



**Victorian Certificate of Education  
2011**

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

**STUDENT NUMBER**

Letter

Figures										
Words										

**AGRICULTURAL AND HORTICULTURAL  
STUDIES**

**Written examination**

**Friday 11 November 2011**

**Reading time: 9.00 am to 9.15 am (15 minutes)**

**Writing time: 9.15 am to 10.45 am (1 hour 30 minutes)**

**QUESTION AND ANSWER BOOK**

**Structure of book**

<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
8	8	100

- Students are to write in blue or black pen.
- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
- No calculator is allowed in this examination.

**Materials supplied**

- Question and answer book of 17 pages.

**Instructions**

- Write your **student number** in the space provided above on this page.
- All written responses must be in English.

**Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.**

**Instructions**

Answer **all** questions in the spaces provided. Write using black or blue pen.

**Question 1**

Agricultural and horticultural environments may be modified in many ways to improve production.

a. Specify **one** way each of the following changes could be made.

i. Increase the humidity in a glasshouse or polyhouse

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ii. Reduce the impact of frost in an orchard

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iii. Improve the water-holding capacity of a sandy soil

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iv. Reduce the acidity of a potting mix or soil

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v. Reduce heat stress on sheep in a paddock

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vi. Improve the structure of compacted soil in a field

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vii. Increase the concentration of carbon dioxide (CO<sub>2</sub>) in a glasshouse or polyhouse

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7 marks

Nurseries and hydroponic businesses often use materials other than soil to grow their plants.

Some examples are: perlite, peatmoss, vermiculite, gravel, sand, clay pebbles, coconut fibre and rockwool.

b. Describe **one** benefit of using a non-soil growing medium.

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1 mark

NO WRITING ALLOWED IN THIS AREA

- c. Choose **one** of the following techniques for modifying farm topography: laser levelling, contouring, terracing and raised beds.

Selected modification technique \_\_\_\_\_

Explain the benefits associated with this technique for modifying farm topography.

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2 marks

**NO WRITING ALLOWED IN THIS AREA**

**TURN OVER**

**Question 2**

Select **one weed** from Table 1.

**Table 1. Weeds**

Common name of weed	Biological name	Affects
Blackberry	<i>Rubus fruticosus aggregate</i>	animals and plants
Bridal creeper	<i>Asparagus asparagoides</i>	plants
Chilean needle grass	<i>Nassella neesiana</i>	animals and plants
Gorse/Furse	<i>Ulex europaeus</i>	animals and plants
Paterson’s Curse	<i>Echium plantagineum</i>	animals and plants
Serrated tussock	<i>Nassella trichotoma</i>	animals and plants

Name your selected weed \_\_\_\_\_

**a.** Describe **two** effects of the weed on business production.

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2 marks

**b.** If you bought a property in winter, and knew it was infested by the **weed you have selected**, describe how an Integrated Weed Management (IWM) approach may be used to manage this weed problem. In your response specify chemical, biological and/or operational methods that could be used and the timing of these practices.

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4 marks

NO WRITING ALLOWED IN THIS AREA

Frieda applies a selective herbicide to a 20 hectare oat crop. The following year she sows inoculated peas into half of the treated paddock as part of a crop rotation program. The other half of the paddock is sown for grass hay. After emerging from the ground the peas fail to thrive and grow poorly but the grass grows well.

- c. Explain a likely cause for the poor pea growth.

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3 marks

There are four categories of noxious weeds listed under the Victorian *Catchment and Land Protection Act 1994*. The category of the weed determines the responsibilities of landowners.

- d. Describe the responsibilities a farm owner has in relation to **regionally controlled weeds**.

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1 mark

NO WRITING ALLOWED IN THIS AREA

TURN OVER

**Question 3**

Most pesticides used by agriculturalists and horticulturalists include a withholding period on the label.

a. i. Explain what a 'withholding period' is.

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ii. Explain how this knowledge relates to quality assurance of a farm product.

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iii. Suggest **two** other reasons why it is important to read the label for a pesticide.

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1 + 2 + 2 = 5 marks

Choose **one** pest or disease from Table 2.

**Table 2. Pests and diseases**

Common name of pest or disease	Scientific name	Animal or plant it affects
Coccidiosis	<i>Eimeria</i> species	poultry, cattle, sheep, horses and pigs
Cabbage moth (diamondback moth)	<i>Plutella xylostella</i>	Brassica crops
Intestinal worms (ruminants)	Assorted species	cows, sheep, goats
Aphids	Assorted species	ornamental plants, vegetables
Liver fluke	<i>Fasciola hepatica</i>	sheep, goats and cattle
Milk fever	Hypocalcaemia	cattle
Redlegged earth mite	<i>Halotydeus destructor</i>	pastures, crops
Sheep blowfly	<i>Lucilia cuprina</i>	sheep

**Question 3 – continued**

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NO WRITING ALLOWED IN THIS AREA

Name of your chosen pest or disease \_\_\_\_\_

b. Explain how you would go about **monitoring** for this pest or disease.

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2 marks

c. Outline the main aspects of a farm **biosecurity plan** that you could develop to prevent this pest or disease from impacting on the sustainability of an agricultural/horticultural business.

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4 marks

d. Explain how the use of modelling software could assist with managing a pest or disease.

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2 marks

TURN OVER

**Question 4**

Roundup Ready Canola is a variety of Canola that is genetically modified to be resistant to the herbicide, glyphosate (Roundup<sub>TM</sub>). Growers can spray Roundup Ready Canola as a non-selective, post-emergent herbicide over the crop, killing weeds and leaving the crop unharmed.

**a.** Describe **two** advantages and **two** disadvantages of using this type of biotechnology.

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4 marks

**b.** Suggest **two risks** that genetically modified organisms pose to organic growers or to the natural environment. Your response should not include examples already described in **part a**.

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2 marks

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**Question 5**

Agricultural and horticultural managers introduce **new and emerging technologies and innovations** in order to improve the efficiency and/or sustainability of their operations. New and emerging technologies and innovations are found in the following areas: biotechnology, biological control, genetic manipulation, reproduction manipulation, plant or animal breeding, alternative energy sources, information and communication innovation, chemical, pest or disease control, resource management methods, Global Positioning System technology, precision agriculture/horticulture, radiation usage, alternative materials and environment or system modelling.

In this question you will need to identify **two** different new or emerging technologies/innovations that you have studied from the areas listed above. Do not use Roundup Ready Canola.

**a.** Name **one** new or emerging technology or innovation.

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**i.** Describe this new or emerging technology or innovation. Include relevant components, structures, functions and/or procedures.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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**ii.** Describe a current technology or practice that would be replaced **or** describe the problem that inspired the development of the new or emerging technology or innovation.

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\_\_\_\_\_  
\_\_\_\_\_

**iii.** Evaluate one way that this technology or innovation impacts on the local community, local employment or the environment.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3 + 2 + 2 = 7 marks

**NO WRITING ALLOWED IN THIS AREA**

**b.** Name a **second** new or emerging technology or innovation.

**i.** Describe this new or emerging technology or innovation. Include relevant components, structures, functions and/or procedures.

**ii.** Explain why an agricultural or horticultural business would choose to invest in this technology or innovation.

**iii.** Apart from cost, what are the disadvantages of this type of technology or innovation?

3 + 3 + 2 = 8 marks

**TURN OVER**

**NO WRITING ALLOWED IN THIS AREA**

**Question 6**

Nic owns a 100 hectare property which is predominantly under the production of broccoli.

- In recent months Nic has noticed a decline in the growth rate of the broccoli. Total yields are reduced and the plants are malformed.
- Broccoli will grow in all soil types but the soil must be well drained and have a pH of between 6.0 and 6.5.
- Sound market share is built on having a product of consistent quality and supply.
- Broccoli can be grown year round in Victoria. In order to maintain market share Nic plants and harvests at regular intervals throughout the year.
- Markets now demand broccoli heads around 300–400 grams each. In order to achieve this, plants require regular applications of a fertiliser that is high in nitrogen. The plants must also be regularly irrigated.
- Nic's property gently slopes to a creek from which water is pumped for irrigation. Sometimes, in summer, algal blooms (cyano-bacteria) form in the creek.
- Nic has been growing this crop, on a continuous cycle of planting, growing and harvesting, on the same land for the past seven years.
- Nic has been supplementing the application of commercially available fertilisers with fowl manure from a local egg farm.

Nic suspects there is a problem with soil acidification.

- a. What could Nic do to confirm this suspicion?

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1 mark

- b. Identify **two** practices on Nic's farm that could lead to soil acidification.

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2 marks

- c. Identify **one** management practice that would have helped to **prevent** reduced yields and malformed plants.

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1 mark

NO WRITING ALLOWED IN THIS AREA

- d.** Describe the main components of a scientific experiment that would help Nic decide the most sustainable combination of chemical applications and/or manure. The description should include appropriate scientific methodology.

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5 marks

Farm managers have legal responsibilities in relation to waterways and water leaving the farm.

- e. i.** What are these responsibilities?

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- ii.** Identify and explain **three** land management practices that Nic should follow in order to maintain a healthy creek system.

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1 + 5 = 6 marks

**TURN OVER**

**NO WRITING ALLOWED IN THIS AREA**

**Question 7**

- a. Describe **two** ways that agricultural and horticultural processes and/or operations could contribute to climate change.

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4 marks

Chris grows cool-climate lettuces, using irrigation, in the field.

- b. As climate change progresses, identify **two** impacts this might have on production.

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2 marks

- c. List and explain **two** changes that could be made to an agricultural or horticultural business, with which you are familiar, to better cope with the expected climate change.

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4 marks

**NO WRITING ALLOWED IN THIS AREA**

**Question 8**

From the list below choose one agricultural or horticultural business that you are familiar with in terms of its business operations.

- |                    |                                    |   |   |
|--------------------|------------------------------------|---|---|
| • cereal cropping  | • fish or yabbies                  | • container-grown<br>ornamentals              | • horses for recreation                     |
| • poultry for meat | • turf production                  | • field-grown vegetables,<br>herbs or flowers | • rearing rabbits for pet<br>or meat market |
| • poultry for eggs | • garden design/<br>construction   | • hydroponic production                       | • grapevines                                |
| • beef cattle      | • ornamental garden<br>maintenance | • production of fruit/nuts<br>from trees      | • production of<br>indigenous plants        |
| • pigs             | • glasshouse plants                |   |   |
| • sheep or goats   |                                    |   |   |
| • dairy cows       |                                    |   |   |

Name of your selected business type \_\_\_\_\_

a. i. What product or service does your selected business provide?

\_\_\_\_\_

ii. What are the main inputs, processes and outputs of this enterprise?

\_\_\_\_\_

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1 + 3 = 4 marks

To apply for start-up capital for any business, you are required by lenders, such as banks, to develop a business plan to demonstrate its viability.

**b.** Explain the key sections of a business plan that you would need to include for your selected business.

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4 marks

To ensure a product or service meets the quality that markets expect, careful attention must be paid to all areas that influence operations, product or service delivery and marketing.

**c. i.** Identify specific aspects of your selected business type that need to be regularly monitored to ensure the product or service meets market specifications.

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**ii.** Explain how a quality assurance program would help to maintain the quality of your product(s) or service(s).

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3 + 2 = 5 marks

**NO WRITING ALLOWED IN THIS AREA**



NO WRITING ALLOWED IN THIS AREA

Consider the business type you have chosen.

- d. Explain what steps a business owner should undertake to ensure that the business is economically sustainable.

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2 marks

- e. Complete an **analysis** on how climate change may affect your chosen business type. Include a strength, weakness, opportunity and threat presented by the likely changes in climate.

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4 marks

The responsibilities of land managers in relation to regionally controlled weeds and to waterways have been considered in previous questions.

**Identify another aspect** of the natural resource management of an agricultural or horticultural business that is controlled by a local, state, federal or international Regulation or Act.

- f. **Explain** what the Regulation or Act **requires** of the farm manager or landowner.

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2 marks