inhibit the trees ability to compartmentalise or zone off the wound (1)/wound paints increase the risk of decay by trapping moisture behind the painted seal (1)/in some instances wound paint can be a food source for canker pathogens. (1)</li> <li>• Older trees have a reduced capacity to tolerate the potentially adverse effects of wounding. (1)</li> </ul> <p>b)</p> <ul style="list-style-type: none"> <li>• Crown reduction should not exceed 25% of the crown volume. (1)</li> <li>• Crown thinning would be more effective at reducing wind resistance. (1)</li> <li>• Ensure the cuts are positioned at the branch/bark ridge or collar. (1)</li> <li>• Leave wounds untreated for natural healing. (1)</li> </ul>	<p>One mark for any of the reasons to a maximum of <b>four</b> marks.</p> <p>Accept any other suitable answer provided.</p> <p>One mark for any of the reasons to a maximum of <b>four</b> marks.</p> <p>Accept any other suitable answer provided.</p>	8
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11	<p>Claire runs a lawn maintenance business. She has been asked to prepare an improvement plan for a heavily used domestic lawn on a wet clay soil. The lawn is partially shaded by trees.</p> <p>Discuss factors Claire should consider in this situation and propose the actions she should take.</p> <table border="1"> <thead> <tr> <th>Acceptable answer(s)</th> <th>Guidance</th> <th>Max mks</th> </tr> </thead> <tbody> <tr> <td> <p><b>Indicative content</b></p> <p><b>Factors affecting the lawn</b></p> <ul style="list-style-type: none"> <li>• <u>Soil conditions</u> Pros of clay soils: retain moisture, rich in nutrients, Cons of clay soils: Soil compaction, poor drainage, soil heave, slow-warming</li> </ul> <p>Improvement plan</p> </td> <td> <p><b>Band 1: 1-4 marks</b></p> <p>A basic understanding of the problems associated with lawns on wet clay soils. A limited discussion of the potential maintenance operations required and the potential pest, diseases, disorders and weeds that may be encountered.</p> </td> <td>12</td> </tr> </tbody> </table>	Acceptable answer(s)	Guidance	Max mks	<p><b>Indicative content</b></p> <p><b>Factors affecting the lawn</b></p> <ul style="list-style-type: none"> <li>• <u>Soil conditions</u> Pros of clay soils: retain moisture, rich in nutrients, Cons of clay soils: Soil compaction, poor drainage, soil heave, slow-warming</li> </ul> <p>Improvement plan</p>	<p><b>Band 1: 1-4 marks</b></p> <p>A basic understanding of the problems associated with lawns on wet clay soils. A limited discussion of the potential maintenance operations required and the potential pest, diseases, disorders and weeds that may be encountered.</p>	12
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	<p>Install drainage systems such as a ditch drain, soakaway Aeration Top dressing</p> <ul style="list-style-type: none"> <li>• <u>Environmental factors</u> Shade</li> </ul> <p>Improvement plan Crown thinning of trees Sow shade tolerant grass species</p> <ul style="list-style-type: none"> <li>• <u>Biological factors</u> Weeds that thrive on wet conditions (Weeds: <i>Ranunculus repens</i>), (Algae, lichens, liverworts), Moss Improvement plan Scarification Aeration</li> <li>• <u>Function and usage</u> Heavy usage leads to compaction</li> </ul> <p>Improvement plan Aeration Permanent path such as paving Vary the route of paths</p>	<p>To access the higher marks in the band, the answer shows limited application to the scenario.</p> <p><b>Band 2: 5-8 marks</b> A good understanding of the advantages and disadvantages of clay soils in relation to the scenario. A developed discussion of the potential maintenance operations required and the potential pest, diseases, disorders and weeds that may be encountered and how they could be remedied. Some relevant technical terms have been used to support the answer.</p> <p>To access the higher marks in the band, answer shows some application to the scenario.</p> <p><b>Band 3: 9-12 marks</b> An excellent understanding of the advantages and disadvantages of clay soils in relation to the scenario. A fully developed discussion of the potential maintenance operations required and the potential pest, diseases, disorders and weeds that may be encountered and how they could be remedied. A comprehensive range of relevant technical terms have been used to support the answer.</p> <p>To access the higher marks in the band, the answer shows thorough application to the scenario.</p>	
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