

2012
**HIGHER SCHOOL CERTIFICATE
EXAMINATION**

Agriculture

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black or blue pen
Black pen is preferred
- Draw diagrams using pencil
- Board-approved calculators may be used
- Write your Centre Number and Student Number at the top of pages 9, 11, 13, 15, 17 and 19

Total marks – 100

Section I Pages 2–20

80 marks

This section has two parts, Part A and Part B

Part A – 20 marks

- Attempt Questions 1–20
- Allow about 30 minutes for this part

Part B – 60 marks

- Attempt Questions 21–28
- Allow about 1 hour and 45 minutes for this part

Section II Pages 21–22

20 marks

- Attempt ONE question from Questions 29–31
- Allow about 45 minutes for this section

Section I

80 marks

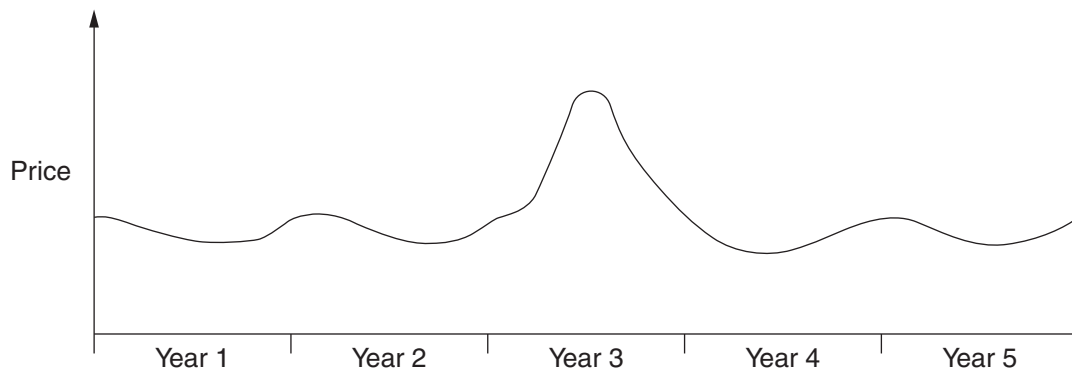
Part A – 20 marks

Attempt Questions 1–20

Allow about 30 minutes for this part

Use the multiple-choice answer sheet for Questions 1–20.

- 1 At which point in a marketing chain would product promotion be most likely to increase total sales of a product?
- (A) Processing
 - (B) Production
 - (C) Transport
 - (D) Wholesaling
- 2 The graph shows how the price of an agricultural commodity has fluctuated over a five-year period.



What is the most likely cause of the price change shown during Year 3?

- (A) Importing more of the commodity
- (B) Unseasonal weather conditions in a major production area
- (C) Normal seasonal variation in the availability of the commodity
- (D) A significant reduction in consumer demand for the commodity

- 3** What is the name of the breeding system which modifies a characteristic of a plant or animal by inserting a single gene into its cells?
- (A) Hybridisation
 - (B) Line breeding
 - (C) Selective breeding
 - (D) Genetic engineering
- 4** What term is used to describe the time between consecutive ovulations in a breeding female animal?
- (A) Standing heat
 - (B) Breeding cycle
 - (C) Oestrous cycle
 - (D) Gestation period
- 5** Predatory mites may be used to assist in the control of red spider mite.
- What type of pest control is this?
- (A) Biological
 - (B) Chemical
 - (C) Cultural
 - (D) Genetic
- 6** What is ONE disadvantage associated with artificial insemination in livestock breeding?
- (A) It may lead to an increase in inbreeding.
 - (B) It may lead to an increase in sexually transmitted diseases.
 - (C) It may reduce the range of male genotypes available to a farmer.
 - (D) It may reduce the number of offspring sired by genetically superior animals.
- 7** What is the name of the hormone that is responsible for maintaining pregnancy?
- (A) Oestrogen
 - (B) Oxytocin
 - (C) Progesterone
 - (D) Prostaglandin

- 8** The number of family farms in Australia has declined markedly over the past 100 years.

What is the most likely consequence of this change?

- (A) Reduced total agricultural output
 - (B) Increased food prices in Australia
 - (C) Reduced population in small rural towns
 - (D) Less variety in agricultural commodities being produced in Australia
- 9** What is a common commercial use of the plant hormone group *auxins*?
- (A) To ripen fruit for market
 - (B) To thin fruit in orchards
 - (C) To defoliate cotton crops
 - (D) To promote root growth in cuttings
- 10** Which of the following is an example of *value adding*?
- (A) Selling wine made on a farm
 - (B) Selling pigs directly to a supermarket chain
 - (C) Selling wheat through a growers cooperative
 - (D) Selling beef cattle through an internet auction
- 11** An animal's production data are often used to decide whether or not to use the animal for breeding.

What is the name given to this method of selecting breeding stock?

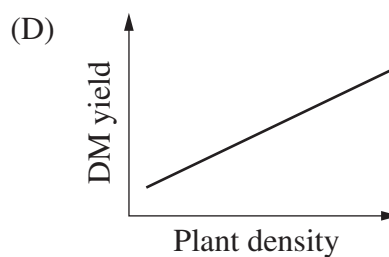
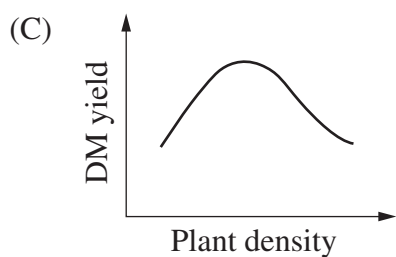
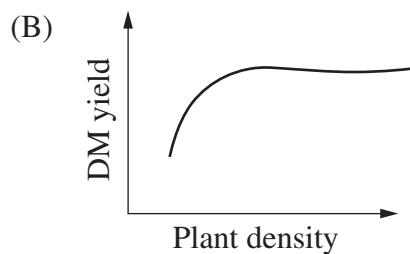
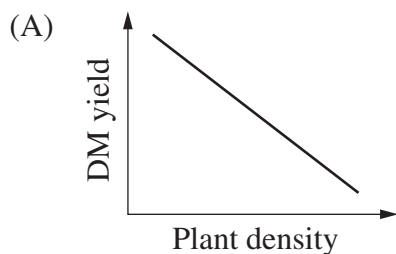
- (A) Show judging
- (B) Progeny testing
- (C) Objective measurement
- (D) Subjective measurement

- 12 A summary of a laboratory report on a sample of soil is provided in the table shown.

<i>Soil characteristic</i>	<i>Value</i>	<i>Comment</i>
Textural class	Sandy Loam	
pH	5.1	Very acidic
Ion exchange capacity	228 meq/100g	In lower range
Available nitrogen	66 mg/kg	Adequate
Total phosphorus	15 mg/kg	Low

Based on this information, which of the following chemicals should be applied to this soil to achieve the greatest increase in pasture production?

- (A) Lime
 - (B) Gypsum
 - (C) Herbicide
 - (D) Nitrogenous fertiliser
- 13 Which ONE of the following graphs shows the correct relationship between plant density and dry matter (DM) yield per plant?



- 14** Ruminant animals can achieve high growth rates on a diet containing only low quality protein.

The feature of rumen microbes that allows this to occur is the ability to

- (A) digest cellulose.
- (B) synthesise amino acids.
- (C) produce B group vitamins.
- (D) synthesise volatile fatty acids.

- 15** The table shows the weights of four different groups of lambs.

	<i>Group A</i>	<i>Group B</i>	<i>Group C</i>	<i>Group D</i>
Mean (kg)	23.0	26.0	27.2	22.8
Standard deviation	1.60	2.16	1.64	1.72
Range of weights (kg)	20–26	23–28	26–29	21–25

Which group of lambs has the LEAST variable weights?

- (A) *A*
 - (B) *B*
 - (C) *C*
 - (D) *D*
- 16** What is the best description of integrated pest management (IPM)?
- (A) Breeding plants or animals which are pest resistant
 - (B) Alternating the chemicals used in a pest control program
 - (C) Encouraging or introducing natural enemies of a pest to control it
 - (D) Choosing the most appropriate control strategies from a range of available options

- 17 An extract from the records kept for a farm that grows 500 ha of wheat is shown.

Machinery loan repayments	\$30 000
Planting costs	\$35 000
Growing costs	\$10 000
Harvesting costs	\$15 000
Income from wheat	\$200 000

What is the gross margin per hectare for the wheat crop?

- (A) \$220
 (B) \$260
 (C) \$280
 (D) \$320
- 18 A farmer wants to grow a crop of chickpeas in a paddock which has a sandy soil and problems with ryegrass as a weed. The farmer chooses to use a herbicide as a pre-emergent spray.

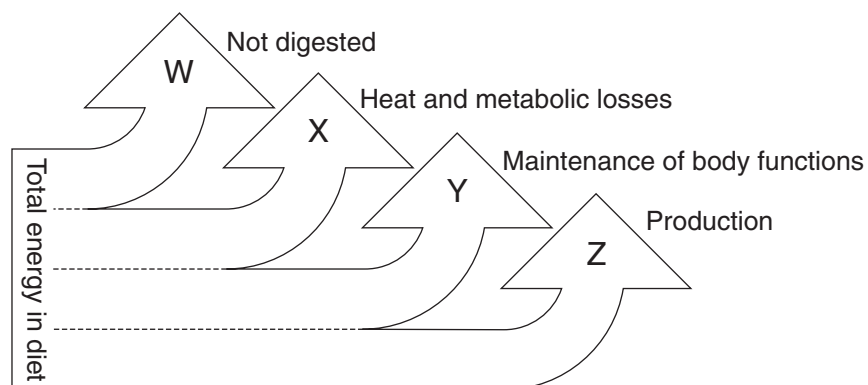
An extract from the herbicide label is shown.

<i>Crop</i>	<i>Weeds</i>	<i>Rate (L/ha)</i>			<i>Critical Comments</i>
		Light soil	Medium soil	Heavy soil	
Chickpeas	Amaranthus Ryegrass Bindweed Canary grass Wild oats	1.5	1.7	2.0	Apply immediately prior to planting
Chickpeas	Ryegrass Barnyard grass Canary grass Wireweed	1.2	1.2	1.2	Apply after crop has reached three leaf stage

What rate of pre-emergent herbicide should the farmer use?

- (A) 1.2 L/ha
 (B) 1.5 L/ha
 (C) 1.7 L/ha
 (D) 2.0 L/ha

- 19 Which pair of nitrogen-containing substances can plant roots extract from the soil?
- (A) Ammonia and nitrite
(B) Ammonia and nitrate
(C) Ammonium and nitrite
(D) Ammonium and nitrate
- 20 The diagram shows how the total energy in a diet is used by an animal.



What is *metabolisable energy* a combination of?

- (A) W and X
(B) Y and Z
(C) W, X and Y
(D) X, Y and Z

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Centre Number

Section I (continued)

Part B – 60 marks

Attempt Questions 21–28

Allow about 1 hour and 45 minutes for this part

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Student Number

Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.

Question 21 (5 marks)

Compare how native and introduced pasture species are used in pasture-based animal production systems. **5**

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Question 22 (6 marks)

- (a) The table shows the dry matter weight of five samples collected from a pasture.

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Calculate the mean and the standard deviation and write them in the spaces provided.

<i>Sample number</i>	<i>Weight (g)</i>
1	220
2	218
3	200
4	215
5	212
Mean
Standard deviation

- (b) Design a trial to investigate the effect of light intensity on plant growth.

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Centre Number

Section I – Part B (continued)

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Question 23 (6 marks)

- (a) Identify sources of water that are available for production purposes on farms. **2**

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- (b) Explain how farm management strategies help maintain the quality of water sources. **4**

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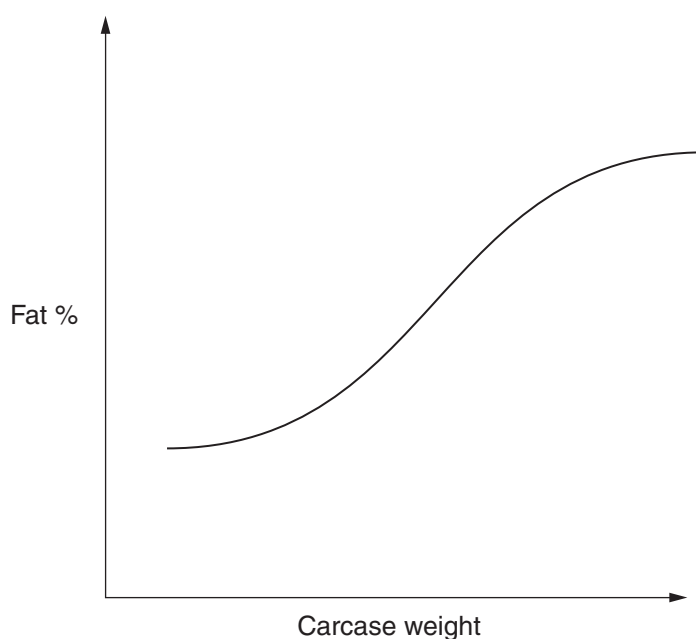
Section I – Part B (continued)

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Question 24 (8 marks)

The graph shows the relationship between carcase weight and fat percentage.



- (a) How can the information in the graph shown be used by a farmer to produce animals to suit a particular market? **2**

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Question 24 continues on page 14

Question 24 (continued)

- (b) Explain management techniques that a farmer can use to modify carcase composition.

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End of Question 24

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Centre Number

Section I – Part B (continued)

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Question 25 (6 marks)

- (a) How can the modification of ONE plant characteristic improve crop production? **2**

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- (b) Describe TWO breeding systems that are used to improve crop production. **4**

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Question 26 (10 marks)

- (a) Explain how management techniques may contribute positively to the long term sustainability of soils. **4**

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- (b) Compare techniques used to manage the nutrient level of soils in the mid 20th century with those currently used. **6**

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Section I – Part B (continued)

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Question 27 (10 marks)

Name ONE farm product you have studied.

Name of farm product

- (a) Outline ONE way that a farmer could sell this product. 2

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- (b) How can a government decision affect the production or marketing of this product? 2

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Question 27 continues on page 18

Question 27 (continued)

- (c) Evaluate methods available to farmers to improve the quality of this product.

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End of Question 27

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Centre Number

Section I – Part B (continued)

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Student Number

Question 28 (9 marks)

- (a) How do rising input costs affect farm decision-making?

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Question 28 continues on page 20

Question 28 (continued)

- (b) Discuss the use of gross margin budgeting in farm business management.

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End of Question 28

Agriculture

Section II

20 marks

Attempt ONE question from Questions 29–31

Allow about 45 minutes for this section

Answer part (a) of the question in a writing booklet.

Answer part (b) of the question in a SEPARATE writing booklet.

Extra writing booklets are available.

In your answers you will be assessed on how well you:

- demonstrate knowledge and understanding relevant to the question
 - communicate ideas and information using relevant examples
 - present a logical and cohesive response
-

Question 29 — Agri-food, Fibre and Fuel Technologies (20 marks)

Answer part (a) of the question in a writing booklet.

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|-----|------|---|----------|
| (a) | (i) | Name a research study relating to biotechnology and identify the reason for undertaking the research. | 2 |
| | (ii) | Outline the findings of the research study named in part (a) (i), and explain how the findings can be used in Australian agricultural production. | 6 |

Answer part (b) of the question in a SEPARATE writing booklet.

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|-----|--|-----------|
| (b) | Discuss the use of genetically modified crops in agricultural systems. | 12 |
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OR

Please turn over

In your answers you will be assessed on how well you:

- demonstrate knowledge and understanding relevant to the question
 - communicate ideas and information using relevant examples
 - present a logical and cohesive response
-

Question 30 — Climate Challenge (20 marks)

Answer part (a) of the question in a writing booklet.

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|-----|------|---|----------|
| (a) | (i) | Name a research study relating to climate variability or its management, and identify the reason for undertaking the research. | 2 |
| | (ii) | Outline the findings of the research study named in part (a) (i), and explain how the findings can be used in Australian agricultural production. | 6 |

Answer part (b) of the question in a SEPARATE writing booklet.

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|-----|---|-----------|
| (b) | Discuss management strategies that a farmer could use to maintain production if Australia's climate becomes hotter and drier. | 12 |
|-----|---|-----------|

OR

Question 31 — Farming in the 21st Century (20 marks)

Answer part (a) of the question in a writing booklet.

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|-----|------|---|----------|
| (a) | (i) | Name a research study relating to new agricultural technologies and identify the reason for undertaking the research. | 2 |
| | (ii) | Outline the findings of the research study named in part (a) (i), and explain how the findings can be used in Australian agricultural production. | 6 |

Answer part (b) of the question in a SEPARATE writing booklet.

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|-----|---|-----------|
| (b) | Discuss the impacts of recently introduced technologies on farm management practices. | 12 |
|-----|---|-----------|

End of paper