Government of **Western Australia**
School Curriculum and Standards Authority

ATAR course examination, 2018

Question/Answer booklet

ANIMAL PRODUCTION SYSTEMS

Please place your student identification label in this box

Student number: In figures | | | | | | | | |

In words _____

_____

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.

Ref: 18-006

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	89	50
Section Three Extended answer	3	2	60	40	30
				Total	100

Instructions to candidates

1. The rules for the conduct of the Western Australian external examinations are detailed in the *Year 12 Information Handbook 2018*. Sitting this examination implies that you agree to abide by these rules.

2. 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. Do not use erasable or gel pens. 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.

3. 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.

4. Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

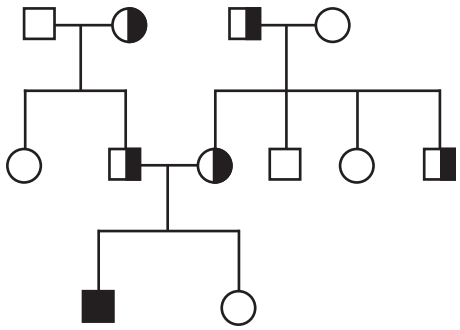
See next page

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. Do not use erasable or gel pens. 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.

Pedigree chart



1. The pedigree chart above shows the pattern of inheritance that can be observed for a trait that is

   (a) recessive.
   (b) heterotic.
   (c) homozygotic.
   (d) dominant.

2. What is the legal term used to describe feed products that cannot be fed to ruminants?

   (a) Prohibited Feed Additives
   (b) Registered Animal Meat Meals
   (c) Banned Ruminant Feeds
   (d) Restricted Animal Material

3. The nutritional values and cost per tonne of lucerne hay and oats are provided below.
   - lucerne hay 17% crude protein, costing $200/tonne
   - oats 12% crude protein, costing $100/tonne

   Use the Pearson Square method to calculate the cost per tonne of a ration requiring 14% crude protein.

   (a) $110
   (b) $120
   (c) $140
   (d) $160

See next page

4. Australia's commitment to biosecurity and food safety is **best** illustrated through the

   (a) Animal Health Statement.
   (b) National Livestock Information System.
   (c) Vendor Declaration.
   (d) Food Security Organisation.

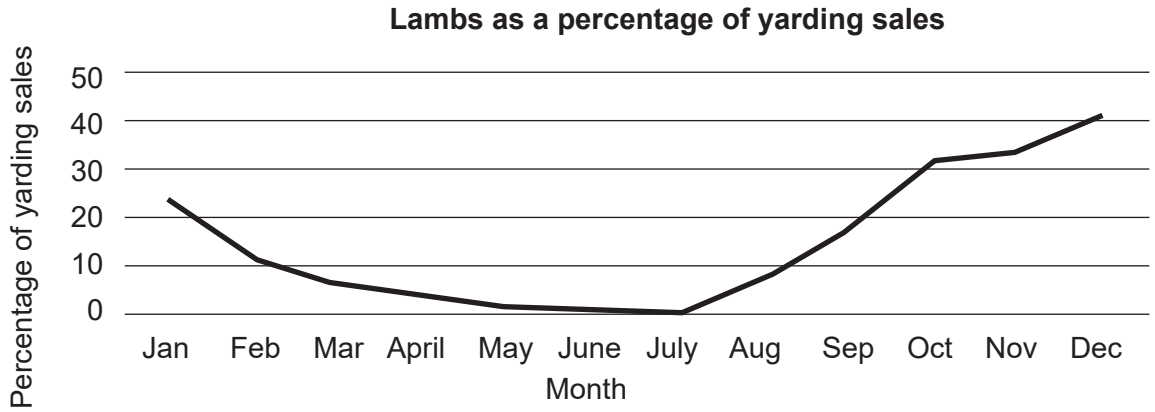
5. The hormone used for the synchronisation of oestrus is

   (a) progesterone.
   (b) prostaglandin.
   (c) gonadotropin.
   (d) follicle stimulating hormone.

6. An effective chemical group to control an internal parasite would be

   (a) a systemic insecticide.
   (b) a residual rodenticide.
   (c) a contact fungicide.
   (d) an insect repellent.

7. The graph below shows lambs as a percentage of yarding sales over the course of a year.



   On the basis of the above graph, the financial returns for feedlotting lambs would probably be **lowest** in

   (a) January – February.
   (b) March – April.
   (c) July – August.
   (d) November – December.

See next page

8. The **most** sustainable short- and long-term option in addressing forecast low seasonal rainfall is to

(a) commence supplementary feeding of animals and plant additional shelter belts.
(b) reduce the number of livestock and increase the cropping area.
(c) change the timing of key livestock practices and purchase additional land.
(d) source additional feed and increase the property's water-holding capacity.

9. Which of the following is true of an agricultural ecosystem compared to a natural ecosystem?

(a) greater species diversification
(b) higher energy input
(c) more genetic variation
(d) increased recycling capability

10. The **most** cost-effective option for conserving biodiversity in a natural ecosystem is to

(a) totally eradicate all non-native predators.
(b) adopt industry-wide organic farming practices.
(c) utilise biological pest control through natural parasites.
(d) ban the application of residual pesticides.

11. The table below shows the price schedule for premium bacon.

	Weight classification		
P2 (fat–mm)	**60.1–75 kg**	**75.1–80 kg**	**80.1–90 kg**
up to12	$3.20	$3.05	$2.40
13–14	$3.05	$2.95	$2.40
15–16	$2.55	$2.60	$2.15
17–18	$2.20	$2.25	$1.95
19+	$1.80	$1.80	$1.80

Calculate the difference in financial return between
- Baconer 1 – 70 kg with a P2 of 10 mm
- Baconer 2 – 85 kg with a P2 of 20 mm

(a) $55
(b) $65
(c) $71
(d) $87

See next page

12. The **most** likely explanation for animals having substantial differences in fat scores at slaughter when managed identically would be

(a) breed influence.
(b) transport issues.
(c) weather factors.
(d) pest resistance.

13. The input that has the **greatest** impact on the profitability of an intensive animal production enterprise's gross margin is

(a) building maintenance.
(b) feed costs.
(c) waste disposal.
(d) insurance cover.

14. The group of additives used to preserve feed are known as

(a) antibiotics.
(b) vitamins.
(c) hormones.
(d) antioxidants.

15. Metabolism of digestive products refers to the

(a) changes the absorbed nutrients undergo during their utilisation by the body.
(b) method by which enzymes are excreted to enable the transmission of protein.
(c) initial process of breaking down complex particles into simple substances.
(d) interrelationship between amino acids and the breakdown of complex carbohydrates.

16. The table below shows the cost and control periods of four external parasite treatments.

External parasite treatments	Cost ($/head)	Control period (days)
One	0.23	30
Two	0.40	60
Three	1.05	90
Four	1.24	120

Refer to the table above to calculate the **most** cost-effective treatment.

(a) One
(b) Two
(c) Three
(d) Four

See next page

17. Which statement **best** represents the use of tariffs in Australian agriculture?

(a) Tariffs are commonly used by the Australian Government to increase our accessibility to export markets.
(b) Tariffs are kept high by the Australian Government to assist our comparative advantage over our trading partners.
(c) Tariffs are significantly reduced by the Australian Government to improve efficiency and market access.
(d) Tariffs are an effective mechanism to encourage competition in local markets.

18. The purpose of a control group is to

(a) eliminate bias within the experimental design.
(b) minimise the effect of the dependent variable.
(c) establish a cause-and-effect relationship.
(d) have a standard measure of comparison.

19. Consumer demand for improved food safety is **best** addressed at the farm level through

(a) government border security policies.
(b) implementing risk avoidance measures.
(c) adopting quality assurance programs.
(d) mechanising farming practices.

20. A high standard deviation from experimental data indicates

(a) possibility of experimental error.
(b) accurate experimental design.
(c) bias toward the independent variable.
(d) data are clustered around the mean.

End of Section One

See next page

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See next page

Section Two: Short answer **50% (89 Marks)**

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

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 90 minutes.

Question 21 **(16 marks)**

A producer has a contract with a poultry processing company. The company annually supplies 800 000 meat bird chicks and all the necessary feed requirements. Historical production records indicate an annual mortality (death) rate of 2%.

The table below shows the gross margin for the meat bird enterprise.

Gross revenue	
Supply of meat birds (contract $0.60 per meat bird)	**(A)**
Variable expenses	
Labour	$210 000
Contract shed cleaning	$13 000
Bedding	$21 000
Waste disposal	$6 000
Maintenance	$11 000
Utilities (water and electricity)	$13 000
Insurance	$9 000
Gross margin	**(B)**
Gross margin per meat bird	**(C)**

(a) (i) Use the information in the table above to calculate (3 marks)

(A) gross revenue: _____

(B) gross margin: _____

(C) gross margin per meat bird: _____

Question 21 (continued)

A serious incident occurs resulting in a substantial number of meat bird deaths in the enterprise.

(ii) Identify a possible reason for the increase in the mortality rate and describe its impact on the economic sustainability of the enterprise. (3 marks)

Possible reason: _____

Impact: _____

_____

_____

_____

(b) Explain **one** short- and **one** long-term strategy to minimise the mortality rate of **any** animal production enterprise. (6 marks)

Short-term strategy: _____

_____

_____

_____

_____

_____

_____

_____

Long-term strategy: _____

_____

_____

_____

_____

_____

_____

_____

(c) Describe **one** benefit and **one** limitation of using gross margins for financial planning purposes. (4 marks)

Benefit: _____

_____

_____

_____

_____

Limitation: _____

_____

_____

_____

_____

_____

Question 22 **(13 marks)**

Animal rights groups are increasing their pressure on the Australian agricultural industry. This has influenced consumer perceptions and their expectations of animal production systems.

(a) State a farming practice that has been investigated closely by an animal rights group and outline the reason for their concern. (3 marks)

Farming practice: _____

Reason: _____

_____

_____

_____

_____

(b) Describe the potential impact that animal rights groups could have on: (4 marks)

a production system. _____

_____

_____

_____

_____

access to global markets. _____

_____

_____

_____

_____

See next page

(c) Describe how each of the following stakeholders can assist in addressing consumers' animal welfare concerns. (6 marks)

Producer: _____

Industry groups: _____

Government: _____

See next page

Question 23 **(15 marks)**

The future of Australia's agriculture depends largely on producers' ability to develop and maintain export markets.

(a) (i) For an animal production system that relies on exports for its ongoing sustainability, list **one**: (3 marks)

export product. _____

export market. _____

major competitor. _____

(ii) For the export product identified in Question 23(a)(i), describe **two** ways in which the Australian industry maintains its global competitiveness. (4 marks)

One: _____

_____

_____

_____

_____

Two: _____

_____

_____

_____

_____

(b) Using an example, explain what is meant by comparative advantage. (4 marks)

(c) Explain, using a relevant example, **one** Australian quarantine strategy that ensures our industry is protected against exotic diseases. (4 marks)

See next page

Question 24 **(15 marks)**

While conducting research to improve production targets, a producer notices an online advertisement for a medicated feed additive 'Profit++'. This product can only be purchased from the United States. The promotional brochure states that a trial was carried out that demonstrated the following increases in production performances:

- daily weight gain: 10%
- feed efficiency: 5%.

(a) (i) Describe a possible legal issue with using 'Profit++' in Australia. (2 marks)

(ii) Based on the information provided about 'Profit++', would you recommend that the producer use this product? Justify your recommendation. (4 marks)

Recommendation: _____

Justification: _____

You have been asked to design and conduct an investigation into the medicated feed additive 'Profit++'.

(b) (i) Write an hypothesis for the proposed trial. (1 mark)

(ii) Describe, using specific examples, **two** aspects of experimental design you would use to minimise possible errors in the results. (4 marks)

One:

Two:

(c) List **one** feed additive and **one** growth promotant used in the Australian livestock industry. Outline how each optimises production. (4 marks)

Feed additive:

Growth promotant:

See next page

Question 25 **(17 marks)**

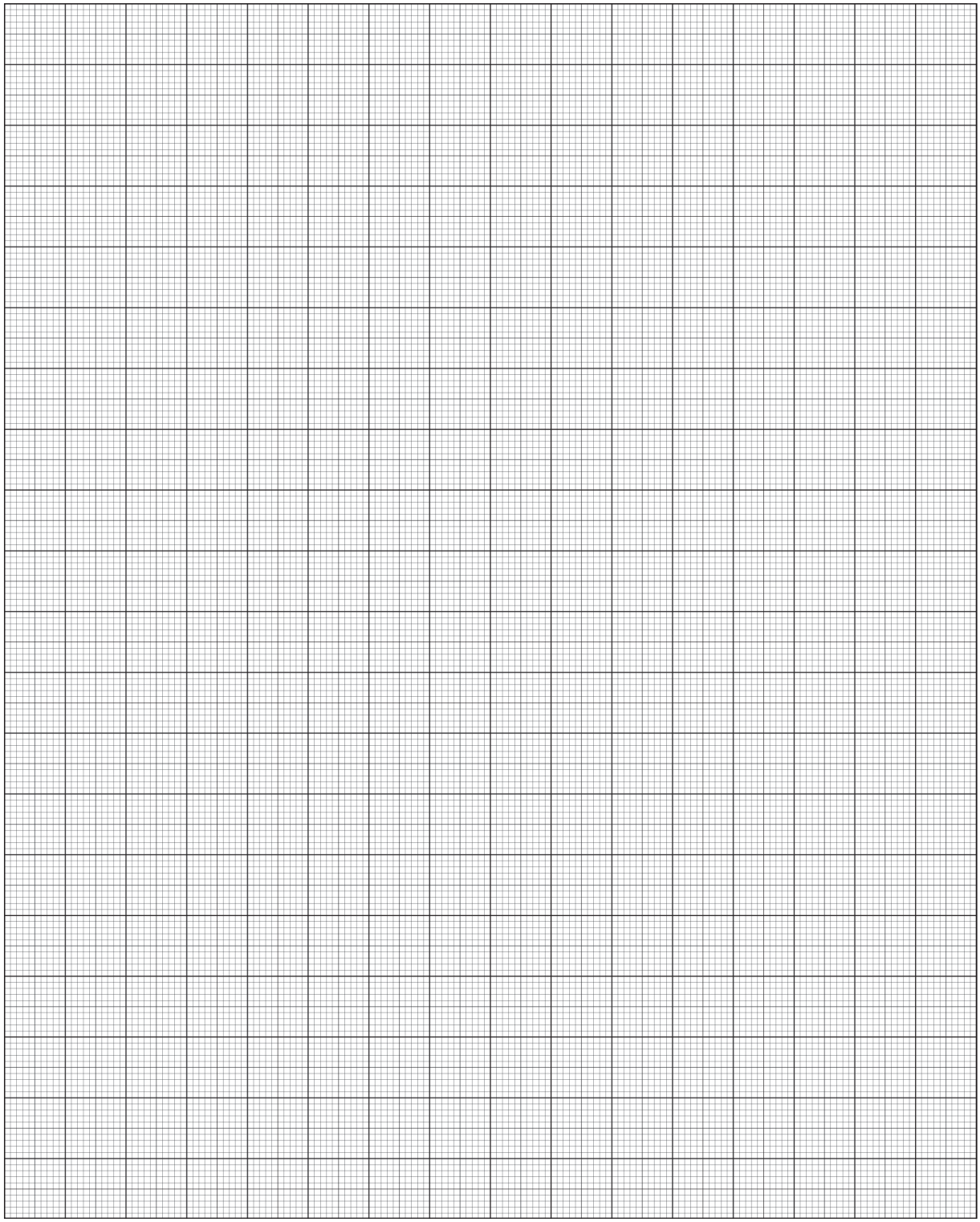
In January, two groups of sheep were drenched with separate chemicals, Drench A and Drench B. All sheep were then placed in a new pasture paddock as one group. Initial faecal worm egg counts (FWEC) were taken prior to drenching and then repeated once a month until July. Results are shown in the table below.

There was a low standard deviation with the monthly FWECs.

	Pest population (FWEC) (eggs per gram)	
Month	**Drench A**	**Drench B**
January	100	100
February	0	500
March	0	700
April	100	1200
May	200	1500
June	500	2900
July	700	3100

(a) (i) Draw a line graph on the grid provided on page 19 to represent the trial data in the above table. (5 marks)

See next page



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

See next page

Question 25 (continued)

(ii) Describe the conclusion you can draw from the graph and the standard deviation. (4 marks)

Graph: _____

_____

_____

_____

_____

Standard deviation: _____

_____

_____

_____

_____

The faecal worm egg count at which management action should be taken is 500 eggs per gram.

(b) (i) Plot the economic threshold line on the graph on page 19. (1 mark)

(ii) Describe how incorrect economic principles of pest and disease control have been applied in this situation. Identify **one** possible consequence of not adhering to these principles. (3 marks)

_____

_____

_____

_____

(c) Define pesticide resistance and outline **two** ways in which a producer could contribute to this issue through poor management practices. (4 marks)

See next page

Question 26 **(13 marks)**

Animal production systems use genetics in order to focus on economically-important traits to improve breed performance.

(a) For an animal breeding program, list an economically-important trait and outline how a producer could measure improvements in this trait. (2 marks)

Heritability estimates of dairy cattle traits

Trait	Heritability
Milk protein %	0.58
Milk fat %	0.58
Incidence of mastitis (bacterial infection)	0.06

(b) Using an example from the table, describe how heritability affects breed performance. (3 marks)

See next page

A fine-wool producer has a breeding goal to lower or maintain fibre diameter while increasing fleece weight. The estimated breeding values of three rams are as follows:

	Fibre diameter		Fleece weight	
	Microns	**Accuracy**	**Grams**	**Accuracy**
Ram 1	+3	90%	+45	75%
Ram 2	0.0	75%	+40	85%
Ram 3	−0.1	55%	+42	52%

(c) (i) Which ram best suits the wool producer's breeding goal? Justify your selection. (3 marks)

(ii) Calculate the estimated increase in fleece weight of the progeny from your recommended ram. (1 mark)

See next page

Question 26 (continued)

(d) Explain, using an example, how you could use information from an animal's pedigree to assist in meeting **one** of the following breeding goals: (4 marks)

☐ Improve enterprise profitability

☐ Meet changing market requirements

(Indicate with a tick the breeding goal on which your answer is based.)

End of Section Two

Section Three: Extended answer **30% (40 Marks)**

This section contains **three** questions. You must answer **two** questions: the compulsory question (Question 27) and **one** of the other questions (Question 28 or Question 29). For Question 27, write your answer in the spaces provided. For Question 28 or Question 29, write your answers on the lined pages following Question 29.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 60 minutes.

Question 27 **(20 marks)**

This compulsory question must refer to **one** animal enterprise you studied during the year.

Animal enterprise: _____ (0 marks allocated)

Sound risk assessment and management practices are very important for enterprise sustainability.

(a) Define ‘duty of care’ in the workplace and state why it is important. Describe **two** practices that people involved in your animal enterprise follow to ensure that their ‘duty of care’ obligations are met. (6 marks)

Question 27 (continued)

(b) Describe **one** economic risk and **one** climate change risk that could affect the sustainability of your animal enterprise. Explain the mitigation strategies used to manage these risks. (10 marks)

Economic risk: _____

Economic mitigation strategy: _____

Climate change risk: _____

Climate change mitigation strategy: _____

See next page

(c) Discuss how a new technology could be used to improve the sustainability of your animal enterprise. (4 marks)

See next page

Question 28 **(20 marks)**

Animal breeding technologies play an important role in the production system.

(a) Explain how **two** different breeding technologies can be used to improve animal enterprise performance. Describe **one** potential ethical issue associated with breeding technologies. (8 marks)

(b) Explain the processes involved in implementing a successful breeding technology in an animal production system, including:
- establishing breeding goals
- hormone manipulation of oestrus
- management of breeding animals. (12 marks)

or

Question 29 **(20 marks)**

It is essential that producers have knowledge of an animal's digestive system.

(a) Explain the function of both the gastric and microbial digestive systems. Discuss how a producer can assist an animal's effective use of protein and energy for **one** of these digestive systems. (11 marks)

(b) For a stated market, explain the feeding strategies a producer could implement to:
- meet specified market requirements
- avoid product variations. (9 marks)

End of questions

Question number: _____

Question number: _____

Question number: _____

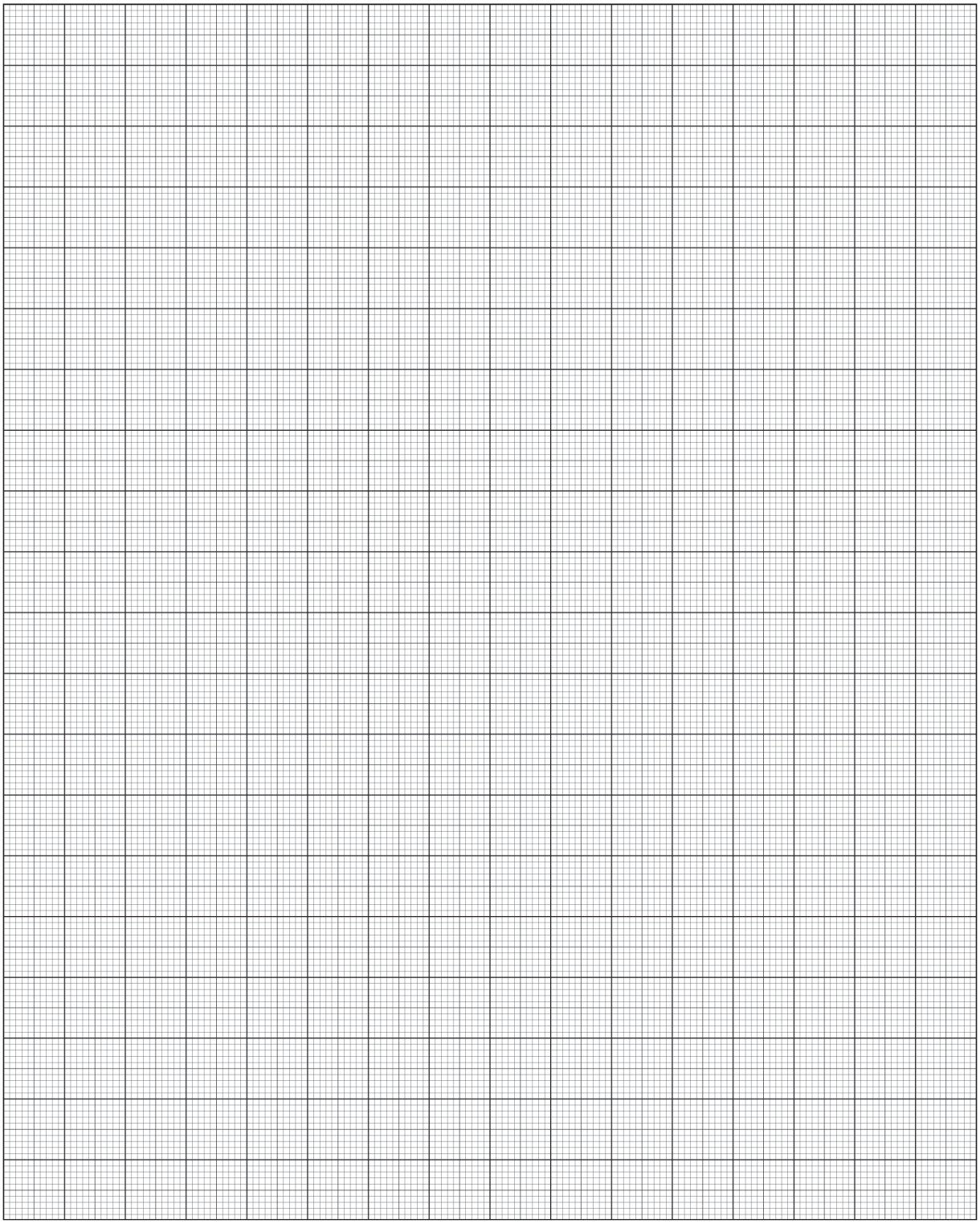
Question number: _____

Question number: _____

Supplementary page

Question number: _____

Spare grid



ACKNOWLEDGEMENTS

Question 1 Pedigree chart from: *Biology 110 Fall 2012: Pedigree analysis* (Figure: The pattern of inheritance […]). (2012). Retrieved May, 2018, from https://wikispaces.psu.edu/display/Biology/Pedigree+Analysis

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