

**2015 HIGHER SCHOOL CERTIFICATE
EXAMINATION**

Agriculture

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black pen
- Draw diagrams using pencil
- Board-approved calculators may be used
- Write your Centre Number and Student Number at the top of pages 9, 13, 17, 19 and 21

Total marks – 100

Section I Pages 2–22

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 21–27
- Allow about 1 hour and 45 minutes for this part

Section II Pages 23–24

20 marks

- Attempt ONE question from Questions 28–30
- Allow about 45 minutes for this section

Section I
80 marks

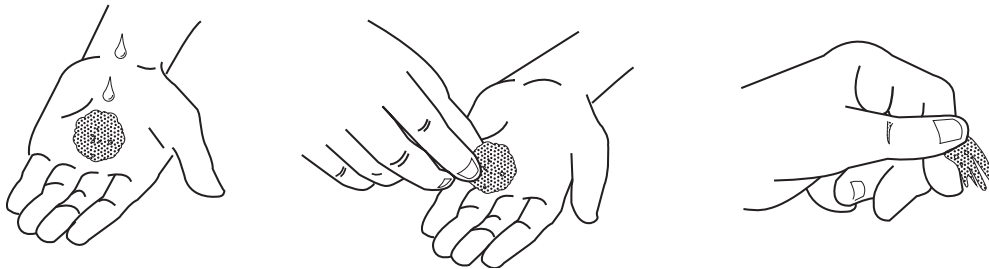
Part A – 20 marks

Attempt Questions 1–20

Allow about 30 minutes for this part

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

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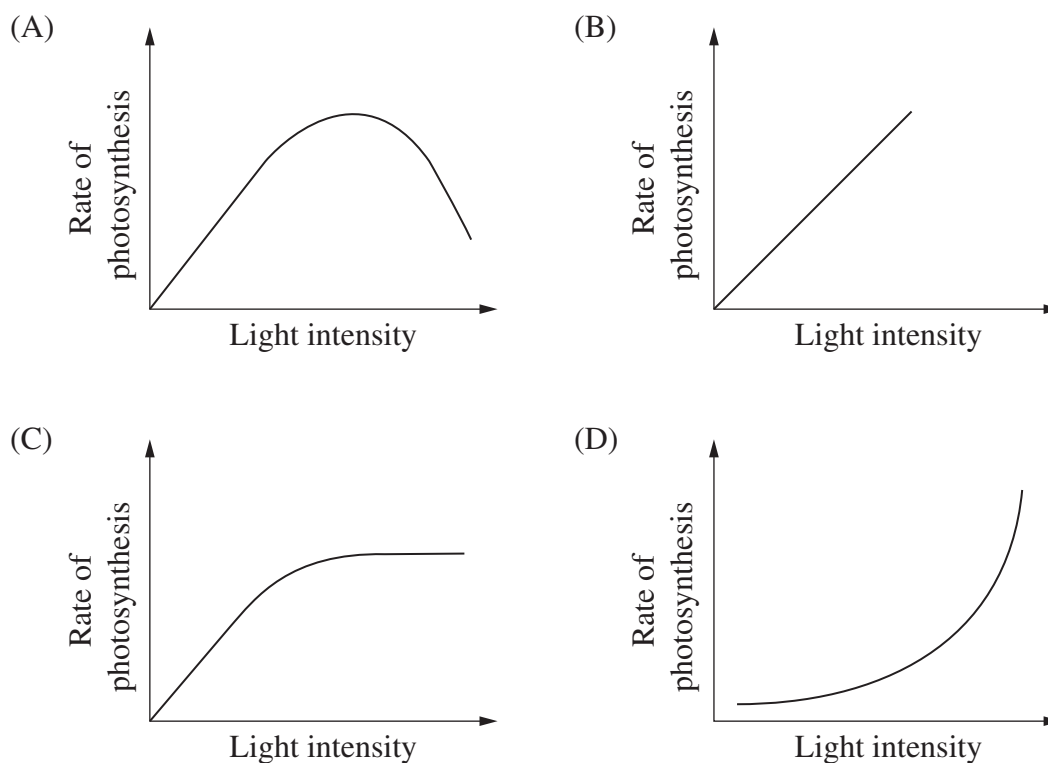


What is being determined by the test shown in the diagrams?

- (A) Bulk density
 - (B) Porosity
 - (C) Structure
 - (D) Texture
- 2** What is a land use practice that was commonly used by the Aboriginal inhabitants of Australia?
- (A) Minimum tillage
 - (B) Firestick farming
 - (C) Conservation tillage
 - (D) Subsistence farming
- 3** What advantage does a pasture consisting of introduced species have over a native pasture system?
- (A) Superior growth rate
 - (B) Persistence during drought
 - (C) Requires fewer fertiliser applications
 - (D) Provides a habitat for beneficial insects

- 4 What is the component of experimental design that involves the management of variables?
- (A) Control
 - (B) Replication
 - (C) Randomisation
 - (D) Standardisation
- 5 What is the name of the bacteria responsible for nodule formation on legumes?
- (A) Reticulum
 - (B) Rhizobium
 - (C) Rhizomes
 - (D) Ribosomes
- 6 What plant hormone is commonly used in post-harvest fruit ripening?
- (A) Auxins
 - (B) Cytokinins
 - (C) Ethylene
 - (D) Gibberellins
- 7 Which organ in the ruminant digestive system functions in a way that most closely resembles the function of the stomach of the monogastric digestive system?
- (A) The abomasum
 - (B) The omasum
 - (C) The reticulum
 - (D) The rumen
- 8 Which of the following is NOT an example of overcoming an environmental constraint in plant production?
- (A) Adding lime to acidic soils
 - (B) Growing crops in a glasshouse
 - (C) Covering fruit trees with bird netting
 - (D) Applying hormones to plant cuttings to promote root growth

9 Which of the graphs most accurately shows the effect of light intensity on photosynthesis?



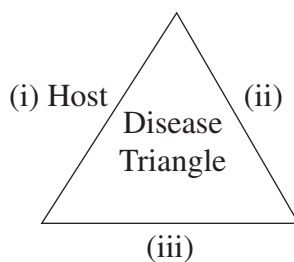
10 A farmer observes that daily milk production from her cows is variable. She decides to record daily milk yield per cow over a period of time. A summary of the results is shown in the table.

<i>Breed</i>	<i>Feeding regime</i>	<i>Average milk production (litres/day/cow)</i>
Holstein	Pasture only	32
	Pasture + grain	38
Jersey	Pasture only	26
	Pasture + grain	30

Which of the following correctly reflects these observations about the daily milk yield?

- (A) It is influenced only by genetics.
- (B) It is influenced only by environment.
- (C) It is influenced by many unrelated factors.
- (D) It is influenced by the interaction between genetics and environment.

11

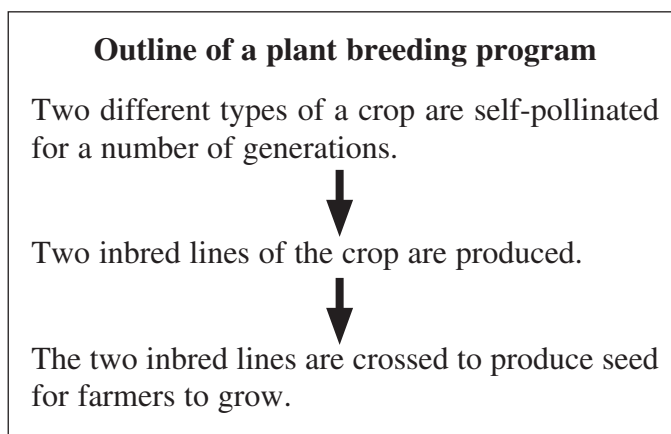


The disease triangle shows the three factors needed for a disease to develop in a plant or animal.

Which row in the table shows the correct labels for sides (ii) and (iii) of the triangle?

	(ii)	(iii)
(A)	Pathogen	Time
(B)	Environment	Vector
(C)	Pathogen	Environment
(D)	Environment	Time

12



What system of plant breeding is shown in the diagram?

- (A) Line breeding
- (B) Hybridisation
- (C) Selective breeding
- (D) Genetic engineering

- 13** Which of the following should be subtracted from total enterprise income to calculate a gross margin?
- (A) Fixed costs
 - (B) Variable costs
 - (C) Variable equity
 - (D) Total farm costs
- 14** A portion of a pesticide label is shown.

<i>Insect pests</i>	<i>Situation</i>	<i>Application rate/Type</i>
Aphids, Thrips	Roses, Poppies, Daisies	10 mL/L Knapsack sprayer
Aphids	Lucerne, Oats, Barley	15 L/Ha Boom spray
Leaf Miner	Citrus	10 mL/L Knapsack sprayer
Caterpillars, Aphids	Vegetable crops	10 L/Ha Boom spray 7.5 mL/L Knapsack sprayer

A farmer wishes to treat aphids in his vegetable crop using a knapsack sprayer.

How much of this pesticide should be added to 5 litres of water in the knapsack sprayer?

- (A) 7.5 mL
 - (B) 25 mL
 - (C) 37.5 mL
 - (D) 50 mL
- 15** A farmer has borrowed money to establish an enterprise for the export market.
- What is a likely effect of an increase in Australian interest rates on the profitability of the farm?
- (A) Profit would decrease because total farm costs would increase.
 - (B) Profit would increase because costs of production would decrease.
 - (C) There would be no effect on profit because the product is being exported.
 - (D) Profit would increase because the product would become more competitive in the world market.

- 16** A student performed an experiment to investigate how shading affects the growth of a plant species. The results of the trial are shown.

	<i>Location 1: Indoors/Shadehouse</i>	<i>Location 2: Outdoors/Full sun</i>
<i>Pot</i>	<i>Height after 14 days (cm)</i>	<i>Height after 14 days (cm)</i>
1	7	9
2	5	11
3	8	10
4	6	13
5	4	12

What is the average (mean) height of the plants in the control treatment?

- (A) 5 cm
 - (B) 6 cm
 - (C) 8.5 cm
 - (D) 11 cm
- 17** Under which of the following conditions is the net assimilation rate of plants likely to be highest?
- (A) Warm days and cool nights
 - (B) Cool days and warm nights
 - (C) Both day and night temperatures are cool
 - (D) Both day and night temperatures are warm
- 18** A company's website describes its operations as follows.

'Our business includes grain farms, feedmills, hatcheries, broiler and breeder farms and processing plants.'

Which of the following best describes this company's marketing strategy?

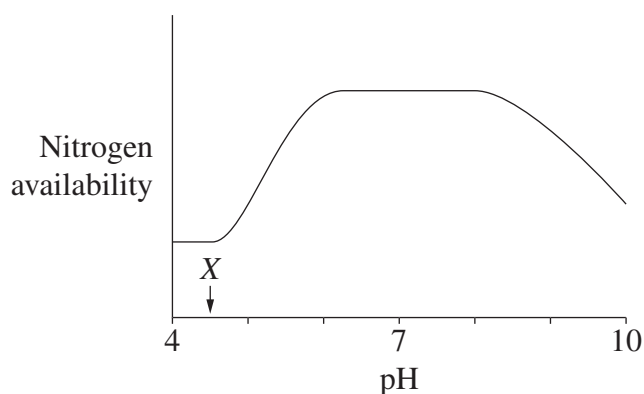
- (A) Cooperative
- (B) Marketing board
- (C) Direct marketing
- (D) Vertical integration

19 The long-term fertility of sandy soils is best maintained by

- (A) applying gypsum.
- (B) applying a chemical fertiliser.
- (C) conserving organic matter (soil carbon).
- (D) regularly using the land to grow organic crops.

20 The graph shows the availability of nitrogen to plants growing in a soil.

The soil was tested and the pH is shown at point X in the diagram.



Tonnes of material required to alter soil pH

<i>Material</i>	<i>Tonnes/Ha</i>	<i>pH change (+ or -)</i>
Gypsum	5	0.3
Lime	3	1
Nitrate fertiliser	0.3	1
Organic mulch	10	0.2

The best strategy to make nitrogen more available to plants growing in this soil is to apply

- (A) gypsum.
- (B) lime.
- (C) nitrate fertiliser.
- (D) organic mulch.

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Centre Number

Section I (continued)

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Student Number

Part B – 60 marks

Attempt Questions 21–27

Allow about 1 hour and 45 minutes for this part

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

Question 21 (8 marks)

- (a) Outline the influence of testosterone on the behaviour of male animals. 2

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- (b) How can crossbreeding be used to improve the productivity of an animal production system? 2

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Question 21 continues on page 10

Question 21 (continued)

(c) Describe the effect of TWO factors on the fertility of farm animals.

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End of Question 21

Question 22 (6 marks)

- (a) Describe the effect of organic matter (soil carbon) on a physical characteristic of soil. **2**

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- (b) Explain how conservation tillage assists in maintaining soil fertility. **4**

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Centre Number

Section I — Part B (continued)

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Student Number

Question 23 (8 marks)

- (a) Explain how soil texture influences the water-holding capacity of soils. **2**

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- (b) Explain how land capability assessment can be used to improve the long-term sustainability of Australian farms. **6**

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Question 24 (10 marks)

- (a) Explain the importance of using standardised conditions and a control when conducting agricultural trials.

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Question 24 continues on page 15

Question 24 (continued)

- (b) Describe an experiment to test the effect of plant density on growth or yield. In your answer, show how the experiment demonstrates sound experimental design.

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End of Question 24

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Centre Number

Section I — Part B (continued)

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Student Number

Question 25 (10 marks)

- (a) Explain, using examples, why plant breeding programs are necessary in Australian agriculture. **4**

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Question 25 continues on page 18

Question 25 (continued)

- (b) Explain the advantages AND disadvantages of using hybrid plant varieties.

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End of Question 25

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Centre Number

Section I — Part B (continued)

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Student Number

Question 26 (10 marks)

Answer parts (a), (b) and (c) in relation to an identified farm product.

Name of farm product

- (a) Outline a strategy that a farmer could use to market this product.

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- (b) Describe ways of value adding this product.

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Question 26 continues on page 20

Question 26 (continued)

- (c) Describe factors affecting the supply of, and demand for, this product.

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End of Question 26

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Centre Number

Section I — Part B (continued)

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Student Number

Question 27 (8 marks)

- (a) Explain how a recent technology has aided farmers in the production OR marketing of agricultural products. **4**

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Question 27 continues on page 22

Question 27 (continued)

- (b) Provide points for AND against contract selling as a marketing strategy available to farmers.

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End of Question 27

Agriculture

Section II

20 marks

Attempt ONE question from Questions 28–30

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

Your answers 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
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Question 28 — Agri-food, Fibre and Fuel Technologies (20 marks)

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

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|-----|------|--|----------|
| (a) | (i) | Outline the role of biosecurity in protecting Australia's agricultural industries. | 2 |
| | (ii) | Describe methods used to produce biofuels in Australia. | 6 |

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

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|-----|---|-----------|
| (b) | Discuss the uses of, and implications for Australian agriculture of, genetically modified crops. In your answer, include specific examples. | 12 |
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OR

Please turn over

Question 29 — Climate Challenge (20 marks)

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

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|-----|------|---|----------|
| (a) | (i) | Outline the effect of the Southern Oscillation Index on climate in Australia. | 2 |
| | (ii) | Describe how nitrogen fertiliser and intensive ruminant production contribute to greenhouse gas production. | 6 |

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

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| (b) | Many climate scientists predict that Australia's average temperatures will rise and rainfall patterns will change in the future. | 12 |
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Discuss the options available to farmers to maintain production on their farms under these changed climatic conditions. In your answer, include specific examples.

OR

Question 30 — Farming in the 21st Century (20 marks)

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

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| (a) | (i) | Outline the need for research when developing new technologies in agriculture. | 2 |
| | (ii) | Describe the roles of patents and plant breeders' rights in the research and development of new technologies. | 6 |

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

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|-----|--|-----------|
| (b) | Discuss the implications for Australian agriculture of using technologies such as computers and/or smart devices. In your answer, include specific examples. | 12 |
|-----|--|-----------|

End of paper