

## 0174-012/512 Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (1080)

### Level 3 Forestry and Arboriculture – Theory Exam (1)

June 2018

1	<p>a) Name the parts labelled A-D in Figure 1. (4 marks)</p> <p>b) Explain how the structure of <b>two</b> labelled parts helps it perform effectively. (4 marks)</p>		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>a) A. Petiole (1 mark) B. Mid rib (1 mark) C. Vein (1 mark) D. Leaf Blade (1 mark)</p> <p>b) A – Is made up of stiffened cells which allow it to keep the leaf facing the sun. (1 mark) B – Stiff and usually central which supports the veins and gives the leaf structure. (1 mark) C - Are numerous and thin which keeps pressure up and allows efficient transport of fluids. (1 mark) D – Is thin and contains chloroplasts which allows light to pass through it aiding photosynthesis. (1 mark)</p>	<p>1 mark for each part named up to a maximum of 4 marks</p> <p>1 mark for each explanation up to a maximum of 4 marks</p>	<b>8</b>
2	<p>a) Give the chemical equation for photosynthesis. (1 mark)</p> <p>b) Balance the chemical equation given in Question 2a) (1 mark)</p> <p>c) Explain the process of photosynthesis. (3 marks)</p>		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>a) <math>6\text{CO}_2 + 6\text{H}_2\text{O}</math> (sunlight energy)</p> <p>b) <math>\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2</math></p> <p>c)</p> <ul style="list-style-type: none"> <li>• The process of synthesising carbohydrates from CO<sub>2</sub> and H<sub>2</sub>O. (1 mark)</li> <li>• O<sub>2</sub> is produced as a net by-product. (1 mark)</li> <li>• Happens in the chloroplasts of a plant cell. (1 mark)</li> <li>• Sunlight is used as an energy source for the process (1 mark)</li> </ul>	<p>1 mark for the chemical equation.</p> <p>1 mark to balance the equation in 2a)</p> <p>1 mark for each explanation up to maximum of 3 marks. Accept any other suitable answer provided</p>	<b>5</b>

	<ul style="list-style-type: none"> <li>• One stage (dark phase) takes place without the need for sunlight. (1 mark)</li> <li>• ATP is used to store the energy needed to power the process. (1 mark)</li> <li>• The process locks CO<sub>2</sub> from the atmosphere. (1 mark)</li> </ul>		
3	Give one benefit and one limitation of seed dispersal by wind. (2 marks)		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>Benefits:</p> <ul style="list-style-type: none"> <li>• Will usually travel a good distance which means the species will have a wide distribution. (1 mark)</li> <li>• Good strategy for colonisers and pioneer species to find uncolonised ground. (1 mark)</li> </ul> <p>Limitations:</p> <ul style="list-style-type: none"> <li>• Random landing site which means it may not be suitable for germination. (1 mark)</li> <li>• Seed could be gathered by prevailing winds resulting in competition through clustering. (1 mark)</li> </ul>	1 mark for one benefit and one limitation up to a maximum of 2 marks. Accept any other suitable answer provided.	2
4	Explain one consequence of a blocked air filter and how it affects the performance of a chainsaw. (2 marks)		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>Consequences:</p> <ul style="list-style-type: none"> <li>• Restricted air flow to the engine means a lack of oxygen leading to incomplete burn of the fuel/air mix. (1 mark)</li> <li>• Spark plug will become blackened / carbonised resulting in little or no spark. (1 mark)</li> <li>• Incomplete burn means the exhaust can become carbonised or blocked further reducing air flow. (1 mark)</li> </ul> <p>Effects:</p> <ul style="list-style-type: none"> <li>• May not start or be difficult to start. (1 mark)</li> <li>• Reduced performance and efficiency whilst cutting. (1 mark)</li> <li>• Will struggle to pick up revs leading to low chain speed. (1 mark)</li> <li>• Produce excessive white smoke which could harm the operator. (1 mark)</li> </ul>	1 mark for one consequence and 1 mark for one effect up to a maximum of 2 marks. Accept any other suitable answer provided.	2
5	<p>a) Identify one suitable method for felling a tree in breezy conditions.(1 mark)</p> <p>b) Give <b>two</b> reasons for the felling method chosen in part a. (2 marks)</p>		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>

	<p>a)</p> <ul style="list-style-type: none"> <li>• Danish pie/ safe corner cut (1 mark)</li> <li>• Split level cut (1 mark)</li> </ul> <p>b)</p> <ul style="list-style-type: none"> <li>• Allows you to insert a felling bar to prevent the tree sitting back (1 mark) or push the tree against the weight/wind (1 mark).</li> <li>• Allows you to release the tree when you choose by removing the holding wood. (1 mark)</li> </ul>	<p>1 mark for each answer up to a maximum of 1 mark. Accept any other suitable answer provided.</p> <p>1 mark for each answer up to a maximum of 2 marks. Accept any other suitable answer provided.</p>	3
6	<p>a) State <b>two</b> pre-start checks required before using a chainsaw. (2 marks)</p> <p>b) Explain a consequence of <b>not</b> carrying out <b>each</b> of the pre-start checks stated in part a. (2 marks)</p>		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>a)</p> <ul style="list-style-type: none"> <li>• All safety features present (1 mark)</li> <li>• Correct chain tension. (1 mark)</li> <li>• Fuel and oil. (1 mark)</li> <li>• General visual check for loose parts. (1 mark)</li> </ul> <p>b)</p> <ul style="list-style-type: none"> <li>• Are essential for safe use of the saw and so must be functional before cutting. (1 mark)</li> <li>• Incorrect chain tension can cause damage, poor cutting or accidents. (1 mark)</li> <li>• Insufficient fuel and oil could result in needing to leave the tree part way through felling. (1 mark)</li> <li>• All nuts and bolts of the chainsaw must be present and tight to ensure safe use. (1 mark)</li> </ul>	<p>1 mark for each check up to a maximum of 2 marks. Accept any other suitable answer provided.</p> <p>1 mark for each check up to a maximum of 2 marks. Accept any other suitable answer provided.</p>	4
7	Give <b>four</b> reasons for leaving waste on a work site. (4 marks)		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<ul style="list-style-type: none"> <li>• Plant material breaks down on site enriching the soil. (1)</li> <li>• No transportation required therefore lower carbon footprint. (1)</li> <li>• Less labour intensive and easier on workers. (1)</li> <li>• Quicker and therefore cheaper for the customer. (1)</li> <li>• Woodchip can be used on garden beds to help weed control and nutrient replenishment. (1)</li> <li>• Wood can be processed into firewood and sold. (1)</li> <li>• Provides a habitat for invertebrates and small mammals. (1)</li> </ul>	1 mark for each reason up to a maximum of 4 marks.	4
8	<p>a) State the common and scientific names of the fungi shown in Figure 2. (2 marks)</p> <p>b) State the common name of their preferred host. (1 mark)</p>		

	c) For the fungus named in Question 8 b), explain <b>two</b> ways to manage the affected tree in the Figure 2. (4 marks)		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>a)</p> <ul style="list-style-type: none"> <li>Birch polypore or razor strop fungus (1 mark)</li> <li>Fomitopsis betulina (Piptoporus betulinus) (1 mark)</li> </ul> <p>b) Birch species</p> <p>c)</p> <p>Significance:</p> <ul style="list-style-type: none"> <li>Causes a brown rot by preferentially removing cellulose. (1 mark)</li> <li>Can colonise exposed sap wood and aggressively invade the heart wood. (1 mark)</li> <li>Can act parasitically on dead or dying trees (1 mark)</li> <li>Can act saprophytically weak or stressed trees. (1 mark)</li> <li>Tree safety becomes an issue because the wood becomes progressively more brittle. (1 mark)</li> </ul> <p>Management:</p> <ul style="list-style-type: none"> <li>Felling is an option as trees are often already in decline when this fungus becomes apparent. (1 mark)</li> <li>Trees can be left as habitat where the value or frequency of target is low. (1 mark)</li> </ul>	<p>1 mark for each name, up to a maximum of 2 marks.</p> <p>1 mark for each significance and management up to a maximum of 4 marks. Accept any other suitable answer provided.</p>	7
9	<p>a) Give one example where breeding for resistance to pests and diseases could be an appropriate management strategy. (1 mark)</p> <p>b) Describe <b>four</b> limitations of this approach. (4 marks)</p>		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>a)</p> <ul style="list-style-type: none"> <li>Dutch elm disease. (1 mark)</li> <li>Ash dieback. (1 mark)</li> </ul> <p>b)</p> <ul style="list-style-type: none"> <li>The development and testing is a lengthy and expensive process. (1 mark)</li> <li>No guarantee of success. (1 mark)</li> <li>Pests and diseases also evolve to become more aggressive. (1 mark)</li> <li>Long lag before resistant trees are providing value in the landscape. (1 mark)</li> <li>Does not save existing trees. (1 mark)</li> </ul>	<p>1 mark for each example up to a maximum of 1 mark.</p> <p>1 mark for each limitation up to a maximum of 4 marks. Accept any other suitable answer provided.</p>	5

10	a) Briefly describe the function of a PiCUS tomograph in decay detection. (2 marks) b) Describe one benefit and one limitation of a PiCUS tomograph. (4 marks)		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<p>a)</p> <ul style="list-style-type: none"> <li>Sensors are placed around the trunk and then tapped sending sound waves across tree trunk (1 mark). The speed of each sound wave is measured by the sensors and a coloured read out gives an indication of wood density. (1 mark)</li> </ul> <p>b) Benefits:</p> <ul style="list-style-type: none"> <li>Detailed information about internal condition of wood. (1)</li> <li>Portable. (1)</li> <li>Non-invasive. (1)</li> <li>Can be uploaded onto a PC for inclusion in a report. (1)</li> <li>Accurate and reliable. (1)</li> </ul> <p>Limitations:</p> <ul style="list-style-type: none"> <li>Does not pick up on rot types which make the wood hard and brittle. (1)</li> <li>Difficult to use in the canopy. (1)</li> <li>Limited use below the buttress area. (1)</li> <li>Takes experienced operator to gather and interpret data. (1)</li> <li>Expensive. (1)</li> </ul>	<p>1 mark for each answer up to a maximum of 2 marks. Accept any other suitable answer provided.</p> <p>1 mark for each benefit up to a maximum of 2 marks. Accept any other suitable answer provided.</p> <p>1 mark for each limitation up to a maximum of 2 marks. Accept any other suitable answer provided.</p>	6
11	Explain why there is a system for reporting notifiable diseases. (2 marks)		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>
	<ul style="list-style-type: none"> <li>The process is designed to prevent the spread of pests and diseases. (1 mark)</li> <li>Exotic / alien diseases need to be controlled as they can devastate native plant populations. (1 mark)</li> <li>There is a monetary value to controlling pests and diseases (1 mark) (e.g. <i>Phytophthora</i> in Larch).</li> <li>Increased risk to biosecurity because of increased international trade and transportation. (1 mark)</li> </ul>	1 mark for each explanation up to a maximum of 2 marks.	2
12	Discuss the factors to be considered when managing and working in an ash woodland suffering with <i>Hymenoscyphus fraxineus</i> (Chalara/Ash dieback). (12 marks)		
	<b>Acceptable answer(s)</b>	<b>Guidance</b>	<b>Max mks</b>

<p><b>Indicative content:</b></p> <ul style="list-style-type: none"> <li>• Sanitation (cleaning tools / clothing / boots)</li> <li>• PPE</li> <li>• Certification (of operators)</li> <li>• Species selection for replanting (selective replanting with different broadleaf or coniferous species)</li> <li>• Biosecurity.</li> <li>• Dealing with arisings (chipping / burning / leave to decompose)</li> <li>• Working methods and equipment.</li> <li>• Machinery and access.</li> <li>• Legislation (licenses, permissions and protections).</li> </ul> <p>Any other relevant points.</p> <p><b>Band 1: 1-4 marks</b> Basic discussion with limited range and depth with regards to factors to be considered when working in a woodland that is suffering with <i>Hymenoscyphus fraxineus</i>. Few or no links made between factors to be considered. To access the higher marks in the band, appropriate use of some technical terms.</p> <p><b>Band 2: 5-8 marks</b> Good discussion with adequate range and depth with regards to the factors to be considered when working in a woodland that is suffering with <i>Hymenoscyphus fraxineus</i>. Some good links made between factors to be considered. To access the higher marks in the band, appropriate use of a range of technical terms.</p> <p><b>Band 3: 9-12 marks</b> Detailed discussion with extensive range and depth with regards to the factors to be considered when working in a woodland that is suffering with <i>Hymenoscyphus fraxineus</i>. Consistent links made between factors to be considered. To access the higher marks in the band, appropriate and accurate use of a wide range of technical terms.</p>		12
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