0174-002/502 Level 3 Technicals in Horticulture

Level 3 Horticulture – Theory Exam (1) – March 2018

Underline essential technical terms to be seen in the answer

Embolden **and, not** or **or** within the answer to clarify requirements for the mark,

Use brackets to indicate text that is extraneous for the mark (but supports examiner understanding)

Use slash to separate alternative/equivalent acceptable terms within an answer

Standard wording:

*Do **not** accept..... (Expected responses that are incorrect but close)*

*Answer must focus on..... and **not**..... (Clarification of the required focus/ clarifies boundary between acceptable and unacceptable – word 'focus' can be replaced as appropriate – capture, explain, elicit, highlight etc)*

Allow..... (Answers that may be on the boundary of acceptable – elaborate to clarify if necessary – usually added at standardisation)

Q	Acceptable answer(s)	Guidance	Max mks
1	1 mark for each difference given up to 4 marks: • Angiosperm seeds are enclosed [in an ovary] **or** gymnosperms seeds are not enclosed or are 'naked' on the surface of scales, leaves or cones. (1 mark) • Angiosperms have flowers **or** gymnosperms are non-flowering. (1 mark) • Angiosperms typically have flattened leaves **or** gymnosperms have scale-like or needle-like leaves. (1 mark) • Angiosperms can be evergreen and deciduous **or** the majority of gymnosperms are evergreen but not all. (1 mark) • Angiosperms can be woody or herbaceous **or** the majority of gymnosperms are woody but not all. (1 mark)	Accept any other suitable answer provided.	**4**
2	Adaptations of plants could include: Reduced water loss (1 mark) including an explanation from the list below: • Rolled leaves to reduce transpiration by enclosing stomata from exposure. (1 mark) • A waxy cuticle to reduce transpiration or from upper surface of leaf. (1 mark) • Hairy leaves to reduce transpiration or trap humid air. (1 mark) • A reduced number of stomata to reduce transpiration. (1 mark) • Light reflecting colour to reduce heat or transpiration. (1 mark) **Or**	**Maximum of 3 marks for identifying adaptations, remaining marks for explanation of identified adaptations.** Accept any other suitable answer provided.	**6**

	Efficient water uptake (1 mark) including an explanation from the list below: • Fibrous root system to capture rainfall. (1 mark) • Deep root system to access deep water. (1 mark) **Or** Salt tolerance (1 mark) including an explanation from the list below: • Exudation of salt to reduce toxic levels of salt. (1 mark) • Removal of leaves to reduce toxic levels of salt. (1 mark) • Higher osmotic potential to ensure uptake of water in salty soil. (1 mark)		
3	The species epithet could describe: Habitat which helps to identify the conditions the plant may be found in (1 mark) for example arvensis which means it is found on cultivated land (1 mark). Origin which helps identify which country the plant originates from (1 mark) for example japonica which means it originates from Japan (1 mark). The species epithet could describe: Flower colour which will help with the visual identification in the field (1 mark) for example alba which means white (1 mark). Leaf shape which will help with the visual identification in the field (1 mark) for example cordate which means it has a heart shaped leaf (1 mark).	1 mark for each example provided and 1 mark for each explanation provided, up to a maximum of 2 marks for botanical characteristics. 1 mark for each example provided and 1 mark for each explanation provided, up to a maximum of 2 marks for morphological characteristics. Accept any other suitable answer provided.	**4**
4	Example ornamental trees may include: *Tilia cordata, Platanus x hispanica, Quercus robur* 'Fastigiata', *Fagus sylvatica, Populous alba.* Example shrubs may include: *Mahonia* x *media* spp., *Prunus laurocerasus*, *Sarcococca* spp. *Aucuba japonica* 'Crotonifolia', *Garrya elliptica*, *Hydrangea anomala* subsp. *petiolaris*.	1 mark for a large botanically named ornamental tree suitable for growing on a city street. 1 mark for a botanically named shrub suitable for growing in shaded, cooler conditions, with potential rain shadow from wall.	**2**
5	• Benefits growth and/or health by eliminating competition from weeds for water and nutrients. (1 mark) • Reduces damage from pests and diseases because there are no host plants to harbour pests and diseases. (1 mark)	1 mark for any explanation up to 2 marks of the benefits of controlling weeds:	**2**

		Accept any other suitable answer provided.	
6	• Trailing foot shields or side guards to protect user from rotating blades and/or flying debris. (1 mark) • Grass catcher shield closes automatically and prevents operation of the mower when open. (1 mark) • Handle lever/Blade brake/dead man's handle controls an automatic brake which stops the blades in 3 seconds when operator releases grip. (1 mark). • The mower must have an on/off switch or secondary control which prevents accidental starting. (1 mark) • Blades designed to twist and not break to prevent flying debris and avoid injury to operator. (1 mark) • Fine mesh collection boxes reduce the amount of dust inhalation. (1 mark)	1 mark for each of the 3 safety features explained:	**3**
7	Check the following are in good working order: • Throttle trigger (1 mark) • Throttle trigger interlock (1 mark) • Starting lock (1 mark) • Stop switch (1 mark) • Blade brake (1 mark) • Cutting blades clean, sharp and not warped (1 mark) • Handles clean and dry (1 mark) • Spark plug boot securely fitted (1 mark) • No loose fittings (1 mark) • No fuel leaks (1 mark)	1 mark for each pre-use check up to a maximum of 4 marks:	**4**
8	PUWER requires that: • The manufacturer/ operator/ owner must ensure the machine is suitable for intended use. (1 mark) • The manufacturer/ operator/ owner must ensure the machine is safe for use. (1 mark) • The machine is maintained in a safe condition and inspected to ensure it is correctly installed. (1 mark) • The machinery is used only by people who have received adequate information, instruction and training. (1 mark) • The manufacturer/ operator/ owner must ensure suitable health and safety features such as protective devices and controls are in working order. (1 mark). [These could include emergency stop devices, adequate means of isolation from sources	1 mark for each consideration up to a maximum of 3 marks.	**3**

	of energy, clearly visible marking and warning devices].		
9	Could include: • Brown leaves (1 mark). • Scorched leaves (1 mark). • Creased leaves (1 mark). • Bud and leaf drop (1 mark). • Dieback of shoots or whole plants (1 mark).	1 mark for each physical sign of weather damage up to a maximum of 3 marks. *Do **not** accept range of nutrient deficiencies as they are not weather dependent.*	**3**
10	a) Biological control examples include: • Parasitic wasps (*Encarsia formosa)* (1 mark) • Black ladybird (*Delphastus pusillus)* (1 mark) Cultural control examples include: • Good weed control (1 mark). • Good ventilation (1 mark). • Quarantine (1 mark). b) Advantages: • Low cost as it is quick and effective to use. (1 mark) • Easy to apply all year round. (1 mark) • They are strictly regulated for use in the industry. (1 mark) Disadvantages: • They need to be specific to the pest (1 mark). • They may affect beneficial organisms (1 mark). • Sometimes difficult to control the spread (drift) (1 mark).	1 mark max for a biological control 1 mark max for a cultural control 1 mark max for an advantage of chemical control 1 mark max for a disadvantage of chemical control	**4**
11	a) • notifiable pests and diseases (1 mark) • certification schemes (1 mark) • plant passports (1 mark) • phytosanitary legislation (1 mark) b) 1 mark for the name of a current disease of major national concern eg Ash Die back. • The plant health regime lays down rules for plant production controls. (1 mark)	1 mark for each identified biosecurity measures up to a maximum of 3 marks 1 mark for each outlined biosecurity measure up to a maximum of 3 marks	**7**

	• The inspection of plants at the place of their production, during the growing season, and post-harvest. (1 mark) • Clean and disinfect tools to minimise the spread of the disease. (1 mark) • Checking plant passports and registration requirements prior to moving or importing plants. (1 mark) • Local task forces are encouraged to check trees for symptoms of disease (1 mark) (e.g. woodland trust volunteers; arborists; forestry commission; garden enthusiasts) • Education campaigns in place to reduce the spread of the disease. (1 mark) • Nursery stock should be sourced from reputable suppliers. (1 mark)		
12	1 mark for an example of a named disease e.g. fusarium patch. Environmental conditions that will encourage spread of fusarium patch include: • High pH/Alkaline conditions will favour the growth of the fungal mycelium. (1 mark) • poor drainage results in surface moisture building up which allows the fungus to infect the leaves it comes in contact with. (1 mark) • High levels of nitrogen encourages the lush growth of grass which leaves it prone to fungal attack. (1 mark) • excessive thatch results in surface moisture building up which allows the fungus to infect the leaves it comes in contact with. (1 mark) • dirty machinery/tools / footwear encourages the physical spread of infected grass debris or spores across a lawn. (1 mark) Methods of control include: • Scarifying / spiking / hollow or solid tining to ensure that the lawn dries rapidly after dews or rainfall by improving the aeration and drainage. (1 mark) • Prune back overhanging trees or shrubs to improve the general airflow over lawns. (1 mark) • Use a switch to remove heavy dews in the morning. (1 mark) • Avoid using high doses of nitrogen fertiliser in late summer or autumn. (1 mark)	1 mark for each environmental condition explained, up to a maximum of 3 marks. 1 mark for each method of control, up to a maximum of 2 marks.	**6**

	• Use the fungicide trifloxystrobin [Garden Lawn Disease Control] to control the fungus. (1 mark) • Iron sulphate [moss killer] to reduce the severity of the disease. This compound toughens the grass and acidifies the turf. (1 mark)	Accept any other suitable answer provided.	
13	**Indicative content** Integrated Pest Management can be linked to: • sustainability • plant health • resistance to pesticides • fertilizer application • irrigation • wildlife diversity • monitoring effectiveness • cost effectiveness • legal requirements. **Band 1: 1-4 marks** A basic understanding of the topic with limited evaluation of the benefits of implementing IPM. Few or no links made between the management process and monitoring and control of pests/ diseases and disorders. To access the higher marks in the band, discussion is supported with a relevant example. **Band 2: 5-8 marks** A good understanding of the topic with a developed evaluation of the benefits of implementing IPM. Some links made between the management process and monitoring and control of pests/ diseases and disorders. To access the higher marks in the band, discussion is supported with a range of relevant examples. **Band 3: 9-12 marks** A thorough understanding of the topic with a fully developed evaluation of the benefits, including the full implications of IPM. A wide range of specific and appropriate examples are used to support the discussion. Consistent links made between the management process and monitoring and control of pests/ diseases and disorders. To access the higher marks in the band, a comprehensive range of examples have been applied (possibly from case studies).		**12**