

2014 HSC Agriculture Marking Guidelines

Section I, Part A

Multiple-choice Answer Key

Question	Answer
1	A
2	B
3	B
4	A
5	D
6	D
7	C
8	B
9	C
10	D
11	C
12	B
13	D
14	C
15	B
16	D
17	B
18	A
19	A
20	C

Section I, Part B

Question 21 (a)

Criteria	Marks
• Outlines an effect of the named soil degradation problem on agricultural production	2
• Makes a relevant point	1

Sample answer:

Soil compaction results in reduced plant growth due to root growth being impeded and so the plant has less access to water and nutrients.

Question 21 (b)

Criteria	Marks
• Explains how a farming practice can lead to the identified soil degradation problem	2
• Identifies a farming practice which can lead to a soil degradation problem	1

Sample answer:

Continuous cultivation with heavy machinery compresses the soil particles. This results in a layer of compacted soil below the soil surface.

Question 21 (c)

Criteria	Marks
• Describes procedures to alleviate or prevent the named soil degradation problem	4
• Describes a procedure to alleviate or prevent the named soil degradation problem and identifies a second method OR • Outlines at least two procedures to alleviate or prevent the named problem	3
• Identifies procedures to prevent or rehabilitate degraded soil OR • Describes a procedure to alleviate or prevent the named problem	2
• Identifies a procedure to alleviate or prevent the named problem	1

Sample answer:

Soil compaction can be prevented by adopting minimum tillage techniques. This reduces the amount of compaction by limiting the number of times heavy machinery passes over the soil.

Compacted soils can be rehabilitated by first deep ripping them with a tined cultivator and then increasing the organic matter content of the soil to improve the soil structure.

Question 22 (a)

Criteria	Marks
• Outlines an effect of the named pest/disease on the productivity of a plant or animal system	2
• Identifies an effect of a pest/disease on plants or animals	1

Sample answer:

Fruit fly larvae spoil fruit, lowering the fruit's value and the fruit grower's productivity.

Question 22 (b)

Criteria	Marks
• Provides characteristics and features of an IPM program for a named pest/disease	4
• Sketches in general terms the main features and components of an IPM program for a named pest/disease	3
• Identifies some components of an IPM program OR • Outlines a component of an IPM program	2
• Identifies a component of an IPM program	1

Sample answer:

Components of an integrated pest management program to control fruit fly in stone fruit, include:

- Monitoring populations – The use of traps to identify when fruit flies are active.
- Physical barriers – Place fruit fly netting over trees to stop the fruit fly getting to the fruit.
- Chemical control – Use fruit fly sprays on the trees.
– Use insecticide-impregnated baits.
- Biological – The breeding and release of sterile male fruit flies.
- Cultural – Destroy any fruit fly infested fruit.

Question 23 (a)

Criteria	Marks
• Correctly identifies both terms	2
• Correctly identifies one term	1

Sample answer:

- (i) Faeces
- (ii) Metabolisable

Question 23 (b)

Criteria	Marks
<ul style="list-style-type: none"> Comprehensively describes the differences in monogastric and ruminant digestion for both protein AND carbohydrate 	6
<ul style="list-style-type: none"> Describes the major differences in monogastric and ruminant digestion for protein AND carbohydrate 	4–5
<ul style="list-style-type: none"> Describes the major differences between monogastric and ruminant digestion in terms of protein OR carbohydrate OR <ul style="list-style-type: none"> Provides some differences between monogastric and ruminant digestion of protein AND carbohydrate 	2–3
<ul style="list-style-type: none"> Identifies a difference between monogastric and ruminant digestion in terms of carbohydrate OR protein 	1

Sample answer:

Ruminant animals utilise carbohydrates by the process of fermentation in the rumen. Microbes in the rumen break down complex carbohydrates such as cellulose and starches, producing volatile fatty acids. These are absorbed by the animal and used directly as an energy source. One disadvantage of this system is that some dietary energy is utilised by the microbes and some is lost due to the production of CO₂ and methane.

Monogastric animals directly digest the food in their stomach, and in this system less energy is lost. They are unable to use cellulose in the diet, meaning they need diets based on grains or other high-energy foods.

The microbes in the gut of ruminants are able to synthesise amino acids from non-protein nitrogen sources in the diet. They also synthesise all the amino acids from those present in the diet. This means ruminant animals don't need 'essential' amino acids in their diets.

Monogastric animals must have all the essential amino acids present in their diet. Other nitrogen sources in the diet cannot be used to make protein.

Question 24 (a)

Criteria	Marks
• Correctly identifies the effect of both hormones on the plant	2
• Correctly identifies the effect of one hormone on the plant	1

Answers could include:

<i>Plant Hormone</i>	<i>Effect on the plant</i>
Ethylene	<ul style="list-style-type: none"> • Stimulation of fruit ripening • Breaking of dormancy • Stimulates root shoot growth • Stimulates flower opening • Stimulates leaf and flower senescence
Gibberellins	<ul style="list-style-type: none"> • Can cause seedless fruits • Breaks seed dormancy in some plants • Stimulates stem elongation

Question 24 (b)

Criteria	Marks
• Comprehensively explains how management techniques can be used to overcome environmental constraints and uses relevant examples	6
• Provides some explanation of how management techniques can be used to overcome environmental constraints using at least one example	4–5
• Explains how a management technique can overcome an environmental constraint OR • Identifies a constraint to production and a management technique to overcome it OR • Outlines a constraint OR technique AND uses an example	2–3
• Identifies a constraint to production or a relevant management technique to overcome it	1

Sample answer:

A lack of water is a major constraint in Australian agriculture. Irrigation is used widely to grow crops in arid environments. The application of additional water relieves water stress on the plants and increases crop productivity.

Some horticultural crops are susceptible to cold, and growth is slowed or plants are killed. Using heated greenhouses allows plants to be grown at their optimum temperature and therefore improve yield. Greenhouse protection can also allow crops to be grown out of season and so ensure high prices are achieved for the crop.

Question 25 (a)

Criteria	Marks
• Provides a detailed justification of AI as a technique for manipulating reproduction	5
• Outlines reasons for using or not using AI	4
• Outlines a reason to use or not to use AI	3
• Provides an outline of AI as a reproductive technique	2
• Identifies a feature of AI	1

Sample answer:

AI is a good technique for manipulating reproduction in farm animals. Compared to natural mating, AI can be performed without the male animal being present on a farm. A farmer can buy in straws of semen of one or more male animals to inseminate females. This means that a farmer has total control over the lineage of the offspring. Alternatively a farmer could use different sires that best suit the dam being inseminated resulting in the desired traits being passed to the offspring. Semen can be frozen thus allowing it to be imported from other countries. This gives farmers access to a much wider range of male genotypes.

Question 25 (b)

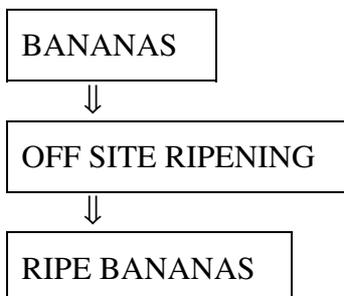
Criteria	Marks
• Provides a detailed explanation, with an example, of how objective measurement is used to select breeding stock	5
• Provides some explanation, with an example, of how objective measurement is used to select breeding stock	4
• Provides a description of how objective measurement is used to select breeding stock	3
• Provides an outline of objective measurement OR a breeding program	2
• Identifies a feature of objective measurement OR a breeding program	1

Sample answer:

Objective measurement is used by farmers in order to select breeding stock. Farmers could use objective measurements and give them a value as in the case of EBVs (Estimated Breeding Values) used in a breed-plan. Here values are used to decide what sire or dam traits are required and they are bred with the relevant partner. Their offspring's value can be calculated and thus over time these measurements can be continually used to obtain breeding stock for the trait required eg calving, birth weight, 400 day weight etc.

Question 26 (a)

Criteria	Marks
• Identifies both a processing step AND a consumer product	2
• Identifies either a processing step OR a consumer product	1

Sample answer:**Question 26 (b)**

Criteria	Marks
• Clearly explains the relationship between the timing of a named farm operation and the influence on a specific aspect of product quality or quantity	4
• Shows the relationship between the timing of a named farm operation and the influence on product quality or quantity in general terms	3
• Identifies a farm operation and makes a tenuous link to product quality or quantity	2
• Identifies a farm operation OR an aspect of product quality or quantity	1

Sample answer:

Once the bananas on the bell have emerged and the flowers have fallen off, the hands are thinned out, insecticide is sprayed onto them and bags are placed over the bananas. This is to ensure that the hands have ample room to grow and that no pest such as flying foxes or birds can damage the fruit leaving skin marks, which will reduce the quality of the fruit.

Question 26 (c)

Criteria	Marks
• Outlines a marketing strategy and makes a judgement on its effectiveness in promoting the product to consumers	4
• Outlines a marketing strategy and makes a tenuous link to promotion of the product to consumers	3
• Outlines a marketing strategy OR outlines an aspect of promotional effectiveness	2
• Identifies a marketing strategy OR identifies an aspect of promotional effectiveness	1

Sample answer:

One strategy used to promote bananas is the television advertising campaign “Na Na Na Na – Make your body sing”. This strategy has been effective in increasing consumer awareness of bananas as a nutritious, healthy food product. As a result, sales of bananas have increased and more people are eating them.

Question 27 (a)

Criteria	Marks
<ul style="list-style-type: none"> Clearly outlines how identified financial circumstances can affect farm profitability 	4
<ul style="list-style-type: none"> Identifies financial circumstances affecting farm profitability and outlines the impact that one will have on farm profitability 	3
<ul style="list-style-type: none"> Identifies financial circumstances affecting farm profitability OR <ul style="list-style-type: none"> Outlines how a financial circumstance affects farm profitability 	2
<ul style="list-style-type: none"> Identifies a financial circumstance affecting farm profitability OR an effect of financial pressure on farms 	1

Sample answer:

Off-farm financial circumstances which can affect farm profitability include high or variable interest rates and poor prices paid for agricultural commodities.

High interest rates affect farm profitability by reducing the amount of money a farmer can afford to borrow, and so reducing the ability to invest in new and more efficient equipment.

Poor prices paid for agricultural goods directly affect profitability by reducing farm income regardless of the costs of production.

Answers could include:

- Costs of inputs
- Prices of alternative products
- Regulation changes requiring expensive compliance
- Currency exchange rates
- Low interest rates
- High commodity prices

Question 27 (b)

Criteria	Marks
<ul style="list-style-type: none"> Comprehensively assesses at least two relevant financial techniques 	6
<ul style="list-style-type: none"> Comprehensively assesses one relevant financial technique AND outlines one other or names one other 	4–5
<ul style="list-style-type: none"> Assesses the effectiveness of a relevant financial technique OR <ul style="list-style-type: none"> Outlines a financial technique OR <ul style="list-style-type: none"> Names two relevant financial techniques 	2–3
<ul style="list-style-type: none"> Names a relevant financial technique 	1

Sample answer:

Gross margins are one way of successfully analysing the performance of individual farm enterprises. This involves calculating the gross income from the sale of enterprise outputs and then subtracting the total variable costs of production of the enterprise. This is then related to a unit of input, such as per hectare. Gross margins allow farmers to compare the performance of enterprises with others that use similar inputs on their farm or with other farms in their locality.

Return on investment is a measure of the income received from the sale of all farm outputs expressed as a percentage of the money invested in the farm. It does not allow comparisons between enterprises to be made but is useful in determining the overall financial performance of the farm.

Section II

Question 28 (a) (i)

Criteria	Marks
• States a conclusion AND a recommendation from the research	2
• States a conclusion OR a recommendation from the research	1

Answers could include:

Any relevant conclusion and recommendation from the research.

Question 28 (a) (ii)

Criteria	Marks
<ul style="list-style-type: none"> • Identifies the key components of good experimental design from the trial using specific examples • Gives a comprehensive explanation of how each design component contributes to accuracy of the results • Links the results obtained to making valid conclusions 	6
<ul style="list-style-type: none"> • Identifies the key components of good experimental design from the trial using specific examples • Gives an explanation of how each design component contributes to accuracy of the results or validity of conclusions 	4–5
<ul style="list-style-type: none"> • Uses examples to identify the key components of good experimental design from the trial 	2–3
<ul style="list-style-type: none"> • Makes a relevant point from the research study 	1

Answers could include:

Discussion and example of:

- replication
- randomisation
- standardisation
- control

in the research study.

Question 28 (b)

Criteria	Marks
<ul style="list-style-type: none"> Comprehensively describes a biotechnology AND its effect on production AND describes an ethical issue related to its use Provides a logical and coherent response throughout Uses relevant agricultural examples 	10–12
<ul style="list-style-type: none"> Describes a biotechnology AND its effect on production AND describes an ethical issue related to its use Provides a logical and coherent response Uses relevant agricultural examples 	7–9
<ul style="list-style-type: none"> Describes a biotechnology AND its effect on production OR describes an ethical issue related to its use Provides an organised response Includes some examples 	4–6
<ul style="list-style-type: none"> Describes a biotechnology OR the effect of a biotechnology on production OR describes an ethical issue related to the use of a biotechnology May include an example <p>OR</p> <ul style="list-style-type: none"> Identifies a biotechnology AND identifies an effect of the biotechnology on production AND identifies an ethical issue related to the use of the biotechnology 	1–3

Answers could include:

- GMOs (eg cotton, canola)
- biofuels
- bio pesticides
- vaccines
- gene markers (eg Genestar)
- rumen modification
- sperm testing and/or sexing
- embryo splitting and/or sexing
- cloning

Question 29 (a) (i)

Criteria	Marks
• States a conclusion AND a recommendation from the research	2
• States a conclusion OR a recommendation from the research study	1

Answers could include:

Any relevant conclusion and recommendation from the research.

Question 29 (a) (ii)

Criteria	Marks
<ul style="list-style-type: none"> • Identifies the key components of good experimental design from the trial using specific examples • Gives a comprehensive explanation of how each design component contributes to accuracy of the results • Links the results obtained to making valid conclusions 	6
<ul style="list-style-type: none"> • Identifies the key components of good experimental design from the trial using specific examples • Gives an explanation of how each design component contributes to accuracy of the results or validity of conclusions 	4–5
<ul style="list-style-type: none"> • Uses examples to identify the key components of good experimental design from the trial 	2–3
<ul style="list-style-type: none"> • Makes a relevant point from the research study 	1

Answers could include:

Discussion and examples of:

- replication
- randomisation
- standardisation
- control

in the research study.

Question 29 (b)

Criteria	Marks
<ul style="list-style-type: none"> • Assesses strategies available to farmers to manage climate variability • Provides a logical and coherent response throughout • Uses relevant agricultural examples 	10–12
<ul style="list-style-type: none"> • Discusses strategies available to farmers to manage climate variability • Provides a logical and coherent response • Uses relevant agricultural examples 	7–9
<ul style="list-style-type: none"> • Describes strategies available to farmers to manage climate variability • Provides an organised response • Uses a relevant agricultural example 	4–6
<ul style="list-style-type: none"> • Identifies strategies available to farmers to manage climate variability • May include an example 	1–3

Answers could include:

Strategies:

- plant breeding
- improved irrigation practices
- timing of planting
- soil moisture conservation
- extended fallows
- retaining crop residues
- moisture monitoring
- crop density
- grazing strategies
- stocking rates
- shelter or shade trees
- fodder conservation
- new varieties/breeds
- enterprise change
- financial analysis

Question 30 (a) (i)

Criteria	Marks
• States a conclusion AND a recommendation from the research study	2
• States a conclusion OR recommendation from the research study	1

Answers could include:

Any relevant conclusion and recommendation from the research.

Question 30 (a) (ii)

Criteria	Marks
<ul style="list-style-type: none"> • Identifies the key components of good experimental design from the trial using specific examples • Gives a comprehensive explanation of how each design component contributes to accuracy of the results • Links the results obtained to making valid conclusions 	6
<ul style="list-style-type: none"> • Identifies the key components of good experimental design from the trial using specific examples • Gives an explanation of how each design component contributes to accuracy of the results or validity of conclusions 	4–5
<ul style="list-style-type: none"> • Uses examples to identify the key components of good experimental design from the trial 	2–3
<ul style="list-style-type: none"> • Makes a relevant point from the research study 	1

Answers could include:

Discussion and example of:

- replication
- randomisation
- standardisation
- control

in the research study.

Question 30 (b)

Criteria	Marks
<ul style="list-style-type: none"> Comprehensively describes a new technological development AND its effect on production AND issues related to its application Provides a logical and coherent response throughout Uses relevant agricultural examples 	10–12
<ul style="list-style-type: none"> Describes a new technological development AND its effect on production AND issues related to its application Provides a logical and coherent response Uses relevant agricultural examples 	7–9
<ul style="list-style-type: none"> Describes a new technological development AND its effect on production OR issues related to its application Provides an organised response Includes some examples OR <ul style="list-style-type: none"> Outlines a new technological development AND outlines an effect on production AND outlines issues related to its application 	4–6
<ul style="list-style-type: none"> Describes a new technological development OR describes the effect of a new technological development on production OR describes issues related to the application of a new technological development May include an example OR <ul style="list-style-type: none"> Identifies a new technological development AND identifies an effect of a new technological development AND identifies an issue related to the application of a new technological development 	1–3

Answers could include:

- Satellite technologies (GPS, satellite, imaging)
- Computer technologies (record keeping, weather forecasting)
- Biotechnologies (GMOS, vaccines, rumen modifiers)
- Electronic identification systems
- Robotics

Agriculture

2014 HSC Examination Mapping Grid

Section I Part A

Question	Marks	Content	Syllabus outcomes
1	1	Outline the phases of growth	H2.1
2	1	Competition in plant communities	H2.1
3	1	Constraints imposed by environmental factors	H1.1
4	1	Reproductive techniques	H2.2
5	1	Describe the chemical characteristics of a soil	H1.1
6	1	Breeding systems and their genetic basis	H2.2
7	1	Chemical and physical characteristics of soil	H1.1
8	1	Factors that limit fertility of farm animals	H2.2
9	1	Value added product	H3.3
10	1	Identify function of root nodules	H2.1
11	1	Supply of and demand for a product	H3.1
12	1	Practices that have contributed to changes in water quality	H1.1
13	1	The collection and analysis of data	H4.1
14	1	Australian land classification	H1.1
15	1	Complex interaction involving problem organisms	H2.1
16	1	Describe physical characteristics of a soil	H1.1
17	1	Chemical and physical characteristics of soil	H1.1
18	1	Present data in an appropriate form	H4.1
19	1	The role of hormones	H2.2
20	1	Use nutritional data to determine the suitability of animal feeds	H2.2

Section I
Part B

Question	Marks	Content	Syllabus outcomes
21 (a)	2	Farming practices that have contributed to soil degradation	H2.1
21 (b)	2	Investigate practices that have lead to one important soil degradation problem	H2.1
21 (c)	4	Investigate practices that have lead to one important soil degradation problem	H2.1
22 (a)	2	Plant OR animal pest/diseases and the productivity of an agriculture system	H2.1, H2.2
22 (b)	4	Integrated pest management	H2.1, H2.2
23 (a)	2	The fate of energy in animal nutrition	H2.2
23 (b)	6	Physiology of ruminant and monogastric digestion	H2.2
24 (a)	2	Plant hormones	H2.2
24 (b)	6	Plant reproduction systems	H2.2
25 (a)	5	Reproductive techniques	H2.1
25 (b)	5	Objective measurement for breeding stock	H2.2
26 (a)	2	Processing raw agricultural commodities	H3.1, H3.4
26 (b)	4	Schedule timing of operations in a product cycle	H3.1, H3.4
26 (c)	4	Marketing strategy	H3.2
27 (a)	4	The impact of financial pressures on farmers	H3.1
27 (b)	6	Techniques to analyse a financial situation	H3.4

Section II

Question	Marks	Content	Syllabus outcomes
28 (a) (i)	2	Analyse a research study in terms of conclusion and recommendation	H4.1
28 (a) (ii)	6	Analyse a research study in terms of design	H4.1
28 (b)	12	Current areas of development in biotechnology	H3.4, H5.1
29 (a) (i)	2	Analyse a research study in terms of conclusion and recommendation	H4.1
29 (a) (ii)	6	Analyse a research study in terms of design	H4.1
29 (b)	12	Management techniques available to farmers in a changing climate	H3.4, H5.1
30 (a) (i)	2	Analyse a research study in terms of conclusion and recommendation	H4.1
30 (a) (ii)	6	Analyse a research study in terms of design	H4.1
30 (b)	12	Current technological developments	H3.4, H5.1