



STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

1997

AGRICULTURE

2/3 UNIT (COMMON)

SECTION I

(20 Marks)

*Total time allowed for Sections I, II, III, and IV—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Board-approved calculators may be used.

Section I

- Attempt ALL questions.
- Answer the questions in the spaces provided in this paper.

EXAMINER'S USE ONLY

Page	Marks
2	
3	
4	
5	
6	

SECTION I

(20 Marks)

Attempt ALL questions.

Allow about 35 minutes for this Section.

EXAMINER'S
USE ONLY

QUESTION 1

Name ONE farm product you have studied.

Name of farm product

Answer ALL parts in Question 1 about the product.

(a) (i) List TWO potential markets for the farm product.

1.

2.

(ii) For ONE of the markets listed in (a) (i), state TWO market specifications for the product.

Type of market

.....

.....

(iii) Name ONE input used to produce the product.

Input

(iv) State how the input can be manipulated to affect ONE of the market specifications.

.....

.....

QUESTION 1. (Continued)

EXAMINER'S
USE ONLY

(b) (i) Describe TWO post-production techniques that maintain the quality of the farm product.

1.

.....

2.

.....

(ii) Describe ONE technique that may be used to add value to the farm product.

.....

.....

(c) How can market demand affect farmer OR industry decisions relating to the nature of the product?

.....

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.....

QUESTION 2

EXAMINER'S
USE ONLY

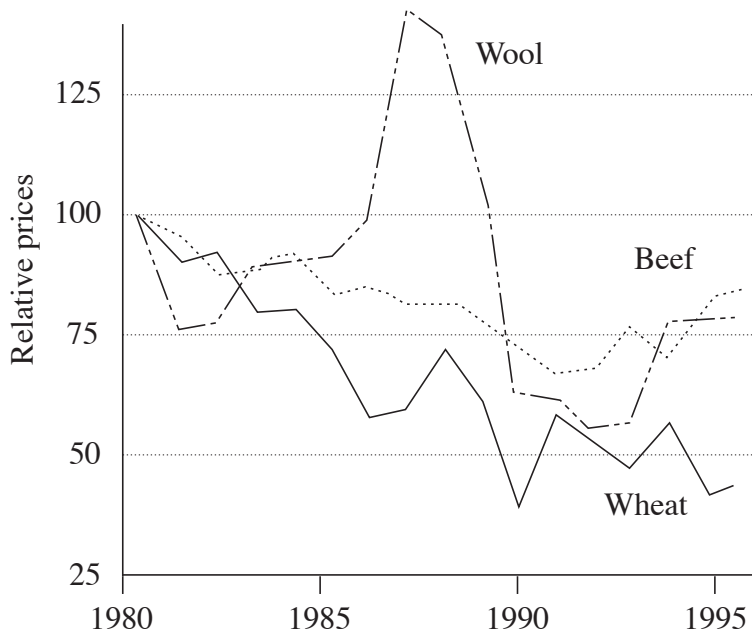


FIG. 1. AUSTRALIAN COMMODITY PRICES RELATIVE TO 1980
ABARE

(a) What is the main general trend over time for prices received by farmers in all THREE commodity groups?

.....

(b) State TWO possible factors that may have contributed to the overall trend shown in Figure 1.

(i)

(ii)

(c) Outline TWO ways in which governments may influence the trend.

(i)

.....

(ii)

.....

QUESTION 2. (Continued)

EXAMINER'S
USE ONLY

(d) Outline the possible effect of this trend on the widespread adoption of environmentally sustainable farming practices.

.....
.....

(e) (i) What would be the expected impact on the number of farms in future years if this trend continues?

.....

(ii) Outline the social implications of this impact on:

1. individual farmers;

.....
.....

2. the wider rural community.

.....
.....

QUESTION 3

Patches of poor growth were observed in a pasture, despite regular additions of superphosphate. Plants showed signs of micronutrient deficiency. A field experiment was designed to examine the effect of micronutrients on the production of the pasture. Five rates of a micronutrient mixture were applied: 0, 10, 50, 250, and 500 g/ha. Within the field, five different sites were used for each micronutrient treatment. All sites received the same amount of superphosphate.

(a) Name TWO appropriate measurements that could be made on the pasture to assess response to micronutrients.

(i)

(ii)

(b) Describe TWO features of good experimental design that are evident in this trial.

(i)

.....

(ii)

.....

(c) Describe further work the experimenter would undertake before making recommendations to farmers in the district about micronutrients in pastures.

.....

.....

.....

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2/3 UNIT (COMMON)

SECTION II*(45 Marks)*

*Total time allowed for Sections I, II, III, and IV—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Board-approved calculators may be used.

Section II

- Attempt THREE questions.
- Answer the questions in the spaces provided in this paper.
- Place a tick in the boxes on this page to indicate the questions you have attempted in Section II.

Question	Questions Attempted	Examiner's Use Only
4		
5		
6		
7		

SECTION II

(45 Marks)

Attempt THREE questions.

Each question is worth 15 marks.

Allow about 80 minutes for this Section.

QUESTION 4

(a) Figure 2 shows the relationship between recent agricultural activity and the death of rural trees.

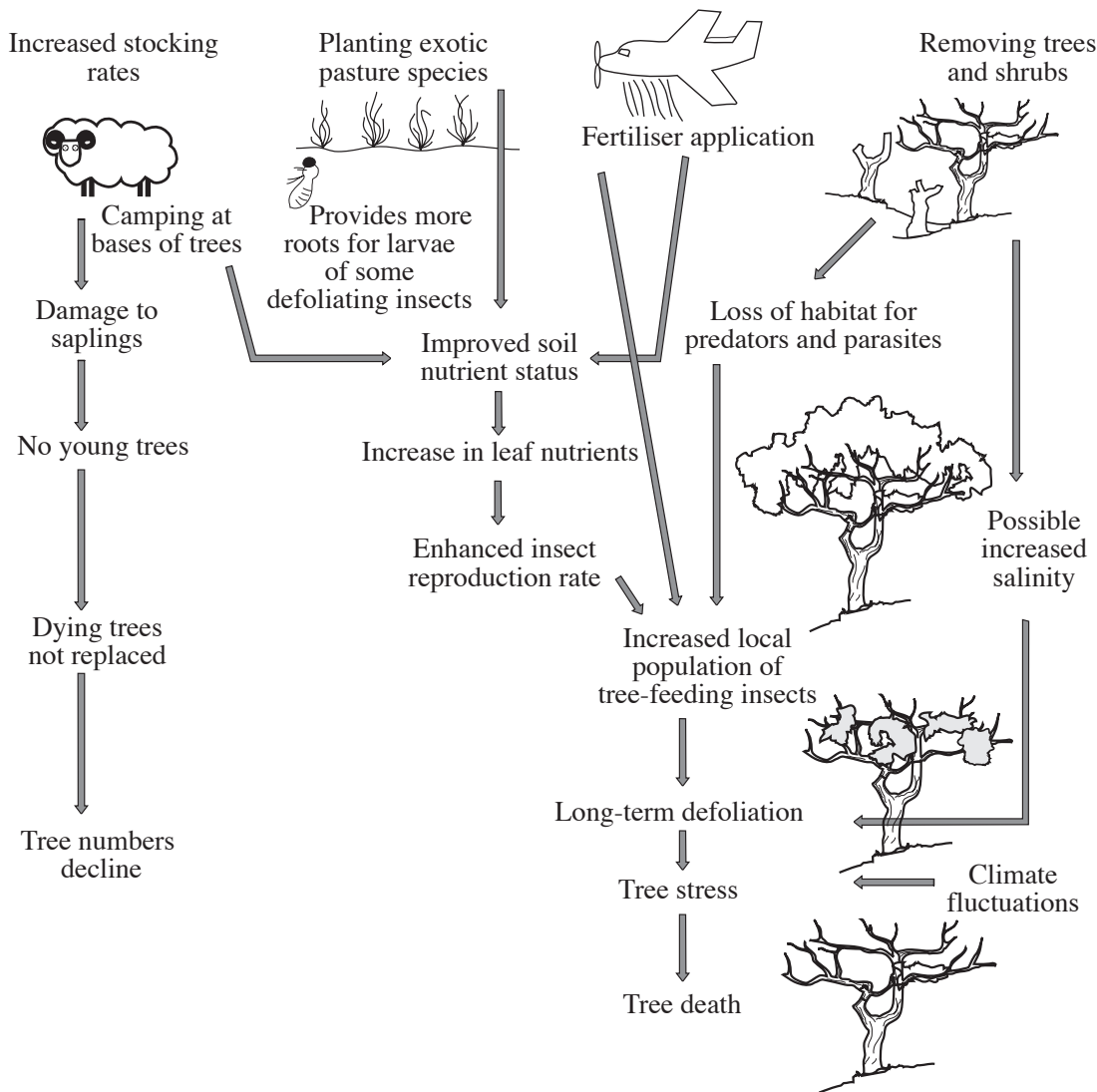


FIG. 2. AGRICULTURAL ACTIVITY AND TREE DEATH

'Landcare: Science in action', Beryl Morris, CSIRO 1993 p7.
Courtesy CSIRO Publishing.

QUESTION 4. (Continued)

EXAMINER'S
USE ONLY

(i) From Figure 2, identify TWO agricultural activities that contribute to the death of trees on farms.

1.

2.

(ii) Describe the relationships between livestock and the reduction in trees shown in Figure 2.

.....

.....

.....

.....

(b) Outline TWO benefits of trees to agricultural ecosystems.

(i)

.....

(ii)

.....

(c) Describe the effect of ONE Aboriginal land management practice on Australian ecosystems prior to European settlement.

.....

.....

.....

QUESTION 4. (Continued)

(d) (i) Agriculture has potential to harm waterways. Identify FOUR ways in which this can occur.

- 1.
- 2.
- 3.
- 4.

(ii) Outline TWO practices that attempt to reduce the impact of farming on waterways.

- 1.
.....
- 2.
.....

(e) (i) Marketing is an important component of agricultural enterprises.

List THREE ways agricultural products are marketed.

- 1.
- 2.
- 3.

(ii) For a farm product that you have studied:

Name of product

- 1. describe the marketing process;
.....
.....
.....
- 2. describe the role of advertising and promotion in the marketing of this product.
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QUESTION 5

- (a) In any animal production system an interaction can be identified between the breeding program and the environment. These are shown as interacting in Figure 3 below.

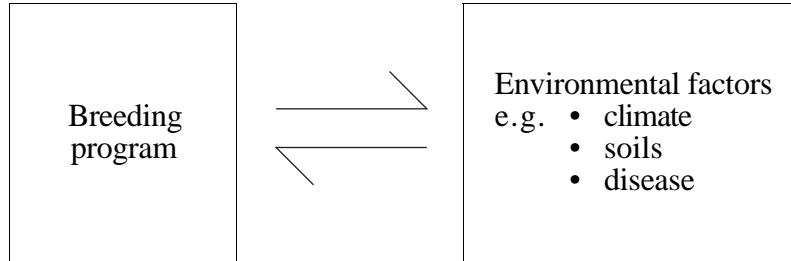


FIG. 3. BREEDING SYSTEM AND ENVIRONMENT INTERACTION

For an animal production system you have studied, answer the following questions.

Animal production system

- (i) List TWO characteristics or traits that are significant in a breeding program in this animal production system.
 - 1.
 - 2.
- (ii) Outline an objective measurement used to monitor each of the characteristics or traits listed in part (a) (i) above.
 - 1.
.....
 - 2.
.....
- (iii) How have market specifications changed the selected characteristics or traits in a breeding program for this animal production system?
.....
.....

QUESTION 5. (Continued)

EXAMINER'S
USE ONLY

- (iv) Describe how ONE disease *OR* climatic factor can limit production in the system.

.....
.....
.....

- (v) For the disease or climatic factor identified in part (a) (iv) above, describe how management of the production system attempts to reduce the negative effects of the disease or factor.

.....
.....
.....
.....

- (b) Using an example, describe how breeding programs can be used to produce animals better adapted to the environment.

.....
.....
.....

- (c) Explain why ruminant animals have a less efficient feed conversion ratio than monogastric animals.

.....
.....
.....
.....

QUESTION 5. (Continued)

EXAMINER'S
USE ONLY

(d) For a plant production system you have studied, answer the following questions.

Plant production system

- (i) List TWO soil properties that can limit this plant production system.
 - 1.
 - 2.
- (ii) Describe the relationship of ONE of the properties listed in part (d) (i) above, to growth and development of the plant.
.....
.....
.....
- (iii) Describe the relationship of ONE of the properties listed in part (d) (i) above, to the quality of the salable product.
.....
.....
.....

QUESTION 6

- (a) Figure 4 shows the results of a well designed field trial that investigated the effect of three different uses of pasture on total soil nitrogen content.

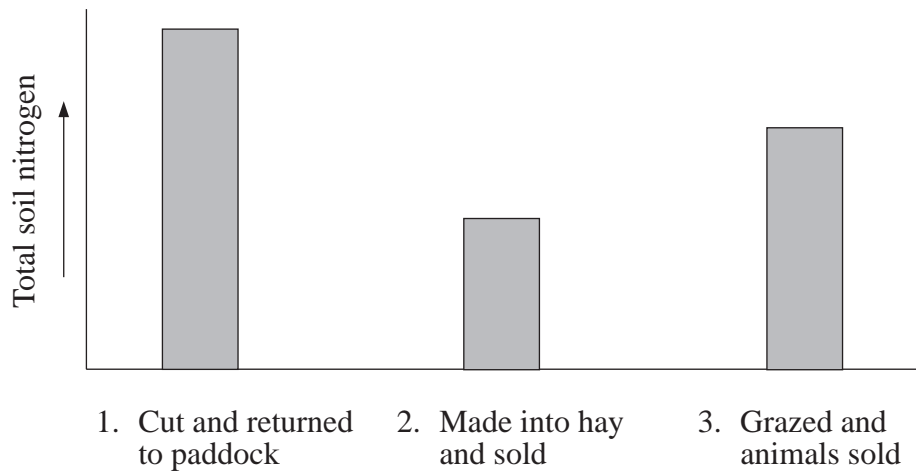


FIG. 4. SOIL NITROGEN LEVELS AFTER THREE DIFFERENT PASTURE USES

- (i) Give reasons for the relative difference in soil nitrogen levels between the three kinds of pasture usage.

1. Cut and returned

.....
.....

2. Hay

.....
.....

3. Grazed

.....
.....

- (ii) Outline TWO management strategies needed to ensure sustainable production in pasture systems used for hay or grazing.

1.

2.

QUESTION 6. (Continued)

EXAMINER'S
USE ONLY

- (iii) How would you monitor the effectiveness of these management strategies?

.....
.....

- (iv) Outline the role of soil nitrogen in pasture systems.

.....
.....

- (v) Describe how soil acidification might influence the productivity of pasture production systems.

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.....

QUESTION 6. (Continued)

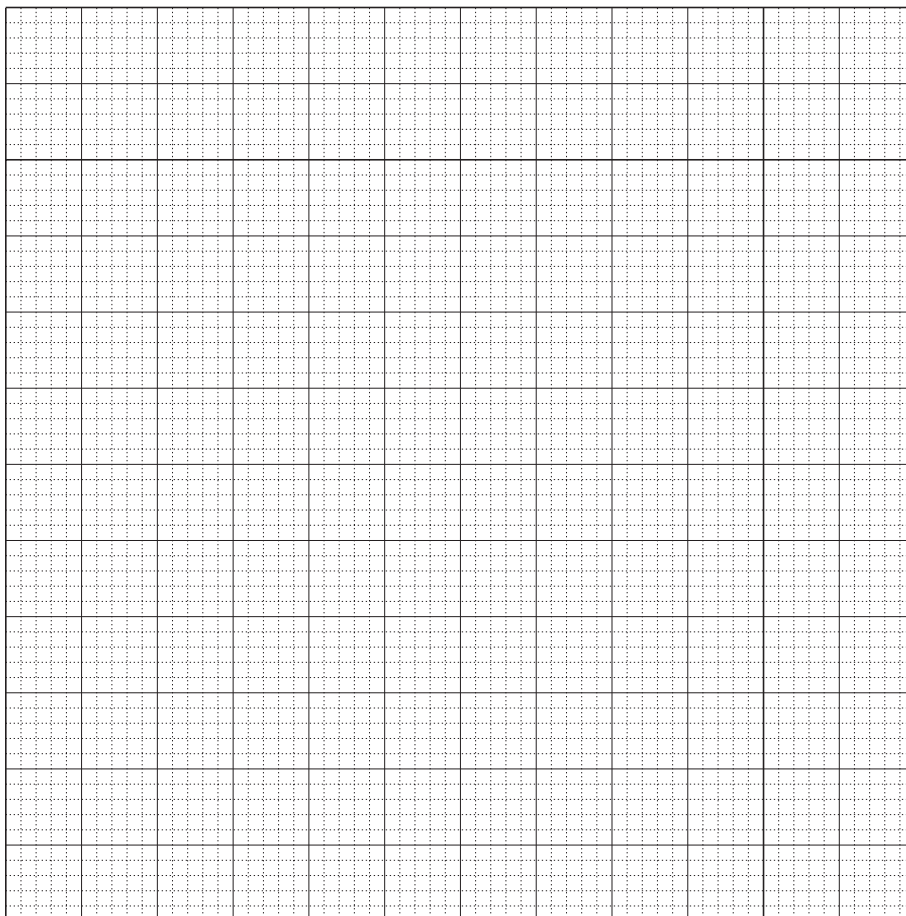
EXAMINER'S
USE ONLY

- (b) Table 1 shows the yield (t/ha) from a jojoba plantation under dryland and irrigation conditions.

AGE (years)	YIELD (tonnes/ha)	
	<i>Dryland</i>	<i>Irrigation</i>
4	0.3	0.4
5	0.4	0.7
6	0.5	1.0
7	0.6	1.3
8	0.7	1.6
9	0.8	1.8
10	0.9	2.0
11	1.0	2.0

TABLE 1. DRYLAND AND IRRIGATION YIELDS OF JOJOBA

- (i) Graph the data from Table 1 on the grid below.



QUESTION 6. (Continued)

EXAMINER'S
USE ONLY

- (ii) From your graph, identify the effects irrigation has on jojoba production.

.....
.....

- (iii) How could a grower determine if it was worthwhile outlaying the capital cost of irrigating a jojoba crop?

.....
.....
.....

- (iv) Jojoba has been found to be relatively salt tolerant and deep rooted. Outline why a plant with such properties might be useful in irrigation areas.

.....
.....

- (v) Perennial crops like jojoba can be top dressed with organic material such as manure. Describe the role of soil microbes in making the nutrients in the organic material available to the plants.

.....
.....
.....
.....

QUESTION 7.

(a) Disease occurrence is determined by a complex interaction of three main factors:

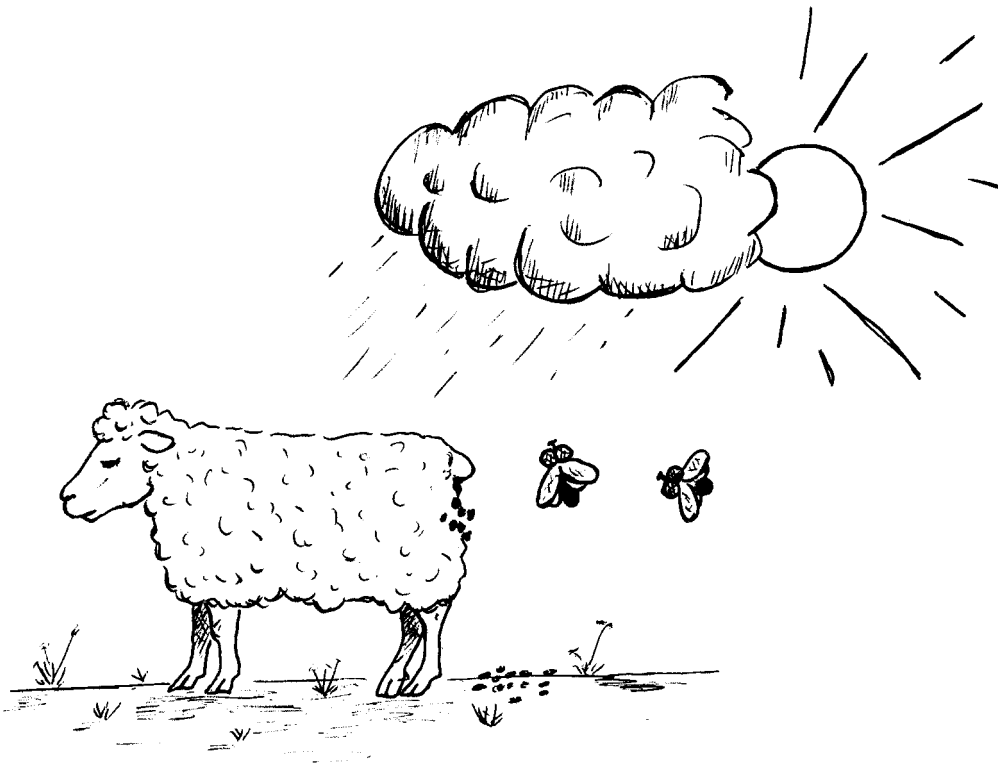


FIG. 5. INTERACTION OF FACTORS AFFECTING DISEASE

(i) From Figure 5, state each factor and identify an example of each.

Factor 1 and example

Factor 2 and example

Factor 3 and example

(ii) For an animal that you have studied, outline how a farmer could manipulate ONE of the named factors to decrease disease.

Animal type
Factor

.....
.....

QUESTION 7. (Continued)

EXAMINER'S
USE ONLY

(b) Animal producers are aware that Integrated Pest Management (IPM) is more effective in controlling disease than only using chemicals.

(i) Define Integrated Pest Management.

.....
.....

(ii) Describe an IPM program for an animal production system that you have studied.

.....
.....
.....
.....

(iii) What problems may arise with consistent use of a chemical in the control of pests?

.....
.....

QUESTION 7. (Continued)

EXAMINER'S
USE ONLY

- (c) Figure 6 below represents the interaction of supply and demand in determining market price.

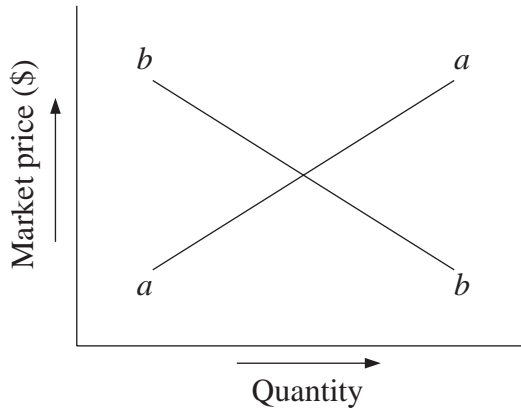


FIG. 6. SUPPLY AND DEMAND AND PRICE

- (i) 'Demand' is represented by line
- (ii) A technological innovation enables producers to supply more product for the same output cost. How would this affect market price?
.....
.....
- (d) One-third of Australia's 110 000 commercial farms produce 70% of the total farm output and make a sustainable profit.
- (i) The average rate of return on capital is 2.5% for this group. What is meant by 'return on capital'?
.....
.....
- (ii) Many Australian farmers operate with a high debt. How would a fall in interest rates affect this group?
.....
- (iii) In an attempt to improve their situation, farmers may consider changing management strategies. Name and outline a method of financial analysis that could assist in the making of such decisions.
Name of analysis
-
.....

QUESTION 7. (Continued)

EXAMINER'S
USE ONLY

(e) (i) List TWO factors that contribute to reproductive efficiency in animals.

1.

2.

(ii) Explain how reproductive efficiency could affect overall productivity of an animal production system.

.....

.....

.....

(f) (i) Name ONE hormone involved in regulating the reproductive systems of an animal.

.....

(ii) Outline the role of this hormone in the reproductive system of farm animals.

.....

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2/3 UNIT (COMMON)

SECTION III*(20 Marks)***SECTION IV***(15 Marks)*

*Total time allowed for Sections I, II, III, and IV—Three hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- Board-approved calculators may be used.

Section III

- Attempt ONE question.
- Answer the question in the spaces provided in this paper.
- Place a tick in the box on this page to indicate the question you have attempted in Section III.

Section IV

- Attempt ONE question.
- Answer the question in a *separate* Writing Booklet.
- You may ask for additional Writing Booklets if you need them.

Question	Question Attempted	Examiner's Use Only
8		
9		
10		

SECTION III

(20 Marks)

Attempt ONE question.

Each question is worth 20 marks.

Allow about 35 minutes for this Section.

QUESTION 8. Plant Production

(a) (i) List TWO inputs that affect the process of photosynthesis.

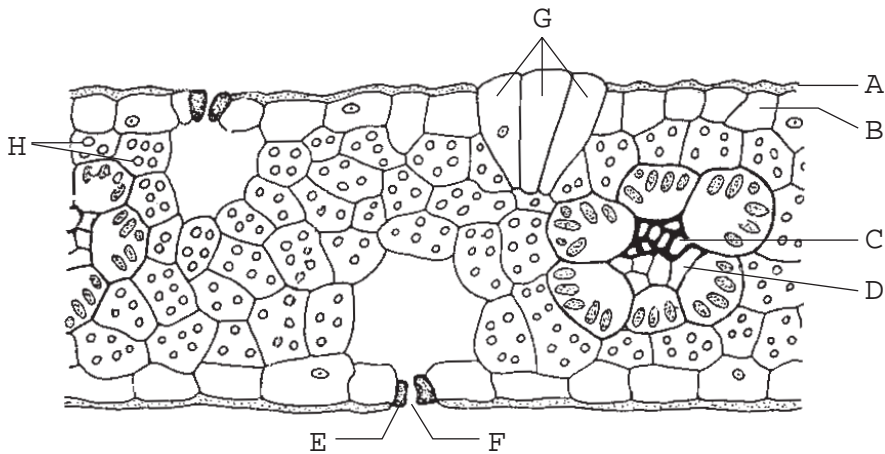
1.

2.

(ii) Describe management techniques that can be used to manipulate these inputs to optimise the rate of photosynthesis.

.....
.....
.....
.....

(b) Figure 7 is a diagrammatic representation of a transverse section of a leaf.



'Plant Tissue Culture Practice', Taji, Dodd & Williams, 2nd ed, University New England, 1993.

FIG. 7. TRANSVERSE SECTION OF A LEAF

QUESTION 8. (Continued)

EXAMINER'S
USE ONLY

(i) Use the letters from the diagram to complete the following table.

<i>Plant function</i>	<i>Leaf part</i>
Leaf rolling	• G
Transport of plant sugars	•
Control of transpiration	• •
Photosynthesis	•
Transport of water	•

(ii) Outline how plants control transpiration.

.....
.....

(c) (i) Name ONE plant hormone.

(ii) Outline how this hormone can be used to manipulate plant production.

.....
.....

(d) Describe the effects of plant density on vegetative and reproductive yield.

.....
.....
.....
.....

QUESTION 9. Animal Production

EXAMINER'S
USE ONLY

- (a) Figure 8 shows the changes in antibody level in farm animals in response to two vaccinations.

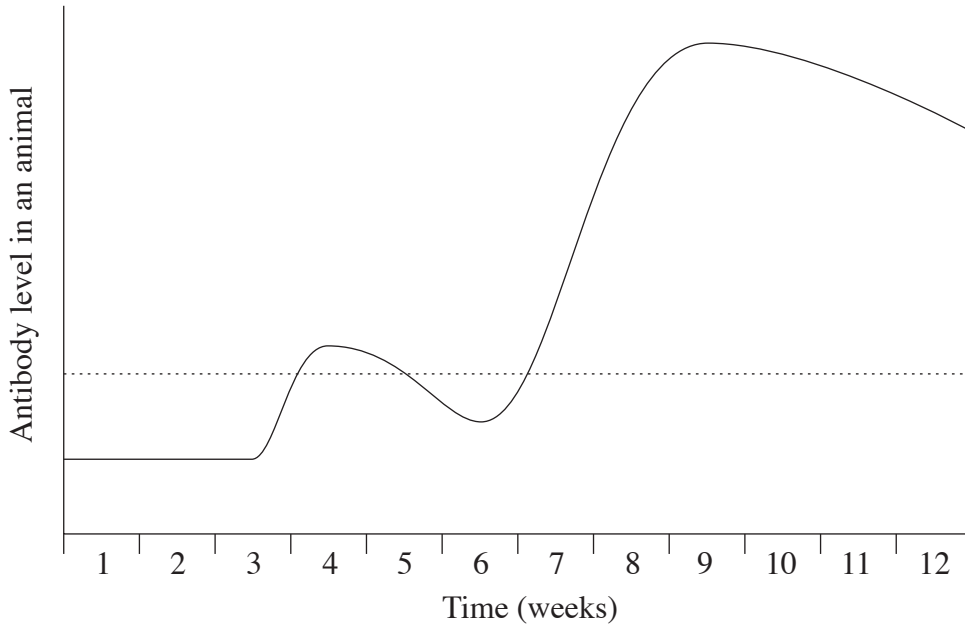


FIG. 8. IMMUNITY IN RESPONSE TO VACCINATION

- (i) Identify the week in which each vaccination was carried out.

Vaccination 1

Vaccination 2

- (ii) What is the significance of the dotted line in Figure 8?

.....
.....

- (iii) Outline the role of antibodies in the immune system.

.....
.....

QUESTION 9. (Continued)

EXAMINER'S
USE ONLY

- (iv) Using an example, describe an animal disease management program that does not rely solely on vaccination.

.....
.....
.....

- (v) Outline the advantages and disadvantages of this control program.

.....
.....
.....
.....

- (b) (i) Name a recently developed technology or technique that may improve animal productivity.

.....

- (ii) Describe the way in which this technology or technique works to increase productivity of the animal production system.

.....
.....
.....
.....

- (iii) State TWO factors that may need to be considered before this technology or technique is widely adopted.

1.

2.

QUESTION 10. Land Management

(a) The pie graphs below show the relative role of different forms of erosion and the total amount of erosion over time in Australia.

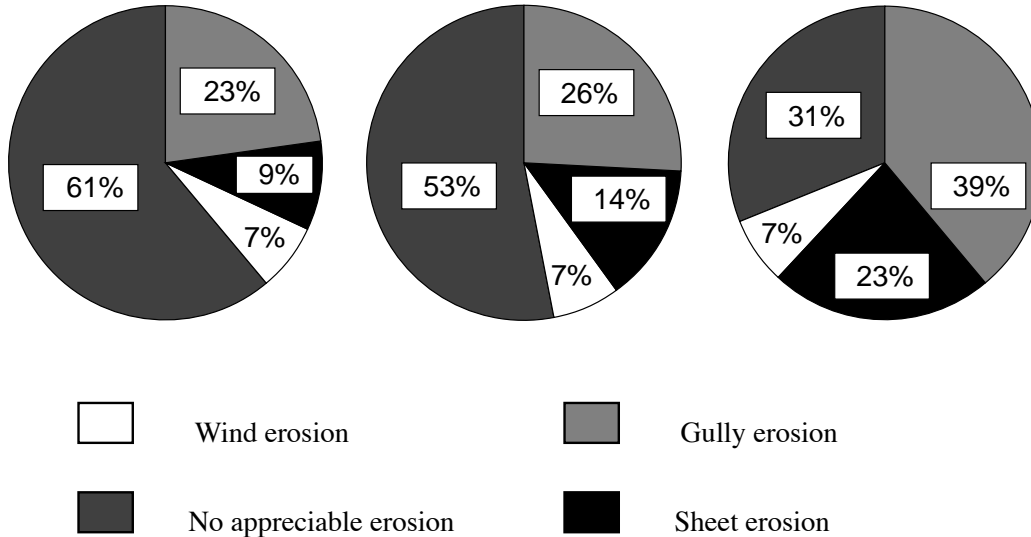


FIG. 9. CHANGE IN AREA OF LAND AFFECTED BY DIFFERENT FORMS OF EROSION

'Landcare: Science in action', Beryl Morris, CSIRO 1993 p7.
Courtesy CSIRO Publishing.

(i) Outline the trends shown in Figure 9.

.....
.....

(ii) Describe the way in which ONE agricultural practice has contributed to these trends.

.....
.....
.....
.....

(iii) Since 1975 many farming practices have been adopted to reduce these trends. Outline TWO practices that help overcome soil erosion.

1.
.....
2.
.....

QUESTION 10. (Continued)

EXAMINER'S
USE ONLY

(iv) What factors might influence farmers' adoption of such land management strategies?

.....
.....
.....

(b) Describe how Landcare is organised.

.....
.....
.....

(c) Using an example from your local area, compare existing land use to that suggested by land capability assessment.

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.....
.....
.....

SECTION IV**Marks**

(15 Marks)

Attempt ONE question.

Each question is worth 15 marks.

Allow about 30 minutes for this Section.

QUESTION 11

The following label is used for a pesticide product.

<p>NOT TO BE USED FOR ANY PURPOSE, OR IN ANY MANNER, CONTRARY TO THIS LABEL UNLESS AUTHORISED UNDER APPROPRIATE LEGISLATION.</p> <p>WITHHOLDING PERIOD FOR EDIBLE CROPS: DO NOT APPLY LATER THAN 7 DAYS BEFORE HARVEST.</p> <p>FLAMMABLE: KEEP AWAY FROM NAKED FLAME.</p>
<p>General Instructions</p> <p>Mixing: Pour the required quantity of 'Squirt' into the water and mix thoroughly. The prepared spray must be used immediately.</p> <p>Complete coverage of fruit is essential. For greasy fruit, the addition of a wetting agent may be necessary.</p> <p>'Squirt' kills fruit fly maggots within fruit.</p> <p>Caution</p> <p>Do NOT spray directly on humans, exposed food, food utensils, or food preparation areas.</p> <p>Avoid spraying poultry or poultry houses.</p> <p>Dangerous to bees. Do NOT spray any plants in flower while bees are foraging.</p> <p>Do NOT contaminate ponds, waterways or drains with the chemical or used container.</p> <p>Store in original container, tightly closed and in a safe place. Wash out container thoroughly and dispose of safely.</p>

FIG. 10. CHEMICAL LABEL EXTRACT FOR THE PESTICIDE 'SQUIRT'

- (a) With reference to the above pesticide label extract, describe important aspects of chemical usage that need to be considered to provide safeguards to: **8**
- (i) the farm environment;
 - (ii) the wider community.
- (b) Describe the ways in which farm chemical usage has been incorporated into farm management systems to reduce their potentially harmful effects. **7**

Please turn over

QUESTION 12**Marks**

‘As a society we have failed to discriminate between technologies that meet our needs in a sustainable way and those that harm the earth.’

STATE OF THE WORLD, 1994

Discuss this statement with reference to Australian agriculture. In your answer you should:

- (a) outline the major features of a sustainable agricultural system; **5**
- (b) describe new technologies and management activities that have been developed to maintain and enhance the sustainability of agricultural systems; **5**
- (c) identify factors that might hinder the adoption of sustainable practices. **5**

QUESTION 13

‘Profitability of agricultural production systems is related to TWO factors: total production and product quality.’

Discuss this statement with reference to an animal OR plant production system that you have studied. In your answer you should:

- (a) outline how each factor contributes to profitability of the system; **6**
- (b) describe decisions that farm managers can make relating to each factor that improves profitability. **9**

QUESTION 14

For a product you have studied:

- (a) outline the marketing chain from producer to consumer; **4**
- (b) describe changes to post-production storage and/or processing that address shifts in market needs; and **6**
- (c) describe how farmers and farmer organisations have changed marketing strategies to address changed consumer preferences and/or needs. **5**