

VCE Agricultural and Horticultural Studies

Written examination – End of year

Sample questions

These sample questions are intended to demonstrate how new aspects of Units 3 and 4 of VCE Agricultural and Horticultural Studies may be examined. They do **not** constitute a full examination paper.

Question 1 (8 marks)

Identify a current research project and its related food or fibre industry, which you have studied this year or are familiar with and which aims to find solutions to climate change challenges faced by Australia's food and fibre industries.

Research project _____

Food or fibre industry _____

- a. i. Describe **one** solution to a climate change challenge, which the research project identified above has found. 2 marks

- ii. Explain how the solution described in **part a.i.** addresses the climate change challenge and how the solution would work. 3 marks

- b.** Evaluate how the solution described in **part a.i.** could be used to address a climate change challenge faced by **another** food or fibre industry that you have studied this year or are familiar with. 3 marks

Question 2 (6 marks)

Metabolic, metazoal and microbial pests and diseases are a threat to agriculture and horticulture in Victoria.

- a.** Give one example for each of the following types of pests and diseases. 3 marks

- Metabolic _____
- Metazoal _____
- Microbial _____

- b.** Choose **one** of the examples from **part a.** and explain the potential impact of this pest or disease on a producer or grower. 3 marks

Question 3 (14 marks)

Aphids, western flower thrips and intestinal worms are pests that affect the food and fibre industries.

- a.** Describe the negative effects of intestinal worms on their host. 2 marks

- b.** Explain **one** economic impact of intestinal worms on a food or fibre industry. 2 marks

- c.** Explain why controlling intestinal worms when they are first observed may not be desirable for a producer. 3 marks

- d.** Outline an integrated pest management plan that could be used to control intestinal worms in a production system. Include the seasonal timing for each method of control in your outline. 3 marks

- e. Restricting the entry of vehicles and people onto a farm is one strategy that a producer may use to establish and maintain biosecurity.

With reference to intestinal worms, discuss two other strategies that a producer may use to establish and maintain biosecurity.

4 marks

Strategy 1 _____

Strategy 2 _____

Question 4 (20 marks)

A farmer manages a sheep property in northern Victoria. The property is divided into four large paddocks, each bordering a creek that runs through the property. From each paddock, the sheep have access to the creek. Each year, the farmer uses one of the four paddocks to grow a wheat crop. He uses a four-year crop rotation system. To prepare a paddock for the wheat crop, he ploughs and fertilises the soil and sows the wheat in autumn.

The farmer has recently undertaken an upstream–downstream water quality analysis of the creek that runs through the property. The table below shows the results obtained for a range of water quality indicators.

Location	Acidity (pH)	Electrical conductivity ($\mu\text{S}/\text{cm}$)	Turbidity (NTU)	Nitrogen (ppm)	Percentage of dissolved oxygen (mg/L)
upstream	6.7	350	9	0.3	7
downstream	7.0	500	12	0.4	6

- a. For each of the following water quality indicators, explain the cause(s) of the difference between the upstream and downstream results shown in the table above.

6 marks

Nitrogen (ppm) _____

Turbidity (NTU) _____

- b. Explain what the results for electrical conductivity shown in the table on page 5 indicate about the water quality of the creek and how this could affect using this water as drinking water for stock or to irrigate crops. 3 marks

- c. Identify the two water quality indicators whose results in the table on page 5 would be of **most** concern to the farmer and explain why. 4 marks

- d. Evaluate the farmer’s current practices and suggest **two** ways in which he could modify his production systems to improve the water quality of the creek. 4 marks

- e. Identify the type of environmental degradation indicated by the results in the table on page 5 and propose two actions that the farmer could take in order to reduce the impact of his practices on the water quality of the creek.

3 marks

Type of environmental degradation _____

Action 1 _____

Action 2 _____

Question 5 (10 marks)

Biodiversity has become increasingly important to the sustainability of agriculture and horticulture.

a. Explain the importance of the relationship between biodiversity and the sustainability of agriculture or horticulture in the

6 marks

- management of pests and diseases

- maintenance of productive and healthy soils.

b. Explain the difference between managed ecosystems and natural ecosystems in terms of their inputs and outputs.

4 marks

Question 6 (11 marks)

A farmer has tested the effectiveness of fertiliser on her pasture at five locations on her farm. Each of the five locations consisted of five trial plots of one square metre and each trial plot had a different amount of fertiliser applied to it. Two weeks after the application of the fertiliser, the pasture in each trial plot was cut and measured for dry matter gains, in grams per square metre.

The table below shows the amount of fertiliser applied to each trial plot and the dry matter gains in the pasture.

	Amount of fertiliser applied (g)	Dry matter gains two weeks after application of fertiliser (g/m ²)				
		Location 1	Location 2	Location 3	Location 4	Location 5
Trial plot 1	0.0	258	265	253	247	272
Trial plot 2	0.5	318	333	482	302	297
Trial plot 3	1.0	453	428	465	455	449
Trial plot 4	1.5	478	465	472	466	453
Trial plot 5	2.0	370	340	399	386	400

- a. What is the purpose of having a trial plot with 0.0 g of fertiliser applied at each location? 2 marks

- b. Identify any unexpected results in the table. Give your reasoning. 2 marks

- c. Evaluate the results in the table and recommend the optimal amount of fertiliser to apply. Give your reasoning. 3 marks

d. Describe **two** ways in which the farmer could improve the reliability of this test.

4 marks

Question 7 (11 marks)

The food and fibre industries consist of both plant and animal production systems.

- a.** Explain why quality standards are important to the food and fibre industries. 3 marks

- b.** Choose one food industry that you have studied this year or are familiar with and identify one product of this industry.

Food industry _____ Product _____

- i.** For the product that you have identified, describe a quality assurance program that can be used to ensure that the finished product meets industry standards. 2 marks

- ii.** Outline **two** key aspects of the quality assurance program described in **part b.i.** 2 marks

- c. Choose one fibre industry that you have studied this year or are familiar with and identify one product of this industry.

Fibre industry _____ Product _____

- i. For the product that you have identified, describe **one** quality standard that can be used to assess the quality of the finished product. 1 mark

- ii. Indicate how the quality standard described in **part c.i.** is measured. 1 mark

- iii. Outline two production practices that can be used during production to influence the quality standard described in **part c.i.** 2 marks

Production practice 1 _____

Production practice 2 _____

Question 8 (6 marks)

Gene editing is one of a suite of modern biotechnologies designed to change the genomes of living organisms for health or economic benefits. For agricultural applications, gene editing can be used to more rapidly achieve the same goals as traditional crossbreeding.

Gene editing creates small ... and precise changes to the DNA of plants [and] animals ... bringing about changes to a gene or group of genes. Gene editing could mimic changes that may occur in the natural processes of genetic variation.

For plants, gene editing is usually performed on cultured plant cells, which are then regenerated into whole plants. For animals, gene editing is usually performed on the single cell ... that develops into an embryo, which grows into an animal ...

With mapping of the genomes of many organisms and access to versatile gene-editing tools, scientists can find a specific gene on a genome, cut the DNA within that gene at a precise point, and 'edit' the components of the DNA to achieve a desired change in the expression of the target gene.

Most gene-editing procedures can be distinguished from 'traditional' genetic engineering because they do not incorporate foreign DNA into the genome of the edited individual. Gene editing uses new types of protein and RNA that guide and cut the target gene in the cell. These tools are quickly turned over and removed from the edited cell, as would be similar material made by immune cells when combating an invading virus.

Source: Rural Industries Research & Development Corporation,
Gene editing (RIRDC publication no. 16/036), RIRDC, Wagga Wagga (NSW), 2016, p. 1,
 <www.agrifutures.com.au/wp-content/uploads/publications/16-036.pdf>

Gene editing is an emerging technology in Australian food and fibre industries.

Identify **one** positive impact and **one** negative impact that gene editing may have on Australian food and fibre industries, and evaluate the potential value of gene editing for these industries.
