

B O A R D O F S T U D I E S
NEW SOUTH WALES

2013

**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, 17, 19 and 21

Total marks – 100

Section I Pages 2–21

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 23–24

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 Which of the following statements is true of early European land management practices in Australia?
 - (A) They did not affect natural waterways.
 - (B) They led to an increase in soil degradation issues.
 - (C) They did not involve the burning of plant material.
 - (D) They encouraged the establishment of a more diverse range of native plant species.

- 2 Which group of chemicals regulates animal reproduction and behaviour?
 - (A) Amino acids
 - (B) Enzymes
 - (C) Hormones
 - (D) Steroids

- 3 Which term is used to describe the arrangement of particles in soil?
 - (A) Bulk density
 - (B) Porosity
 - (C) Structure
 - (D) Texture

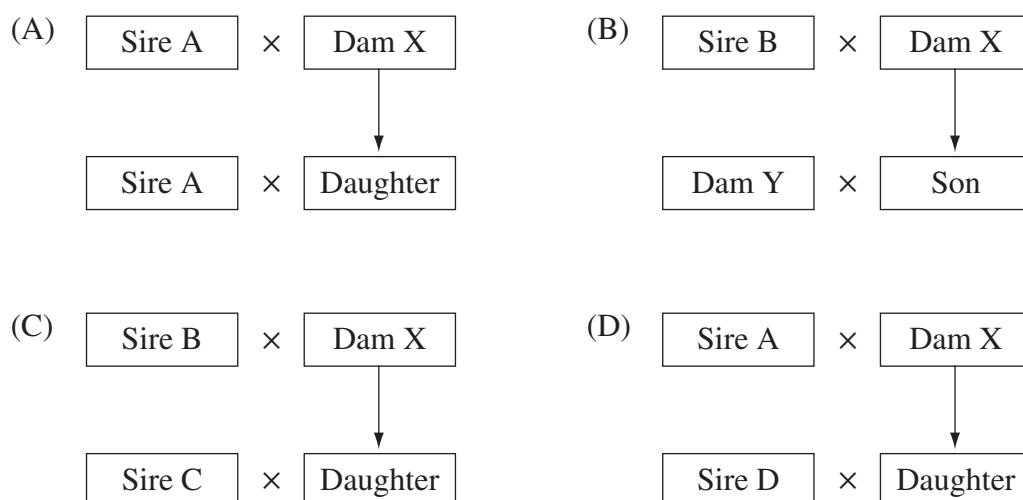
- 4 What is the purpose of welfare legislation and industry codes of practice in animal management?
 - (A) To reduce unnecessary pain and suffering
 - (B) To improve the quantity of animal products
 - (C) To ensure that the latest technologies are being used
 - (D) To allow farm managers to monitor the performance of their employees

- 5 Farmers often increase the quantity and quality of food available to female animals prior to placing them with male animals for mating.

What is the principal reason for doing this?

- (A) To increase the length of the oestrus cycle
 - (B) To increase milk production during lactation
 - (C) To increase the chance of survival of any offspring
 - (D) To increase the rate of ovulation in their breeding stock
- 6 How do Australian native pasture species differ from introduced pasture species?
- (A) They are mostly more productive in highly fertile soils.
 - (B) They are typically more tolerant of hot and dry conditions.
 - (C) They usually grow actively for longer periods during the year.
 - (D) They are generally less susceptible to heavy grazing by livestock.
- 7 What is the role of standardisation in experimental design?
- (A) To reduce the effects of biological variability
 - (B) To reduce the effects of bias by the experimenter
 - (C) To provide a basis for comparison between experiments
 - (D) To ensure that factors other than the variable under investigation do not affect the results

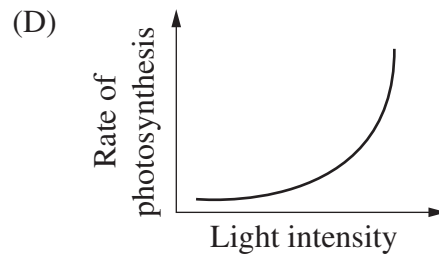
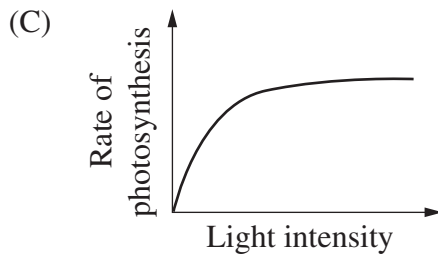
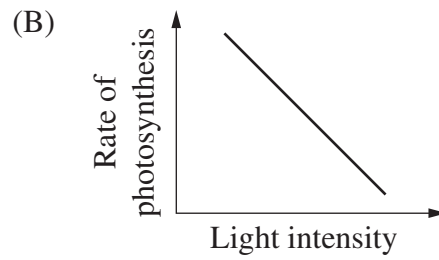
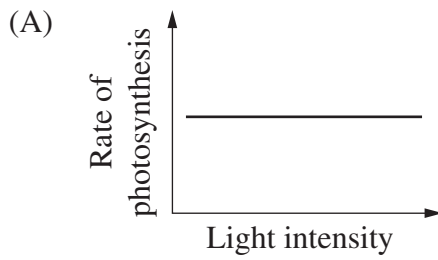
- 8 Which of the following diagrams best represents an example of line breeding?



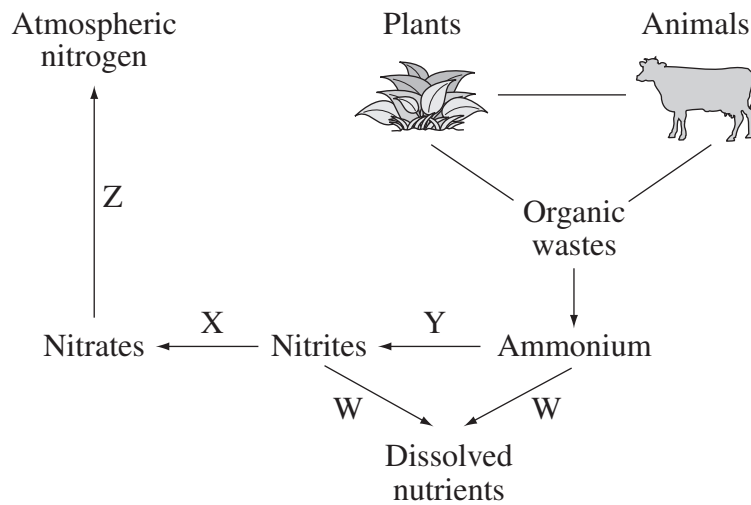
- 9** What is the best method of preventing the development of resistance in pest populations?
- (A) Replacing synthetic pesticides with organic ones
 - (B) Using a different brand of the chemical each season
 - (C) Repeated use of a synthetically manufactured pesticide
 - (D) Implementing a range of chemical and non-chemical pest management strategies
- 10** Which combination of factors is most likely to affect the fertility of farm animals?
- (A) Nutrition, genetics, diseases
 - (B) Day length, topography, diseases
 - (C) Nutrition, day length, light intensity
 - (D) Light intensity, genetics, topography
- 11** What is the role of Rhizobium bacteria found in root nodules on legume plants?
- (A) They provide energy for root growth.
 - (B) They provide resistance to plant pathogens.
 - (C) They assist in absorbing water and plant nutrients.
 - (D) They provide an available source of nitrogen to the plant.
- 12** Which of the following statements is NOT true of embryo transfer in animals?
- (A) Embryos can be frozen and stored for use at a later time.
 - (B) Higher rates of pregnancy are achieved compared to natural mating.
 - (C) Embryos can be split so two or more identical embryos can be produced.
 - (D) Embryos can be sexed so the farmer can choose the gender of the offspring.
- 13** What is increased as a result of the use of hormone growth promotants (HGPs) in animals?
- (A) Fertility
 - (B) Age of maturity
 - (C) Fat content of the carcass
 - (D) Efficiency of food conversion

- 14** In a research paper, what is the principal reason for including a section that details the research methodology?
- (A) Readers can interpret the results of the research.
 - (B) The researcher can patent the research methodology.
 - (C) It allows readers to evaluate the validity of the research methodology.
 - (D) It allows readers to make informed opinions about how the results were analysed.
- 15** Which financial management technique provides an accurate comparison of the relative profitability of enterprises on a farm?
- (A) A whole farm budget
 - (B) A gross margin budget
 - (C) A farm development budget
 - (D) A return to capital statement
- 16** Which of the following is responsible for ovulation?
- (A) Luteinising hormone
 - (B) Oestrogen
 - (C) Progesterone
 - (D) Prostaglandin
- 17** What is a major difference between the digestive processes in ruminant and monogastric animals?
- (A) Monogastric animals do not require roughage in their diet.
 - (B) Ruminant animals are able to synthesise some B group vitamins.
 - (C) Monogastric animals use their own enzymes in the process of digestion.
 - (D) Ruminant animals are able to convert some amino acids into other amino acids.

18 Which of the following graphs correctly illustrates the relationship between photosynthesis and light intensity?

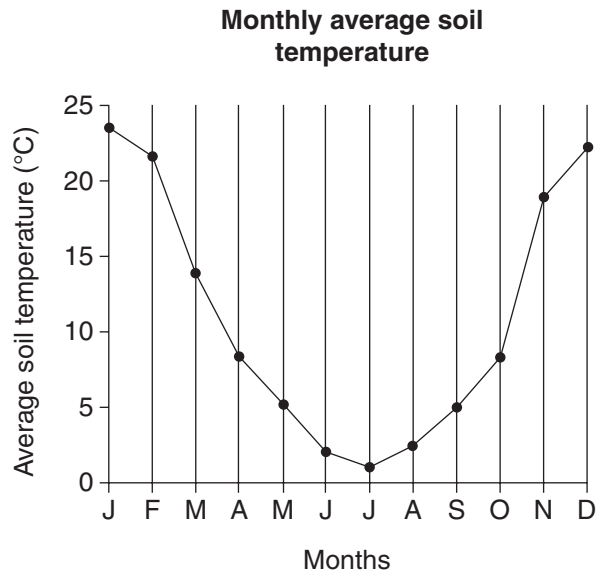
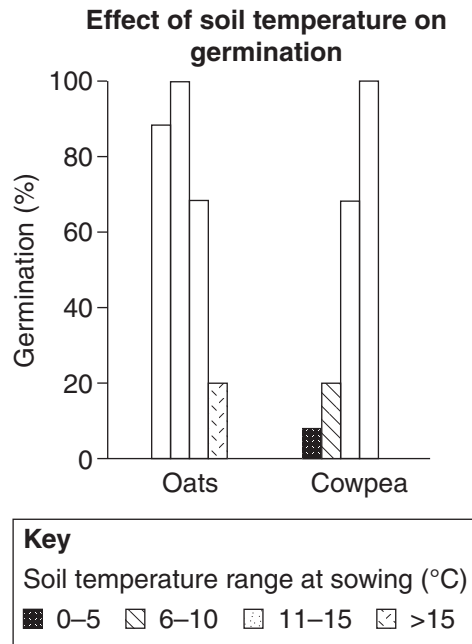


19 The diagram shows a summary of the nitrogen cycle.



Which process in the diagram does NOT involve microbial activity?

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



Using the data provided, in which months should cowpeas be planted in order to maximise their germination percentage?

- (A) February, March, April
- (B) January, February, March
- (C) April, May, June, July
- (D) November, December, January, February

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Centre Number

Section I (continued)

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Student Number

Part B – 60 marks

Attempt Questions 21–28

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 (6 marks)

- (a) Outline ONE ethical issue related to an animal production system. 2

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- (b) Name an animal husbandry practice and describe how its potential negative effects can be reduced. 4

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Question 22 (7 marks)

- (a) Name a pest or disease of a plant/crop and describe an Integrated Pest Management (IPM) program for its control. **4**

Name of pest/disease

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- (b) Explain how integrated pest management programs can reduce the problem of chemical resistance in pest and disease organisms. **3**

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Section I – Part B (continued)

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Question 23 (6 marks)

- (a) How can whole farm planning be used to improve farm sustainability? **2**

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- (b) Name a program which involves farmers, government and community groups working together and explain how it can help reduce the possible harmful environmental effects of agriculture. **4**

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2013 HIGHER SCHOOL CERTIFICATE EXAMINATION

Agriculture

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Section I – Part B (continued)

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Student Number

Question 24 (8 marks)

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Question 24 (8 marks)

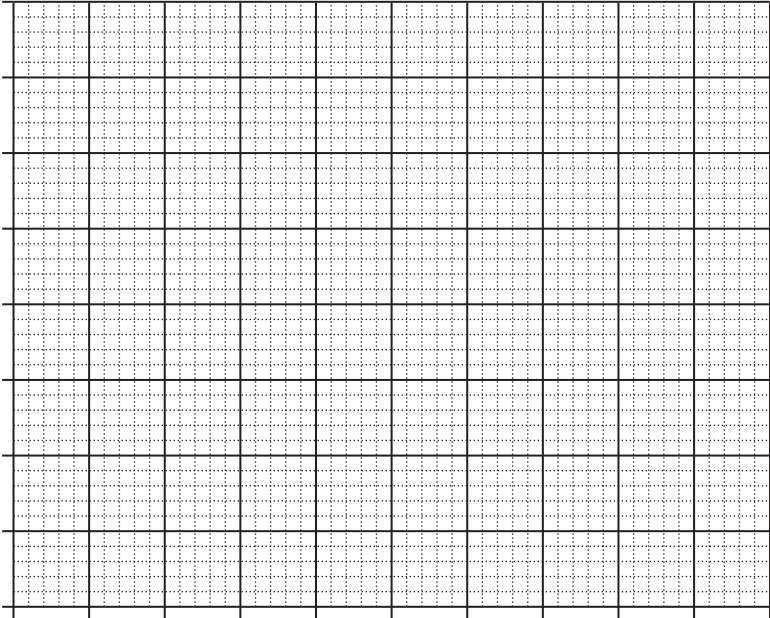
Research was conducted to determine the effect of irrigation on the yield of cherries over one growing season. Two farms were selected for the research project. Farm 1 was located in southern NSW with NO irrigation. Farm 2 was located in northern NSW with irrigation.

Yield of Cherry Trees

	<i>Farm 1</i>		<i>Farm 2</i>
<i>Individual tree identification</i>	<i>Yield (kg/tree)</i>	<i>Individual tree identification</i>	<i>Yield (kg/tree)</i>
A	3	A	7
B	10	B	11
C	7	C	13
D	8	D	15
E	7	E	14
Average	7	Average	12

(a) Graph the average results from the table.

3



Question 24 continues on page 15

Question 24 (continued)

(b) Evaluate the experimental design used in this research trial.

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End of Question 24

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Section I – Part B (continued)

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Student Number

Question 25 (8 marks)

- (a) Explain how crop yield is affected by plant competition. 4

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- (b) Describe strategies a farmer could implement to reduce the effects of plant competition. 4

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Question 26 (8 marks)

- (a) Outline how nutrition affects the fertility of farm animals. **2**

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- (b) Evaluate embryo transfer as a means of manipulating reproduction in animals. **6**

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Section I – Part B (continued)

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Student Number

Question 27 (9 marks)

Name ONE farm product you have studied.

Name of farm product

- (a) Outline a problem a farmer may experience in meeting a market specification for the farm product. **3**

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Question 27 continues on page 20

Question 27 (continued)

(b) Describe ways in which the farm product you have identified can be value added. **6**

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End of Question 27

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Section I – Part B (continued)

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Question 28 (8 marks)

- (a) Outline the effect of ONE technological advance on the production and/or marketing of a farm product. **2**

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- (b) Discuss strategies available to farmers to market farm products. **6**

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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.

- (a) (i) Why is there a need for ongoing research into agricultural technologies related to agri-food, fibre and fuel? **3**
- (ii) How does biosecurity help protect Australia's agricultural industries? **5**

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

- (b) Explain the potential conflict between the need for increased production and ethical concerns relating to the use of biotechnology in agriculture. **12**

OR

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.

- (a) (i) Why is there a need for ongoing research into climate variability? **3**
- (ii) Describe methods available to farmers to trade water resources. **5**

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

- (b) Explain how nitrogen fertiliser AND intensive ruminant production contribute to greenhouse gas emissions. **12**

OR

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

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

- (a) (i) Why is there a need for ongoing research into agricultural technologies related to farming in the 21st century? **3**
- (ii) Describe issues relating to the research and development of future farming technologies. **5**

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

- (b) Explain the benefits of recent developments in biotechnology AND robotics that may assist agricultural production. Include examples in your answer. **12**

End of paper