

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

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

**March 2019**

1	State <b>three</b> environmental factors that can affect the maintenance requirements of a fine quality lawn.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<ul style="list-style-type: none"> <li>• Rainfall (1)</li> <li>• Drought (1)</li> <li>• Light level/shade (1)</li> <li>• Temperature (1)</li> <li>• Aspect (1)</li> <li>• Topography (1)</li> <li>• Snow mould (1)</li> </ul>	1 mark per environmental factor to a maximum of 3 marks	3
2	a) Explain why <b>not</b> scarifying a lawn in springtime may cause problems. b) Give <b>two</b> benefits of <b>each</b> of the following lawn maintenance operations. <ol style="list-style-type: none"> <li>i. Bulky top dressing.</li> <li>ii. Aeration.</li> </ol>		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	a) If lawn is not scarified in springtime thatch may build up (1), accumulation of organic matter could lead to possible disease/pest (1) and there will be a reduced airflow in the turf (1).  b)  <b>Bulky top dressing</b> <ul style="list-style-type: none"> <li>• Corrects surface irregularities (1)</li> <li>• Improves the texture of difficult soils (1)</li> <li>• Encourages greater rooting and thickening of turf (1)</li> </ul> <b>Aeration</b> <ul style="list-style-type: none"> <li>• Allows better movement of air and water in the root zone (1)</li> </ul>	1 mark for each outlined consequence to a maximum of 3 marks        1 mark for each benefit to a maximum of 2 marks for each lawn maintenance operation Do not accept 4 for one only	7

	<ul style="list-style-type: none"> <li>Helps a lawn manage better in periods of drought or waterlogging. (1)</li> </ul> Encourages the development of beneficial soil organisms (1)		
3	State the <b>main</b> function of <b>each</b> of the following structures of a plant. a) Lenticel. b) Pericycle.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	a) Allows gaseous exchange through the bark (1) b) ii. Produces lateral roots (1)	1 mark for each answer to a maximum of 2 marks	2
4	a) List <b>four</b> parts of the leaf involved in the process of photosynthesis. b) Explain the difference between primary and secondary growth in plants.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	a) <ul style="list-style-type: none"> <li>Spongy mesophyll (1)</li> <li>Cuticle (1)</li> <li>Palisade mesophyll (1)</li> <li>Xylem (1)</li> </ul> b) <p>Primary growth occurs as a result of cell division at the tips of stems and roots (1) which helps them to elongate (1)</p> <p>Secondary growth results from cell division in the cambia or lateral meristems (1) causing the stems and roots to thicken (1)</p>	1 mark for each named part to a maximum of 4 marks  Up to 2 marks for each type of growth to a maximum of 4 marks	8
5	Give <b>four</b> advantages of sexual reproduction in plants.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<ul style="list-style-type: none"> <li>Variation in offspring (1)</li> <li>Better disease resistance (1)</li> <li>Seed dispersal leading to less overcrowding (1)</li> <li>Dormant seeds survive in soil during unfavourable conditions (1)</li> </ul>	1 mark for each answer to a maximum of 4 marks  Although the answers are expected to relate to plant science, correct answers relevant	4

		to commercial plant propagation can also be accepted. (eg Seed can be collected freely/propagated at a low cost (1); a large volume of seeds can be propagated at once (1); less P&D transfer than clones taken from parent plant (1))	
6	Describe <b>five</b> signs of water logging due to poor drainage in a soil.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<ul style="list-style-type: none"> <li>• Standing water on the surface (1)</li> <li>• A distinctive smell of rotten eggs when the soil is dug (1)</li> <li>• Presence of indicator plants that like wet conditions (1)</li> <li>• Poor plant development with yellowish leaves and stunted growth (1)</li> <li>• Poorly drained soils are often grey or yellow (1)</li> <li>• Worms coming to the surface (1)</li> </ul>	1 mark for each answer to a maximum of 5 marks	5
7	Explain how sandy soil type affects plant growth.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	Porosity in sandy soil enables efficient aerobic respiration (1), however lower water level can lead to deeper plant rooting/water stress/wilting (1) while nutrient deficiency may occur in plants due to lower cation exchange capacity (1).	1 mark for each answer to a maximum of 3 marks	3
8	With reference to maintaining good soil structure, give <b>four</b> advantages of zero cultivation methods for a new plot.		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<ul style="list-style-type: none"> <li>• It avoids soil compaction. (1)</li> <li>• It does not disturb beneficial soil organisms. (1)</li> <li>• It avoids the mixing of soil horizons. (1)</li> <li>• It minimizes soil erosion. (1)</li> <li>• It maintains soil carbon levels. (1)</li> <li>• It avoids the formation of cultivation pans. (1)</li> </ul>	1 mark for each answer to a maximum of 4 marks. Both turf and horticulture related answers are acceptable.	4
9	Explain the importance of <b>each</b> of the following steps in the process of natural target pruning. a) Undercut. b) Downward cut outside the undercut. c) Downward cut outside the branch collar.		

	Acceptable answer(s)	Guidance	Max mks
	<p>a) Reduces the risk of the branch tearing down the stem (1) and leaving an unsightly and potentially damaging wound (1).</p> <p>b) This eliminates the weight of the branch (1) removing the risk of the branch tearing down the stem (1).</p> <p>c) Minimises the size of the wound (1) which reduces the risk of infection (1).</p>	1 mark up to a maximum of 2 marks for each answer	6
10	<p>a) State <b>four</b> recognised tree-pruning techniques that can be used to ensure compliance with the Highways Act (1980).</p> <p>b) For <b>one</b> of the tree-pruning techniques in 10a, give <b>two</b> situations where it can be used to make a tree compliant with the Highways Act (1980).</p>		
	Acceptable answer(s)	Guidance	Max mks
	<p>a)</p> <ul style="list-style-type: none"> <li>• Crown lifting (1)</li> <li>• Crown thinning (1)</li> <li>• Crown reduction (1)</li> <li>• Modern urban pollarding (1)</li> </ul> <p>b)</p> <ul style="list-style-type: none"> <li>• If a tree obstructs the view at a corner (1)</li> <li>• If the highway is being damaged by the exclusion of the sun/wind by the tree (1)</li> <li>• If the tree obstructs or interferes with the passage of vehicles or pedestrians (1)</li> <li>• If the tree obstructs or interferes with the view of drivers (1)</li> <li>• If the tree obstructs or interferes with the light from a street lamp. (1)</li> </ul>	<p>1 mark for each answer to a maximum of 4 marks</p> <p>1 mark for each answer to a maximum of 2 marks</p>	6
11	<p>You have gained a contract to maintain an area of fine turf that has trees within the lawn space and on the boundary.</p> <p>Discuss the potential impacts of fine turf maintenance operations on the physiological processes and structures of trees.</p>		
	Acceptable answer(s)	Guidance	Max mks

<p><b>Indicative content</b> Turf maintenance operations.</p> <ul style="list-style-type: none"> <li>• Leaf clearance –Nutrient recycling</li> <li>• Scarifying – Rate of water and nutrients penetration</li> <li>• Aeration- Damage to tree roots</li> <li>• Fertilizer application - Leaf growth and herbicide damage</li> <li>• Mowing - Damage to stem, soil compaction, crown lifting, removal of clippings</li> <li>• Irrigation - Shallow rooting</li> <li>• Competition - water and nutrients</li> </ul> <p><b>Band 1: 1-4 marks</b> A basic understanding of the topic with limited discussion and minimal reference to the impacts of the operations on the trees. Few or no terms used for the operations and plant physiological processes and structures. To access the higher marks in the band, discussion is supported with a range of impacts. Little or no reference made to consequences.</p> <p><b>Band 2: 5-8 marks</b> A good understanding of the topic with a developed discussion and reference to specific and relevant impacts of the operations on the trees, supported with relevant examples. Some use of technical terminology for the operations and plant physiological processes and structures. To access the higher marks in the band, a range of maintenance operations and their impacts have been discussed and some reference made to the consequences.</p> <p><b>Band 3: 9-12 marks</b> A thorough understanding of the topic with a fully developed discussion including the full implications of the operations. A wide range of specific and appropriate examples are used to support the discussion. Consistent use of technical terminology for the operations and plant structures. To access the higher marks in the band, a comprehensive range of maintenance operations and their impacts have been discussed with excellent reference made to the consequences.</p>		12
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