



2009 Agricultural and Horticultural Studies GA 3: Written examination

GENERAL COMMENTS

Areas of strength and weakness

Students demonstrated a general understanding of techniques for modifying climate, water, soil/growing media and topography; however, were challenged when asked about specific modifications to a plant or animal's growing environment. All students should be familiar with environmental modifications that influence plant and animal production. When asked to evaluate specific techniques, students should include more detail about the impact of the technique in terms of all areas of sustainability.

Students demonstrated an adequate general knowledge of pests and diseases and the standard of response had improved from 2008. More students were able to describe complete integrated management strategies for the selected pest or disease.

The range of technological innovations described by students has increased markedly from 2008. Students are expected to have knowledge of new and emerging techniques in a number of technical areas; most students were able to correctly name and discuss two techniques. Some students still used examples that were clearly not new or emerging.

The link between biodiversity and sustainability was poorly understood by students. Most knew that biodiversity is desirable but had trouble explaining why. Most students were aware that sustainability involves the biophysical and socioeconomic environment, but very few could present specific examples and relate these to day-to-day business activities and community concerns.

While students generally understand the role of indicators in aiding resource management, specific use of them in business decision-making and land management is still weak. The concept that an indicator is a measured quantity needs emphasis. If the correct quantitative measures are used, it is more likely that the potential for degradation can be identified before it occurs and becomes obvious via qualitative measures.

Students showed good general knowledge of the management of environmental degradations affecting agriculture and horticulture, although many could not distinguish between short-term and long-term management actions. The physical processes leading to degradation also seemed to be poorly understood.

Many students were confused by different aspects of agricultural and horticultural business management. The difference between the environmental information used to identify which plants and animals are sustainable, a property management plan and a business plan with its various components, needs to be clearly understood. Students' knowledge of quality management is improving, but is still very general. Quality management involves quality control of the inputs, processes and outputs of a business. All students should be able to give examples of these for at least one business type.

Choice of options to answer

Students needed to select an option from the provided lists of alternatives in Questions 2 and 7.

Formula answers

When preparing students for the examination, teachers must refer to the current *VCE Agricultural and Horticultural Studies Study Design* and the examination criteria. Students need to be able to apply their understanding to a range of land, plant and animal management techniques in agricultural and horticultural businesses throughout Victoria.

Marking policies

Some questions addressed more than one of the examination criteria. A marking scheme was developed to guide assessors. Marks were allocated to specific elements of the correct answer or according to descriptive criteria. Marks were not deducted if students provided answers that were not correct.

SPECIFIC INFORMATION

For each question, an outline answer (or answers) is provided. In some cases the answer given is not the only answer that could have been awarded marks.

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Question 1ai-ii.

Marks	0	1	2	Average
%	6	31	63	1.6

Methods to modify light levels in a glasshouse or polyhouse include (any two of):

- shade cloth
- shade screens, including trees
- whitewashing
- artificial or supplementary lighting
- internal reflectors
- varying light wavelength
- aspect.

This question was well answered.

Question 1bi-ii.

Marks	0	1	2	Average
%	21	48	31	1.1

Ways the temperature of growing media or soil can be controlled include (two of):

- mulch
- plastics/cloche, putting in a glasshouse
- hotbeds/artificial heating/cooling
- irrigation and drainage
- soil moisture content
- colour of media/pots/bags
- topography/direct exposure.

Generally, this question was well answered.

Question 1ci-ii.

Marks	0	1	2	Average
%	71	18	11	0.4

Pre-sowing treatments include (two of):

- boiling
- abrasive sanding/nick (scarification)
- soak in water and acid solution
- exposure to heat and smoke
- vernalisation/chilling
- passing through appropriate animals.

The concepts of pre-sowing treatments and/or hard-coated seeds were poorly understood. All students should know basic environmental modifications such as these that can alter plant growth.

Question 1di-iii.

Marks	0	1	2	3	Average
%	37	27	24	11	1.1

Practices that can be used to ensure levels of water and oxygen in soil are appropriate for germination include (two of):

- cultivation and mixing of different particles' size balance
- addition of organic matter
- using the correct mix – germination not potting
- irrigation practices
- adding gypsum
- mulching to maintain moisture
- develop a healthy worm environment.

Plant growth is strongly influenced by the environment in the root zone. All students should know a range of methods to modify this environment in both the field and the glasshouse. Many students could not describe one method.

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Question 1e.

Marks	0	1	2	3	Average
%	32	55	12	1	0.9

Advantages and disadvantages of using fogging irrigation in a glasshouse include:

- allows humidity levels to be controlled
- maintains high humidity for propagation
- prevents movement of cuttings
- reduces waterlogging of growing media
- allows the growth of plants outside of normal areas – replicate other environments
- greater potential for fungal diseases
- inappropriate for some plants, for example, roses
- workers' respiratory systems may be affected by walking through the area.

Full marks were awarded to answers that showed detailed consideration of the advantages and disadvantages of the fogging irrigation technique. Two marks were given to answers that showed that the student clearly knew the main advantages and disadvantages of the technique, and one mark was given for identifying isolated advantages and disadvantages of the technique.

Fogging irrigation was understood by a small number of the students. All students undertaking this study should have some understanding of basic horticultural techniques such as this and how they modify the growing environment.

Question 1f.

Marks	0	1	2	3	Average
%	7	63	24	6	1.3

The advantages and disadvantages of using windbreaks in a grazing enterprise include:

- reduce wind chill
- provide shade/shelter/protection
- reduce heat stress
- increased plant/stock production
- increased biodiversity
- soil protection reduced erosion
- reduce water evaporation from dams and soil, leading to moister soils and better growth
- reduced heating and cooling losses in buildings
- reduced paddock size
- cost of establishment – fencing, plants, cultivation
- can harbour pest animals
- cost of maintenance – pruning.

Full marks were awarded to answers that showed detailed consideration of the advantages and disadvantages of windbreaks. Two marks were given to answers that showed that the student clearly knew the main advantages and disadvantages of windbreaks, and one mark was given for identifying isolated advantages and disadvantages of the windbreaks.

The general role of windbreaks in agricultural and horticultural production was understood, but only a small number of students could provide detail of the advantages and disadvantages. This may mean these students do not understand how windbreaks modify the biophysical environment and biodiversity adjacent to them, and the impact this has on agricultural or horticultural activity. Impact upon aesthetics and landscape values should also be considered.

Question 2a.

Marks	0	1	Average
%	13	87	0.9



Disease or pest	Business type affected	Disease or pest	Business type affected
poultry mite	poultry meat or egg production	aphids	nursery field or container-grown ornamentals
colic	equine industry	blowflies	sheep fleece production or meat
rust	ornamentals, horticultural crops, cereal crops and pastures	mastitis	dairy cattle, sheep and goats
powdery mildew	vineyards, many ornamentals, apple trees, wheat	phylloxera	grapevines

One mark was awarded for correctly identifying the business type. Students are expected to know a range of major pests/diseases.

Question 2bi–iv.

Marks	0	1	2	3	4	5	6	7	8	Average
%	7	8	16	18	21	14	10	6	0	3.6

Many students were able to adequately document an integrated management strategy (integrated pest management) to prevent and control the selected pest or disease when given four major headings under which to provide information.

Answers to this question have improved compared with those in 2008, although most students could have provided more detail in their answers. To get full marks in this question, all areas of integrated pest management must have included specific detail related to the pest/disease.

Question 2bi.

Disease or pest	Symptoms (signs) that show the pest or disease is present and how the extent and stage of development of it is monitored
poultry mite	<ul style="list-style-type: none"> darkening of white feathers – with faeces scabbing of skin near vent mite eggs on feathers. Concentration of mites around the vent, tail or throat decreased egg production, decreased weight gain increased disease susceptibility decreased food intake scabby skin
colic	<ul style="list-style-type: none"> lying down more than usual getting up and down repeatedly standing stretched out turning head towards flank curling of upper lip pawing the ground, rolling kicking at the abdomen
mastitis	<ul style="list-style-type: none"> an infection of the mammary (udder) tissue caused by a range of bacteria (over 1000 organisms) inflammation of the mammary gland caused by microorganisms reduced milk yield and altered milk composition pus in milk samples <p>Mastitis is usually found in two forms. The first is obvious since clinical mastitis is easily recognised. Milk is abnormal from the appearance of flakes or clots; garget and quarters may be swollen or sensitive. However, most mastitis is subclinical. The milk appears to be normal. Bacteria usually, but not always, can be isolated in milk. Milk yield is depressed and composition may be altered. Subclinical mastitis may become clinical. There are 15–40 cases of subclinical mastitis for every clinical case. (Dairy farmers should monitor the somatic cell count (SCC) of the herd and for each cow suspected of having a high SCC. They should pay attention to the herd’s monthly average SSC score or weighted average and any changes from month to month.) Herds with bulk tank SCCs above 200 000 will have varying degrees of subclinical mastitis.</p>



Disease or pest	Symptoms (signs) that show the pest or disease is present and how the extent and stage of development of it is monitored
<p>phylloxera</p> <p>grape phylloxera (<i>Daktulosphaira vitifoliae</i>)</p>	<ul style="list-style-type: none"> poor/reduced growth early yellowing of leaves in autumn galls on the roots galls need to be dissected to reveal aphid there may be some galls on the leaves/canopy <p>Grape phylloxera (<i>Daktulosphaira vitifoliae</i>) is a destructive aphid pest that lives on the roots of grapevines. Phylloxera aphids feed by sucking fluids from grapevine roots, which causes a progressive decline in the vigour of infested vines.</p>
powdery mildew	<ul style="list-style-type: none"> dormant shoots, which are heavily infected from the previous growing season, are covered with dense white mycelium, and the terminal bud is pinched and shrivelled other shoots may look normal but the fungal mycelium may develop over winter in otherwise healthy-looking fruit or leaf buds leaves become narrow, brittle, curled and covered with a white powdery layer, while flowers may be stunted and fail to develop secondary mildew may appear as a powdery mottling on either side of the leaves early fruit infection causes a web-like russet on the skin that may be difficult to distinguish from early spray damage less commonly, fruit may be distorted and partly covered with a white powdery coating monitor during winter and the growing season to assist with decisions about mildew control the level of mildewed terminals in winter can be used to help plan mildew control strategies for the coming spring shoots with infected terminal buds can be assessed immediately after flowering, using a minimum of 10 trees per block assess the same trees at intervals during the growing season; if mildew levels increase over time then control measures may need to be improved
rusts	<ul style="list-style-type: none"> brown, yellow or red streak, circular or irregular patch pustules with darker spores in the centre, affected part breaks or tears easily at the pustule margin. Spores rub off easily, spores darken as the plant matures; the plant is stunted crops should be inspected for the presence of stripe rust at regular intervals throughout the growing season cool wet weather conditions promote stripe rust so increased vigilance is desirable after such weather periods. Monitor water levels; free water on the leaf surface for several hours enhances development of rusts and many other diseases

Two marks were given if the answer clearly showed that the student knew the symptoms/monitoring techniques for the pest or disease and one mark was given if the students' knowledge was in some way limited.

Question 2bii.

Disease or pest	Controlling the source of the pest or disease and managing the host's environment so that it does not benefit the pest or disease species
poultry mite	<ul style="list-style-type: none"> sanitisation and cleanliness disinfect housing facilities reduce traffic through different housing facilities
colic	Maintain a regular feeding schedule. Ensure constant access to clean water. Provide 60 per cent of digestive energy from forage. Do not feed mouldy hay or grain. Feed hay and water before grain. Do not overgraze pastures. Make changes to diet and exercise slowly.
aphids	<ul style="list-style-type: none"> aphids may be found on weeds – sowthistle and mustards aphids love new growth (spring). Do not encourage quick growth as the skin layer is not as thick and it is easier for damage to occur. Avoid high nitrogen fertilizer use maintain strong growth and sap flow
blowflies	<ul style="list-style-type: none"> remove dirty wool (dags) from sheep. Mulesing and docking of tails reduce moist areas – wounds, foot rot, weeping eyes and sweat around the base of the horns use fly traps to control flies at the beginning and end of fly season
phylloxera	The major offensive against phylloxera is to control the source. Do not bring any infected material



grape phylloxera (<i>Daktulosphaira vitifoliae</i>)	onto the property. National, state and regional protocols exist to prevent the spread of the disease from infected growing areas (these are called PIZ – phylloxera infected zone). Protocols include all products from the vines, propagation materials, machinery, contractors, processors and visitors to the property.
powdery mildew	Reducing the likelihood of disease outbreak is more effective than trying to control the disease once it is established. Growing tolerant cultivars whenever possible and avoiding conditions of high humidity are important steps. For example, avoid planting in shady areas and prune away all vegetation that produces shade. Do not overcrowd the plants and do not use overhead irrigation late in the day. Finally, all debris should be removed to reduce the amount of fungus available to infect host plants.
mastitis	Environmental conditions that can increase exposure include: <ul style="list-style-type: none"> • overcrowding • poor ventilation • inadequate manure removal from the back of stalls, alleyways, feeding areas and exercise lots • poorly maintained (hollowed out) free stalls • access to farm ponds or muddy exercise lots • dirty maternity stalls or calving areas • general lack of farm cleanliness and sanitation. <p>Reduce muddy areas – concrete the entrance to the dairy. Regular testing and maintenance of milking machines is a key part of any herd’s risk management strategy for mastitis control. Regular testing minimises the risk of teat damage and mastitis spread occurring – prevention is much better than cure.</p>
rusts	A preventative measure is to grow rust-resistant varieties of plants whenever possible. Use crop rotation. Rainy weather, or overhead watering that keeps leaves wet, produces optimum conditions for rusts to spread. Increase light penetration, air movement and rapid drying of the grass surface by pruning or selectively removing dense trees and shrubs bordering the turf.

Two marks were given if the answer clearly showed that the student knew the control strategies for the pest or disease and one mark was given if their knowledge was in some way limited.

Question 2biii.

Disease or pest	Chemical, mechanical and/or biological control methods to treat the pest or disease
poultry mite	<ul style="list-style-type: none"> • use Chemical Carbaryl in the whole house or on individual birds • use Ivermectin if severe • Permethrin • clean housing
colic	Call vet and take all food away. Distract by walking. If mild, give laxatives such as paraffin oil. If serious, surgery may be required.
aphids	<ul style="list-style-type: none"> • encourage natural predators – ladybirds, hoverflies, lacewings and small birds • natural sprays – pyrethrum and garlic sprays, soap/oil sprays. Insecticides with malathion, permethrin and acephate formulations
blowflies	<ul style="list-style-type: none"> • clip wool away from the wound. Use insecticide cream to treat the wound • dips and spray-on chemicals for prevention
grape phylloxera (<i>Daktulosphaira vitifoliae</i>)	At this time, there is no effective way to eradicate phylloxera from large-scale grape-growing businesses. The only effective procedure is to uproot the affected vines and plant new vines on phylloxera-resistant rootstock. Protocols exist for destroying the phylloxera-affected vines once removed.
powdery mildew	<ul style="list-style-type: none"> • there is no adequate substitute for a series of spring and summer fungicide sprays to prevent infection of fruit and leaf buds • infection of fruit buds occurs before petal fall, and infection of terminal buds can occur until lateral extension is complete. Thus, frequent spraying from pink bud until the end of lateral extension is needed to protect fruit, leaf and terminal buds. The frequency of spraying is more important than the dosage of fungicide, and two weeks should be the maximum period between sprays for effective control in orchards where mildew has been a problem • high-volume sprays are recommended for mildew control, although recent work has shown that low-volume sprays can be equally as effective



	These fungicides are not cheap and there are a number of natural ways to treat the powdery mildew. Baking soda is very versatile, readily available and relatively inexpensive; it also can help control and even cure powdery mildew. A mixture of one tablespoon of baking soda, 2.5 tablespoons of vegetable oil, and 4–5 drops of liquid soap added to a gallon of water will act as a fine, natural and inexpensive fungicide (be sure to agitate the spray bottle regularly while applying to keep the ingredients from separating). Another natural cure for this mildew is a mixture of one part milk (any kind or brand) to three parts water.
mastitis	Various antibiotics, including penicillin. It is usually helpful to send a sample of the milk to be cultured so that the best antibiotic is chosen for the specific bacteria. The introduction of a teat sealant product onto the Australian market in 2003 has changed the traditional method of choosing a treatment strategy. There are now three basic drying-off treatment strategies possible: <ul style="list-style-type: none"> • treat the whole herd with antibiotic dry cow treatment (blanket strategy) • treat only infected cows with antibiotic dry cow treatment (selective strategy) • treat infected cows with antibiotic dry cow treatment, and uninfected cows with teat sealant (combination strategy). Post-milking teat disinfection (teat spraying) is one of the most effective cell count and mastitis control measures available if it is done thoroughly.
rusts	Foliar fungicide. Wheat varieties with a rating of five or less may need spraying with foliar fungicide during the season.

Two marks were given if the answer clearly showed that the student knew the specific treatments for the pest or disease and one mark was given if their knowledge was limited to general treatments.

Question 2biv.

Disease or pest	Critical timing required for the treatments to efficiently manage the pest or disease
poultry mite	The life cycle is faster in warm weather. Pests can survive for 4–5 months after the removal of chickens. Spray every 1–2 months or as populations are detected.
colic	More lush growth is available in spring. Monitor more frequently at these times.
aphids	Mating usually occurs in autumn. Eggs over winter on woody stems and wingless females hatch in spring.
blowflies	Most common in the summer months. Eggs hatch within hours of being laid. Larvae pupate in soil and flies can emerge within a week in summer.
phylloxera Grape phylloxera (<i>Daktulosphaira vitifoliae</i>)	A critical aspect is to have your vines tested for phylloxera if they are in a PIZ area. European (<i>Vitis vinifera</i>) grapevines, which comprise the vast majority of Australian vineyards, have very little tolerance to phylloxera. This therefore represents a major threat to the industry. If vine rootstock is <i>Vitis vinifera</i> it is advisable to test for phylloxera as soon as possible.
powdery mildew	Monitor plants and weather conditions. Spray at the first sign of the problem.
mastitis	<ul style="list-style-type: none"> • Be vigilant. Take action as soon as mastitis is detected. • Research has shown that the two most common times when new infections of the udder occur are in the first few days after drying-off, and also at and around calving. • The period around calving (from two weeks before until two weeks after calving) is often the highest risk period for mastitis infections to occur.
rusts	The earlier the development of rust epidemics, the greater the yield loss. Crops need to be monitored to detect rust early as timing is critical for the effective control of rust diseases with fungicides. Rust epidemics can get out of control and can be difficult to manage.

Two marks were given if the answer clearly showed that the student knew the specific timing of treatment and control strategies for the pest or disease, and one mark was given if their knowledge was limited to general timing of control and treatment strategies.

Question 3

These questions were generally answered competently. Students would have done better if they evaluated the impact of technologies using all the areas of sustainability. Specific detail on how the innovation works and its comparison to previous technologies was required. Many answers were too general in nature to obtain full marks.

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Question 3ai–iii.

Marks	0	1	2	3	4	5	6	Average
%	6	6	19	28	25	12	4	3.2

Question 3bi–iii.

Marks	0	1	2	3	4	5	6	Average
%	10	6	23	29	19	12	1	2.8

Questions 3ai. and 3bi.

One mark was given for each nominated innovation that was clearly a new or emerging method or development that related to the business type chosen.

Some students still used examples that were clearly not new or emerging. Area of Study 2 requires students to have knowledge of a range of new or emerging developments related to a specific business, so most students were able to name two examples.

Question 3aii. and 3bii.

Answers did not need to contain highly technical detail, but should have shown that the student had a broad understanding of the nature of the operation of the technology (how it works or how it is used), even if it was not an innovation. Answers had to focus on how the technology works, not what it does.

Two marks were given to answers providing accurate detail of the innovation's operation and one mark if the student only provided an overview of how the innovation works or is used.

Question 3aiii. and 3biii.

Key elements of the innovation's advantage over previously used technology had to be clearly presented, and all disadvantages should have been included in the answer.

Three marks were awarded for a detailed discussion of advantages and disadvantages of the innovation over previously used technology. Two marks were awarded if the main improvements were discussed and one mark if some, but not most, improvements were presented.

Question 4a.

Marks	0	1	Average
%	20	80	0.8

The most likely types of environmental degradation include:

- degraded water quality, for example, salinity
- pesticides/herbicides residues
- nutrients/fertilisers (blue-green algae)
- acidity and turbidity
- discharge of grey/black water.

This question was well answered.

Question 4b.

Marks	0	1	2	3	Average
%	12	32	43	13	1.6

Practices that could have caused the environmental degradation include (three of):

- non-collection of runoff
- amount, type and timing of chemicals
- amount, type and timing of water application
- poor media choice
- poor storage of chemicals
- discharging untreated recycled water.

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This question was well answered with many students giving two or more appropriate causes of the environmental degradation.

Question 4c.

Marks	0	1	Average
%	50	50	0.5

Indicators that should be investigated to confirm there is a problem with water management include (one of):

- algal bloom – pH, nitrogen and phosphate levels, extent and frequency
- pesticides/herbicide residue levels
- other life dying – plant or animal
- E.coli and heavy metal levels.

Students needed to correctly name specific indicators. Students' understanding of different types of indicators needs improvement, especially the relationship between broad overview indicators (often qualitative) and indicators that provide specific evidence (quantitative) and guidance for action.

Question 4d.

Marks	0	1	2	3	Average
%	16	33	35	17	

Actions to fix the problem include (three of):

- implement a drain collection system and recycle water
- stop/change practices that caused the problem
- reduce/change practices regarding the use of chemicals and type of chemicals (not monitoring)
- fix/replace septic system
- change irrigation practices – amount/type
- change practices regarding the selection and storage of media/chemicals.

Question 5a.

Marks	0	1	2	3	Average
%	53	33	12	3	0.7

An annotated diagram to explain how unirrigated soils may become salt affected was expected, showing:

- clearing of vegetation in the recharge zone
- recharge and discharge zones shown
- rising of water table
- salt present in water
- evaporation at the surface causing salt concentration.

One mark was awarded if limited information was presented with many elements missing, two marks were awarded if the main elements were presented but with some points missing, and three marks were given if all elements were presented.

The concept of dryland salinity caused problems for many students. The causes of rising water table and evaporation that causes salts to collect in the root zone seemed to be poorly understood. Students should understand the process that causes major land and water degradation, and be aware of the link between the process and developing prevention and treatment strategies.

Question 5b.

Marks	0	1	2	3	4	Average
%	38	25	20	11	5	1.2

Strategies to maintain short-term economic production on land affected by dryland salinity could include (two of):

- plant salt-tolerant crops and salt-tolerant 'nurse' species in the salt-affected area so that production is maintained during land restoration
- fence off affected areas to ensure that plants are given a chance to deal with the salt and water table before death from overgrazing
- reduce grazing in affected areas

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- plant deep-rooted crops/pasture plants such as lucerne to attempt to lower water table and reduce evaporation in the top soil
- pumping to lower water table so that the water table is lower and evaporation will not cause salt concentration in the top soil
- strategies to improve water use in the recharge areas to prevent water flowing to the discharge area and collecting salt on the way
- mining the salt: a process of removing the salt from the soil that provides income
- diverting water away with a drain to stop water table build up.

Students had a general knowledge of strategies to stop salinity, but explaining two proved to be difficult. A common problem was distinguishing between those strategies suited to maintaining economic production in the short term, and long-term strategies to prevent it from occurring.

Question 5c.

Marks	0	1	2	3	Average
%	43	41	12	4	0.8

The following elements could have been included in a strategy:

- keep sections of remnant vegetation
- change land management practices
- plant trees in recharge areas
- fence affected areas to enable efficient land use strategies
- develop a catchment plan with adjoining farmers
- plant deep-rooted crops/pasture plants such as lucerne
- monitor salt/water table levels.

One mark was awarded if the strategy description was limited, two marks were awarded if the main but not all elements were presented and three marks were given if all elements were presented.

Very few students had knowledge of strategies to prevent salinity and most had difficulty distinguishing between those suited to maintaining economic production in the short term, and long-term strategies to prevent it from occurring.

Question 6a.

Marks	0	1	2	Average
%	72	24	4	0.3

Control and eradicate blackberries and control the spread of willows

- For regionally controlled weeds, land owners have the responsibility to take all reasonable steps to prevent the growth and spread of these weeds on their land.
- For restricted trade in these weeds and their propagules, either as plants, seeds or contaminants in other materials, is prohibited.

One mark was awarded for knowing the management of regionally controlled weeds, and one for knowing the management of restricted weeds. Students did not know the specific categories of weeds as defined by the *Catchment and Land Protection Act 1994*.

Question 6b.

Marks	0	1	2	3	Average
%	19	75	5	0	0.9

The explanation of how capeweed affects pasture and grazing management could have included:

- competition due to smothering
- leaves bare earth in the hottest part of summer
- prolific seed bank produced if allowed to seed
- increase grazing pressure before seeding
- poor nutritional value
- toxicity to some animals (only in highly fertile soils – stock camps)
- preferential grazing of grasses by stock may reduce preferred grasses

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- heavily graze during late winter early spring
- lightly graze during late summer, early autumn
- spray topping.

One mark was given for identifying the problems capeweed can cause, two marks if the answer included control by grazing management and three marks if the timing on the grazing management was included.

The effect of weeds on pasture and grazing production was generally understood by students but the concept of grazing management, especially the timing, being altered because of the presence of weeds needs to be addressed in more detail.

Question 6c.

Marks	0	1	2	Average
%	45	47	8	0.7

The remnant vegetation should be used to increase the number of Indigenous plants across the property by:

- fencing off areas of remnant plants to protect the plants from grazing
- seed collection and propagation from remnant vegetation
- fencing off degraded areas identified by the farm planning process and revegetate, for example, to stop further compaction or erosion
- revegetation to replace willows and blackberries in the riparian zone.

One mark was given for a general answer such as one or both of the first two points, and two marks for answers that included how to use the plants propagated.

Many students understand biodiversity at a very general level. A small number of students were able to describe strategies to increase biodiversity on a rural property.

Question 6d.

Marks	0	1	2	3	Average
%	53	34	12	1	0.6

Explanations of how improving biodiversity affects the sustainability of the property could have included:

- increased biodiversity of flora and fauna should reduce pests
- increased stock shelter
- sustainability is increased by increased yields/profitability
- environmentally and aesthetically more pleasing, land values increase
- amenity of land for the community improves
- catchment management for adjoining properties is improved
- succession planning – wood lot (not initially).

The link between biodiversity and sustainability was explained adequately by a small number of students.

Question 6ei–ii.

Marks	0	1	2	3	4	5	Average
%	15	28	31	19	6	1	1.8

Question 6ei.

Causes of fruit tree stress include (two of):

- blocked irrigation lines – lack of water
- increased water table – waterlogging
- salinity – salt brought to the surface by rising water table
- chickens scratched out the feeder roots causing drying of the soil surface through the removal of small plants and mulch
- acidity of soil
- compaction.

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Question 6ii.

Explanations to establish the cause of the stress needed to include:

- observation of chicken/livestock movements
- check for blocked sprinklers
- test water quality
- observe seasonally
- measure water table depth over time
- test salinity levels – conductivity
- test the pH of the soil.

One mark was awarded for answers presenting a limited explanation of causes, two marks if the answer showed the information applied broadly but with some detail missing, and three marks for a complete understanding of what information is needed to establish the cause of the stress.

This question tested students' ability to evaluate the case study for possible causes of the fruit trees' stress and then to explain what information they needed to confirm the cause of the stress. Knowledge of factors influencing plant (fruit tree) growth, an understanding of indicators and/or tests to check (monitor) for soil/water problems and experience/practice applying these was required to do well in this question.

Many students presented general responses and ignored the case study information.

Question 6f.

Marks	0	1	2	3	4	5	Average
%	20	19	25	21	14	1	2

Answers need to include the following water management changes and a justification based on information from the case study:

- plant trees in recharge areas
- slowing water flow over the soil surface – improve deep-rooted crop cover
- implement drains, dams, rubble to divert or slow flow
- drippers
- fence riparian zone
- develop planting in riparian zone
- plant belts of trees on the slopes
- move chickens away from the river
- reduce grazing pressure.

This question tested students' ability to evaluate the case study to identify problems affecting water management on the property, and then suggest changes needed to solve the problems. The changes had to be justified using the information from the case study. Knowledge of factors influencing water quality, harvesting and use needed to be combined with the information from the case study to suggest and justify the changes.

Many students presented general responses and ignored the case study information.

Question 6g.

Marks	0	1	2	3	Average
%	30	57	12	1	0.9

Environmental information that should be collected to determine the plant and animal species that would be sustainable on the property include (three of):

- climate – wind and rain, the likelihood of extreme weather events, temperature range and variability
- aspect
- sunlight hours
- soil types and conditions
- plant and animal species (including pests)
- neighbouring practices – other success
- catchment management issues
- quality, flow and allocation of the water

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- past use of residual chemicals.

This question was often confused with property management planning and business planning. Students must read questions carefully.

Question 6h.

Marks	0	1	2	3	4	Average
%	32	19	22	16	12	1.6

Pieces of information for the development of a property management plan include (four of):

- current use
- land capability classing
- problem areas
- aerial photo
- current fencing, buildings, laneways
- existing services
- legislation/planning scheme
- soil tests
- data about potential enterprises chosen
- overall objectives for property
- costs of improvements.

Similar questions have been on previous examinations so it was surprising to see the large number of students who received no marks. Many students did not know the difference between business plans and property management plans. Many detailed answers were given for this question.

Question 7ai–iii.

Marks	0	1	2	3	4	5	6	Average
%	8	9	21	35	19	7	1	2.7

For each part of Question 7a., one mark was awarded for adequate relevant information that showed the student had an overview of the planning type, and two marks were awarded when the student showed a fairly complete understanding of the planning type or provided examples related to the business type.

Question 7ai.

Information contained in the business plan includes:

- production activities involved with the business
- how risk will be planned for
- how quality control will be maintained
- the resources, tools and equipment required for production.

Question 7aii.

- cost of production
- how much can be sold and at what price
- projected cash flow (above two over time)

Question 7aiii.

The information contained in the financial plan includes:

- what the market wants and when
- how the market finds out about and purchases the product
- how much the market will pay for the product
- how the market wants to receive the product.

Generally this question was well answered; however, only a small number of students gave responses that were specific to the chosen business type as required.

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Question 7b.

Marks	0	1	2	3	4	Average
%	21	21	24	18	16	1.9

Risk types	Example of risk for your chosen business
environmental	weather related (wind, drought, flood), topography, locust plague, external disease factors, water logging, salinity, etc.
marketing	demand/supply fluctuations, government regulation changes, media fickleness, etc.
financial	price fluctuations of inputs and outputs, international monetary markets, etc.
production	machinery breakdown, technology changes, diseases, labour shortage, etc.

Answers to this question were too general; specific examples were required.

Question 7c.

Marks	0	1	2	3	Average
%	29	46	20	5	1

The answer needed to describe how, for the business chosen, the inputs and processes of production are monitored and to what standards.

If a concept of monitoring during production was presented without detail then one mark was awarded. Two marks were given if input or process monitoring was described, and three marks if both were described for the selected business type.

Few students knew that production monitoring involves process as well as input monitoring. Again, many students did not specifically relate the answer to their chosen business type.

Question 7di–iii.

Marks	0	1	2	3	4	5	6	Average
%	43	17	18	10	7	3	1	1.4

Answers needed to include relevant monitoring of aspects from the financial, environmental/biophysical and social/community areas of sustainability.

For each different aspect presented, one mark was given if an example relevant to the selected business was listed and two marks were given if there was a clear explanation of how the example is monitored to evaluate its business performance.

Very few students received full marks for this question. Sustainability is on each examination and the same three areas are always considered. Students need to be continually asked to evaluate processes and techniques in agriculture and horticulture against all the areas of sustainability, and they must be able to give specific examples.