



# Western Australian Certificate of Education ATAR course examination, 2016

## Question/Answer booklet

### ANIMAL PRODUCTION SYSTEMS

Please place your student identification label in this box

Student number: In figures

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In words

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### Time allowed for this paper

Reading time before commencing work: ten minutes  
Working time: three hours

### Materials required/recommended for this paper

#### *To be provided by the supervisor*

This Question/Answer booklet  
Multiple-choice answer sheet

Number of additional answer booklets used (if applicable):

#### *To be provided by the candidate*

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: non-programmable calculators approved for use in this examination

### Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

## Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of examination
Section One Multiple-choice	20	20	30	20	20
Section Two Short answer	6	6	90	92	50
Section Three Extended answer	3	2	60	40	30
<b>Total</b>					100

## Instructions to candidates

- The rules for the conduct of the Western Australian Certificate of Education ATAR course examinations are detailed in the *Year 12 Information Handbook 2016*. Sitting this examination implies that you agree to abide by these rules.

- Answer the questions according to the following instructions.

Section One: Answer all questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Sections Two and Three: Write your answers in this Question/Answer booklet.

- You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
- Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

**Section One: Multiple-choice****20% (20 Marks)**

This section has **20** questions. Answer **all** questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 30 minutes.

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1. Determine the ratio of oats (8% crude protein) to lupins (36% crude protein) to formulate a feed ration requiring 15% crude protein.
  - (a) 4:1
  - (b) 1:5
  - (c) 3:1
  - (d) 1:2
  
2. It is a legal requirement for any animal feed containing medication to be registered with the
  - (a) Australian Pesticides and Veterinary Medicines Authority.
  - (b) Department of Agriculture and Water Resources.
  - (c) Australian Institute of Health and Safety.
  - (d) Australian Trade Commission (Austrade).
  
3. In the flow of energy through an ecosystem, the
  - (a) energy is cycled; nutrients are not.
  - (b) decomposers do not remove energy from dead organisms.
  - (c) ultimate source of energy is from the sun.
  - (d) energy doesn't pass between organisms.
  
4. Which of the following traits has the **highest** heritability?
  - (a) birth weight
  - (b) maternal milk
  - (c) growth rate
  - (d) twins
  
5. For what reason would the Australian Government introduce a tariff on a livestock import?
  - (a) Increase export trade by subsidising local producers.
  - (b) Improve the comparative advantage of Australian producers.
  - (c) Protect importers against price fluctuations in the market place.
  - (d) Restrict trade by increasing the price of the imported good.

**See next page**

6. Which statement about the mode of action of a systemic pesticide is correct?
- (a) There usually is no residue.
  - (b) It poisons a pest through direct exposure.
  - (c) There are no reported issues with pesticide resistance.
  - (d) It stays in the body fluids of the host organism.

7. The following production data was collected from an animal enterprise.

	Pen 1	Pen 2	Pen 3	Pen 4
Average weight (kg)	90	92	91	89
Weight range (kg)	80–95	75–100	88–92	84–94

- Which pen would **most** likely have the greatest standard deviation in weights?
- (a) Pen 1
  - (b) Pen 2
  - (c) Pen 3
  - (d) Pen 4
8. Inaccurate reporting of trial results due to the researcher's opinion or belief is commonly known as
- (a) standard error.
  - (b) replication faults.
  - (c) variable influences.
  - (d) experimental bias.
9. To maintain the eating quality of red meat, it is important to
- (a) minimise stress levels.
  - (b) minimise the amount of marbling.
  - (c) have a carcass with pH 7 or higher.
  - (d) avoid yellowing of the fat.
10. The main factor contributing to an oversupply of livestock produce entering the domestic market place would be
- (a) a shortage of breeding stock.
  - (b) an inability to meet quality assurance targets.
  - (c) unfavourable seasonal conditions.
  - (d) greater demand from export markets.

11. What is the **most** effective way of improving the efficiency of an animal production system?
- (a) increase animal numbers
  - (b) collect production data
  - (c) purchase additional land
  - (d) adopt current technologies
12. Digestible energy is the energy available after the loss of
- (a) faeces.
  - (b) gas.
  - (c) urine.
  - (d) heat.
13. Which one of the following is **not** a feature of the National Livestock Identification System?
- (a) National Vendor Declaration
  - (b) quality assurance documentation
  - (c) Property Identification Code
  - (d) lifetime traceability
14. When formulating a least-cost ration, it is always important to
- (a) use feed produced on other farms.
  - (b) supply all required nutrients in adequate amounts.
  - (c) use growth promotants to enhance performance.
  - (d) add high-fibre concentrates to promote growth.
15. To assess the overall genetic improvement of the progeny, the producer would
- (a) measure traits of selected males with similar bloodlines.
  - (b) measure the improvement of female fertility.
  - (c) only consider traits that have low heritability.
  - (d) ensure any genetic progress is measurable.
16. Gross margins should be used to compare enterprises that
- (a) make use of the same resources on the property.
  - (b) have similar returns on the invested moneys.
  - (c) supply products with equivalent market specifications.
  - (d) require no additional expenditure on labour.

17. What hormone can be used to increase ovulation and the incidence of multiple births?
- Prolactin
  - Luteinising Hormone
  - Oxytocin
  - Follicle Stimulating Hormone
18. The **most** effective and economically sound strategy for the government to assist producers' response to climate change is to
- implement import barriers on all livestock products.
  - only allow foreign ownership of farming properties in drought areas.
  - fund research into drought-tolerant production.
  - grant easier access to drought relief funding.

Use the Livestock Schedule below to answer Questions 19 and 20.

#### Livestock Schedule

All prices are based on \$/kg Hot Standard Carcass Weight (HSCW)

Weight range (kg)	Fat scores at GR site			
	1	2 and 3	4	5
12.1 to 14	\$1.40	\$2.20	\$2.00	\$1.50
14.1 to 16	\$2.50	\$3.00	\$3.00	\$2.70
16.1 to 18	\$2.50	\$3.30	\$3.30	\$2.90
18.1 to 24	\$3.00	\$3.50	\$3.50	\$3.10

19. What is the difference in return for the following two animals in dollars per kilogram (\$/kg)?
- Animal one: 13.8 kg fat score 5  
Animal two: 17.9 kg fat score 2
- \$1.50/kg
  - \$1.80/kg
  - \$2.00/kg
  - \$2.40/kg
20. What is the **least** important aspect of meeting the market specifications outlined in the Livestock Schedule above?
- nutritional management
  - meat eating quality
  - measuring weight
  - condition scoring

End of Section One

See next page

**Section Two: Short answer****50% (92 Marks)**

This section has **six (6)** questions. Answer **all** questions. Write your answers in the spaces provided.

Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

Suggested working time: 90 minutes.

**Question 21****(22 marks)**

- (a) (i) Complete the table for the breeding (oestrus) cycle of an animal you have studied. (2 marks)

Animal	Length of breeding (oestrus) cycle – days	Duration of oestrus (standing heat) – hours

- (ii) Describe the role of **two** hormones involved in the breeding cycle. (4 marks)

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (iii) Explain how the breeding cycle can be manipulated to meet a given breeding goal. (3 marks)

Breeding goal: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**See next page**

Question 21 (continued)

- (b) (i) Explain why a producer might use artificial insemination in preference to a natural breeding program. (3 marks)

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- (ii) Describe **two** management practices that affect the success rate of an artificial insemination program. (4 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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- (c) (i) Discuss a potential benefit from the use of genetically-modified organisms (GMOs) within the animal production industry. (3 marks)

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- (ii) Discuss a potential issue with the use of GMOs. (3 marks)

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## Question 22

(16 marks)

A producer conducted an investigation to determine whether growth promotants were an economically-viable option in preparing livestock on pasture prior to entering a feedlot.

The animals were drafted into two even groups. The experimental group was given a growth promotant and then placed with the control group onto a pasture paddock. The following data were collected by the farm employees.

Day	Control group mean weight (kg)	Growth promotant group mean weight (kg)
1	260	270
40	320	340
80	350	375
120	360	390

- (a) Write an hypothesis for this trial. (2 marks)

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- (b) (i) Describe an aspect of experimental design that might have influenced the results of this trial. (2 marks)

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- (ii) Outline a 'duty of care' obligation that the producer would have toward the farm employees involved in this trial. (2 marks)

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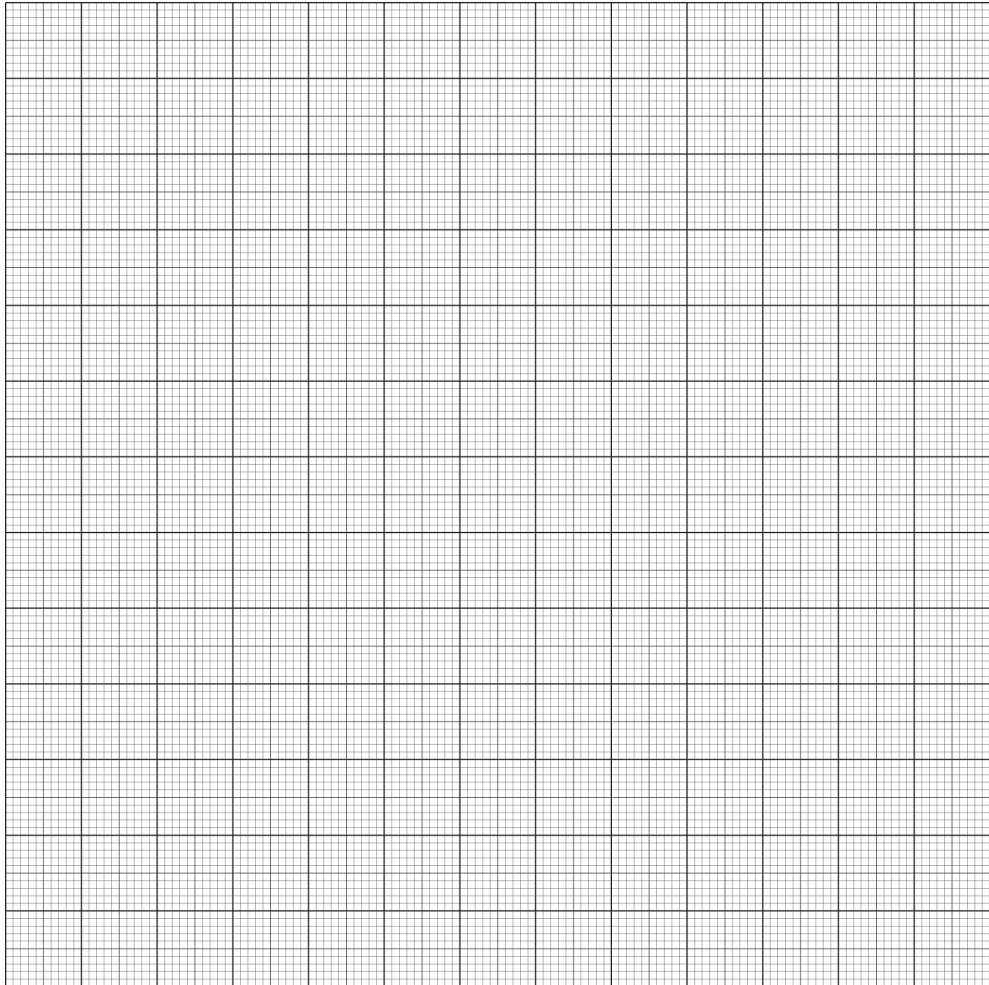
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- (c) (i) Graph the mean weights collected for the animals in the Control group and Growth promotant group over the period of the trial. (5 marks)

A spare grid is provided at the end of this Question/Answer booklet. If you need to use it, cross out this attempt.



- (ii) Provide evidence from your data analysis that either supports or rejects your hypothesis in part (a). (2 marks)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (d) List a feed additive commonly used in animal production systems and outline how it can improve production. (3 marks)

Feed additive: \_\_\_\_\_

Production improvement: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Question 23

(15 marks)

The following table was compiled from animal enterprise data collected from different producers in the same farming district.

	Average of all producers		Average top 20% producers	
<b>Performance data</b>				
Farming area	1000 hectares		950 hectares	
Stocking rate	15 DSE/hectare		18 DSE/hectare	
Return on assets	4%		7%	
<b>Income</b>	<b>Total (\$)</b>			<b>Total (\$)</b>
Sales	3000 @ \$80/head	240 000	3500 @ \$85/head	297 500
<b>Expenses</b>				
Pasture costs	\$60/hectare	60 000	\$70/hectare	66 500
Supplementary feed	\$50/hectare	50 000	\$45/hectare	42 750
Animal health	\$25/hectare	25 000	\$30/hectare	28 500
Husbandry costs	\$15/hectare	15 000	\$20/hectare	19 000
Gross margin		<b>A</b>		<b>B</b>
Gross margin/hectare		<b>C</b>		<b>D</b>

(a) (i) Use the information above to calculate: (4 marks)

Gross margin **A**: \_\_\_\_\_

Gross margin **B**: \_\_\_\_\_

Gross margin/hectare **C**: \_\_\_\_\_

Gross margin/hectare **D**: \_\_\_\_\_

(ii) Discuss a reason for the differences in enterprise gross margins in part (a)(i). (3 marks)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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- (b) Describe a short-term strategy and a long-term strategy a producer could implement to improve the financial performance of an enterprise. (4 marks)

Short-term strategy: \_\_\_\_\_

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Long-term strategy: \_\_\_\_\_

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- (c) State a source of market information and explain its importance in the management of an enterprise. (4 marks)

Source: \_\_\_\_\_

Importance: \_\_\_\_\_

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Question 24

(15 marks)

- (a) Define metabolism and outline its importance in the digestive process. (4 marks)

Metabolism: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Importance: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- (b) Describe **two** benefits of a microbial system in the digestion of feed. (4 marks)

One: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Two: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- (c) Discuss how a sudden change in protein levels in a ration affects the microbial system. (3 marks)

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- (d) Describe **two** strategies for managing animal feed requirements to meet market specifications. (4 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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## Question 25

(12 marks)

A producer's breeding goal is to increase weights while avoiding birthing issues and to also keep replacement females. The estimated breeding values of two male animals in a sales catalogue are as follows:

Animal identification	Birth weight (kg)	Female milk (kg)	Estimated weight gain (kg)
L1	+1	+5	+30
L2	+7	-2	+30

- (a) (i) Justify the selection of the animal you believe best meets the producer's breeding goal. (3 marks)

Selection: \_\_\_\_\_

Justification: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (ii) Calculate the increase in profit of the selected animal based on a liveweight market price of \$3.30 per kilogram. Show **all** workings. (2 marks)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



- (b) (i) Name a breeding goal and state **two** ways in which a producer could assess progress toward it. (3 marks)

Breeding goal: \_\_\_\_\_

One: \_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

- (ii) Describe **two** management practices that may have a negative impact on the progress toward a breeding goal. (4 marks)

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

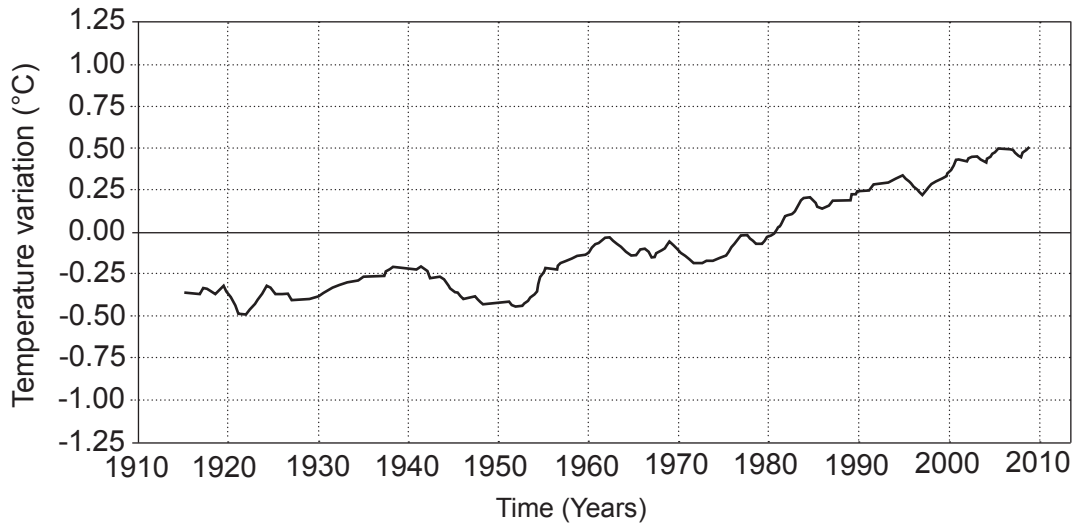
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Question 26

(12 marks)

Climate change has serious implications to the sustainability of the Australian agricultural industry.

Australia's temperature variation 1910–2010



- (a) (i) Outline how the evidence in the above graph either supports or disproves the belief that climate change is occurring in Australia. (2 marks)

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- (ii) Outline what scientists believe is a cause of climate change. (2 marks)

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- (iii) Describe **two** impacts on animal production systems that might result from climate change. (4 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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- (b) Outline both a short-term strategy and a long-term strategy to manage an impact identified in part (a)(iii). (4 marks)

Short-term strategy: \_\_\_\_\_

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Long-term strategy: \_\_\_\_\_

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**End of Section Two**

**See next page**



(b) Name a new technology and explain how it could be used to improve your enterprise's production performance. List **two** factors that determine its effectiveness. (6 marks)

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(c) Discuss how your enterprise management practices consider these sustainability requirements:

- social
- economic
- environmental.

(9 marks)

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## Question 28

(20 marks)

The reliance on chemicals and the issue of pesticide resistance are major concerns for the livestock industry.

(a) Explain:

- how pesticide resistance occurs and outline **two** management strategies that can be implemented to avoid this issue
- the economic principles of controlling pest populations and how they can be applied.

(10 marks)

(b) Compare the effectiveness of **two** different pest control methods. For **one** control method, outline its potential impact on a natural ecosystem.

(10 marks)

or

## Question 29

(20 marks)

To be successful, a producer must monitor production practices to meet market trends as well as being competitive in major markets.

(a) Examples of market trends include leaner meat, guaranteed eating quality and food safety assurance. From these examples, select **one** and explain why the market trend has occurred and how producers use management practices to meet the trend. (5 marks)

(b) Explain:

- the importance of the global economy to the Australian livestock industry using an example
- how maintaining a comparative advantage and quarantine laws assist in achieving success in international markets. Include examples of each.

(15 marks)

End of questions







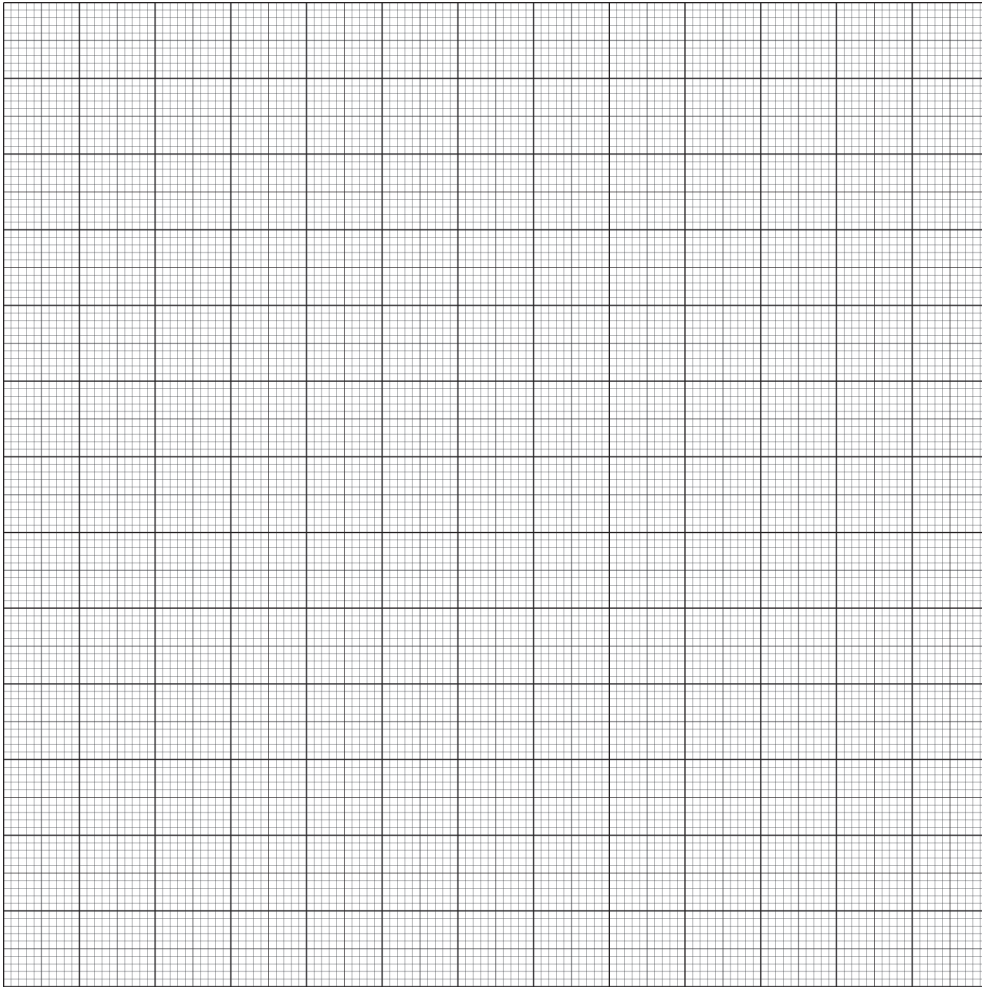








Question 22(c)(i)



## ACKNOWLEDGEMENTS

### Question 26

Graph adapted from: Bureau of Meteorology. (2014). *About the State of the Climate report* (Time series of anomalies in sea-surface temperature and temperature over land in the Australian region). Retrieved June, 2016, from [www.bom.gov.au/state-of-the-climate/](http://www.bom.gov.au/state-of-the-climate/) Used under Creative Commons Attribution 3.0 Australia licence.

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