

2015 HSC Agriculture Marking Guidelines

Section I, Part A

Multiple-choice Answer Key

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

Section I, Part B**Question 21 (a)**

Criteria	Marks
• Clearly outlines the relationship between testosterone and male sexual and/or social behaviours	2
• Makes a relevant point relating to the relationship between testosterone and male behaviours	1

Sample answer:

Testosterone controls normal male sexual behaviour, including the desire to mate. It also controls behaviours relating to aggression and dominance.

Question 21 (b)

Criteria	Marks
• Clearly explains at least one impact of crossbreeding on an animal production system	2
• Makes a relevant point relating to crossbreeding in animal production systems	1

Sample answer:

Crossbreeding can improve productivity in beef cattle by producing calves that have superior growth rates and/or carcass characteristics than the parent breeds.

Answers could include:

- Heterosis
- Hybrid vigour.

Question 21 (c)

Criteria	Marks
• Clearly describes the effects of two factors that affect fertility	4
• Identifies two factors that affect fertility AND describes one of them	3
• Identifies two factors affecting fertility OR • Describes how one factor affects fertility	2
• Identifies a factor affecting fertility	1

Sample answer:

High temperatures may reduce the libido and sperm count in male animals, which reduces their reproductive capacity. Poor nutrition during pregnancy may result in high rates of still births and /or the birth of small weak offspring that have a reduced chance of survival.

Answers could include:

- Daylength
- Diseases
- Management factors
- Age.

Question 22 (a)

Criteria	Marks
• Clearly describes the relationship between soil organic matter and a soil physical characteristic	2
• Makes a relevant point about the relationship between organic matter and a soil physical characteristic	1

Sample answer:

Organic matter cements or binds the sand, silt and clay particles together to form aggregates. It is the aggregates which give the soil structure.

Answers could include:

- Water-holding capacity
- Nutrient-holding capacity.

Question 22 (b)

Criteria	Marks
<ul style="list-style-type: none"> Clearly explains how conservation tillage assists in maintaining soil chemical and/or physical fertility 	4
<ul style="list-style-type: none"> Provides some detail regarding the relationship between conservation tillage and soil fertility 	3
<ul style="list-style-type: none"> Outlines an impact of conservation tillage on soil fertility OR <ul style="list-style-type: none"> Describes conservation tillage 	2
<ul style="list-style-type: none"> Makes a relevant point relating to conservation tillage 	1

Sample answer:

Conservation tillage assists in maintaining soil fertility by decreasing the destruction of soil aggregates that occurs when soils are cultivated repeatedly. It also assists in maintaining soil organic matter levels, thus assisting in the development of soil structure and improving the nutrient and water-holding capacity of the soil.

Answers could include:

- Nutrient cycling
- Biological activity.

Question 23 (a)

Criteria	Marks
<ul style="list-style-type: none"> Clearly explains how soil texture influences the water-holding capacity of soils 	2
<ul style="list-style-type: none"> Makes a relevant point regarding soil texture and the water-holding capacity of soils 	1

Sample answer:

Clay soils have a greater water-holding capacity than sandy soils due to their greater total volume of pore spaces between the soil particles. The smaller pores in clay soils also hold water more strongly against the force of gravity.

Question 23 (b)

Criteria	Marks
<ul style="list-style-type: none"> Clearly explains how land capability assessment enhances sustainability by matching land use to the capacity of the land 	6
<ul style="list-style-type: none"> Makes some links between land capability assessment and the sustainability of farms 	4–5
<ul style="list-style-type: none"> Outlines how land capability assessment can be used to improve sustainability 	2–3
OR	
<ul style="list-style-type: none"> Describes a land capability assessment system 	1
<ul style="list-style-type: none"> Makes a relevant point relating to land capability assessment 	

Sample answer:

Land capability assessment involves using a classification system to gain knowledge regarding the suitability of a piece of land for particular agricultural activities and to identify land that is not suitable for farming.

The five-class system that has been developed by the NSW DPI evaluates the physical, social and historical factors that pertain to the land under investigation. The resulting land class placed on the land (from 1-5) indicates the range of agricultural practices that can safely be carried out on that land. For example, only land classified as class 1 or 2 can be cultivated regularly. Cultivation of land classified 3 or more is likely to lead to erosion problems. Hence land classification systems enhance sustainability by ensuring that land use is closely matched to the capacity of the land to withstand detrimental effects associated with farming.

Question 24 (a)

Criteria	Marks
<ul style="list-style-type: none"> Clearly explains the role of both a control and standardisation of conditions in experimental design 	4
<ul style="list-style-type: none"> Explains the role of either a control or standardisation AND describes the other 	3
<ul style="list-style-type: none"> Explains the role of a control OR standardisation in experimental design 	2
OR	
<ul style="list-style-type: none"> Describes both a control and standardisation 	1
<ul style="list-style-type: none"> Describes a control OR standardisation 	

Sample answer:

A control in an experiment is a treatment where there is no experimental treatment applied or where industry standard conditions are used. A control is used to provide a basis for comparing the treatments in the trial.

Standardisation of conditions involves controlling all experimental variables other than the one under investigation. This is important to help ensure that any differences observed between the treatment groups are due to the variable being investigated and not some other factor.

Question 24 (b)

Criteria	Marks
<ul style="list-style-type: none"> Describes an experiment about plant density AND outlines how a control, randomisation, replication and standardisation were incorporated into it 	6
<ul style="list-style-type: none"> Describes an experiment about plant density AND outlines how some features of good experimental design were incorporated into it 	4–5
<ul style="list-style-type: none"> Describes how an experiment relating to plants was conducted OR <ul style="list-style-type: none"> Identifies the four key components of good experimental design 	2–3
<ul style="list-style-type: none"> Identifies some components of good experimental design OR <ul style="list-style-type: none"> Makes a relevant point relating to a trial about plants 	1

Sample answer:

- The aim of the experiment
- A detailed description of the experiment
- How a control, replication, randomisation and standardisation were incorporated into the design.

Question 25 (a)

Criteria	Marks
<ul style="list-style-type: none"> Clearly makes a link between breeding new plants and a plausible reason for doing so 	4
<ul style="list-style-type: none"> Provides some details about the necessity for plant breeding programs 	3
<ul style="list-style-type: none"> Outlines why plant breeding programs are necessary OR <ul style="list-style-type: none"> Describes a plant breeding program 	2
<ul style="list-style-type: none"> Makes a relevant point relating to plant breeding programs 	1

Sample answer:

Plant breeding programs are necessary to enable crop yields to be maintained or improved in response to variable environmental conditions. Many crop-growing regions in Australia have low and variable rainfall patterns. It is likely that this will become a bigger problem as our climate changes. Hence, in order to maintain production it will be necessary to have access to crop varieties that are more tolerant of water stress and higher temperatures in the future.

Answers could include:

- Pest/disease resistance
- Quality criteria for new markets
- Salinity/acidity tolerance
- World population growth.

Question 25 (b)

Criteria	Marks
<ul style="list-style-type: none"> Explains in detail the advantages AND disadvantages of hybrid plant varieties 	6
<ul style="list-style-type: none"> Explains advantages OR disadvantages of hybrid plant varieties AND Outlines the other one 	4–5
<ul style="list-style-type: none"> Outlines the advantages and disadvantages of hybrid plant varieties OR Outlines the advantages OR disadvantages of hybrid plant varieties 	2–3
<ul style="list-style-type: none"> Makes a relevant point about hybrid plant varieties 	1

Sample answer:

The advantages of hybrid plant varieties include:

- Increased pest/disease resistance
- Increased yields
- Greater uniformity in things such as maturity dates, germination rates.

The disadvantages of hybrid plant varieties include:

- The cost of the seed is very high
- Farmers must purchase new seed every year
- There is a danger of a loss of genetic diversity in crops occurring.

Question 26 (a)

<ul style="list-style-type: none"> Clearly outlines a strategy to market the farm product 	2
<ul style="list-style-type: none"> Identifies a strategy to market the farm product 	1

Sample answer:

A dairy farmer can market milk via a contract selling arrangement with a milk processing company. The contract is based on the volume and quality of the milk supplied.

Question 26 (b)

Criteria	Marks
<ul style="list-style-type: none"> Describes in detail at least two ways the named product can be value added 	4
<ul style="list-style-type: none"> Describes a method of value adding to the named product AND identifies another 	3
<ul style="list-style-type: none"> Identifies two ways that the named product can be value added OR <ul style="list-style-type: none"> Describes a way that the named product can be value added 	2
<ul style="list-style-type: none"> Identifies a consumer product made from the named farm product 	1

Sample answer:

Whole milk can be value added by:

- Processing it to make it more suitable for human consumption. This could include pasteurisation, homogenisation and packaging into plastic bottles
- Milk can also be processed into a wide range of consumer products such as cheeses, yoghurt and ice cream.

Answers could include:

- Flavoured milks
- Powdered milk
- Fat-reduced milk.

Question 26 (c)

Criteria	Marks
<ul style="list-style-type: none"> Describes in detail factors that affect supply AND demand for the named farm product 	4
<ul style="list-style-type: none"> Describes a factor that affects supply OR demand and identifies a factor affecting the other one 	3
<ul style="list-style-type: none"> Identifies factors affecting demand OR supply for the named farm product OR <ul style="list-style-type: none"> Describes a factor affecting supply OR demand for the named farm product 	2
<ul style="list-style-type: none"> Identifies a factor affecting either supply OR demand for the named product 	1

Sample answer:

Climatic conditions such as long-term drought can affect the supply of milk by causing a feed shortage. Cows produce less milk when the quantity and/or quality of their food are limited. Demand for milk is driven by consumer preferences. The overall demand for drinking milk is relatively stable as it is regarded as a staple part of our diets. However, the demand for specialty milks is affected by consumer dietary preferences. A2 milk, for example, is in demand by people who cannot tolerate the proteins in standard milk.

Question 27 (a)

Criteria	Marks
• Identifies a recent technology and clearly links it to improvements in the production OR marketing of agricultural products	4
• Identifies a recent technology and outlines how it improves production OR marketing of agricultural products	3
• Describes a recent production OR marketing technology	2
• Identifies recent production OR marketing technology	1

Sample answer:

The introduction of fruit fly exclusion nets in stone fruit production has eliminated the need for the application of costly insecticides. This has allowed farmers to produce and sell high quality fruit that has no insecticide residues. It also assists in the production of organic fruit and thus opens up additional high value marketing options.

Answers could include:

- Online marketing
- A2 milk production
- Smartphone apps.

Question 27 (b)

Criteria	Marks
• Provides detailed points for AND against contract selling as a marketing strategy	4
• Describes a point for OR against contract selling as a marketing strategy AND identifies a point for the opposite view	3
• Identifies points for and/or against contract selling as a marketing strategy	2
• Identifies a point for or against contract selling as a marketing strategy	1

Sample answer:

An advantage of contract selling when marketing a product is that it allows a fixed price to be negotiated before the product is harvested. This allows farmers to budget ahead based on an expected income.

A disadvantage of contract selling is that if a farmer is unable to supply the contracted amount of product they may be faced with a price penalty or loss of future contracts.

Answers could include:

- Price changes after the contract is signed.

Section II

Question 28 (a) (i)

Criteria	Marks
• Outlines the role of biosecurity	2
• Makes a relevant point relating to biosecurity	1

Sample answer:

The role of biosecurity is to ensure that plant and animal production is not affected by pests and diseases. This can be achieved by quarantine at Australian borders, restrictions of movement of animals or plant material across regions and tracking systems for the movement of livestock.

Question 28 (a) (ii)

Criteria	Marks
• Describes in detail methods used to produce biofuels in Australia	6
• Outlines methods used to produce biofuels in Australia	4–5
• Describes ONE method of producing biofuel in Australia	2–3
• Makes a relevant point relating to biofuels	1

Sample answer:

There are many methods used to produce biofuels in Australia. One method is fermentation and distillation to produce ethanol. Grains or sugar are mixed in water and nutrients and then fermented by yeast, which produces ethanol as a by-product. Ethanol is extracted from the resulting liquid by distillation.

Another method is trans-esterification of vegetable oil to make biodiesel. Vegetable oil is extracted from oilseeds such as canola, or collected from waste cooking oil. The vegetable oil is reacted with an alcohol to form glycerol and esters of the fatty acids. This is separated to make biodiesel.

Question 28 (b)

Criteria	Marks
<ul style="list-style-type: none"> • Demonstrates extensive knowledge and deep understanding of the use and implications of genetically modified crops • The response is logical and cohesive throughout • Uses relevant examples which are current to Australian agriculture to support the answer • Comprehensively discusses the uses and implications of genetically modified crops 	10–12
<ul style="list-style-type: none"> • Demonstrates knowledge and understanding of the use and implications of genetically modified crops • The response is mainly logical and cohesive • Identifies relevant and current examples • Provides some discussion of the uses and implication of genetically modified crops 	7–9
<ul style="list-style-type: none"> • Demonstrates limited knowledge and understanding of the use OR implications of genetically modified crops • The response is organised • Identifies some examples • Outlines the use OR implications of genetically modified crops 	4–6
<ul style="list-style-type: none"> • Identifies some issues related to the use of genetically modified crops OR • Makes a relevant point 	1–3

Answers could include:

- BT cotton to combat Helicoverpa
- Round-up ready canola
- Legal implications of using a GM crop
- Sacrificial crop to avoid pest resistance to the GM gene
- Passing GM traits on to non GM crops
- Increase yield due to pest control
- Pest resistance
- Chemical resistance in weeds
- Lower use of insecticides benefiting the environment.

Question 29 (a) (i)

Criteria	Marks
• Outlines the effect of the SOI on climate in Australia	2
• Makes a relevant point relating to the SOI	1

Sample answer:

Southern Oscillation Index values give an indication of dry or wet conditions in eastern and northern Australia.

When SOI values are negative, there is a reduction in winter and spring rainfall. Sustained positive values indicate higher than average rainfall.

Question 29 (a) (ii)

Criteria	Marks
• Describes in detail how nitrogen fertiliser AND intensive ruminant production can contribute to greenhouse gas production	6
• Outlines how nitrogen fertiliser AND intensive ruminant production contribute to greenhouse gas production	4–5
• Describes how nitrogen fertiliser OR intensive ruminant production contributes to greenhouse gas production	2–3
• Makes a relevant point	1

Sample answer:

Nitrogen fertiliser:

Nitrogen fertilisers can be a source for the production of nitrous oxide (a greenhouse gas) when NH_4^+ is converted into NO_3^- and when NO_3^- is converted into N_2 .

Ruminant animals:

Fermentation from microbes found in the rumen produce methane, which is exhaled by the animal. Ruminants eating high quality pastures have an excess of nitrogen, which is excreted as urine, which is a source of nitrous oxide.

Question 29 (b)

Criteria	Marks
<ul style="list-style-type: none"> • Demonstrates extensive knowledge and deep understanding of options available to farmers to maintain production • The response is logical and cohesive throughout • Uses relevant examples which are current to Australian agriculture to support the answer • Comprehensively discusses the options available to farmers to maintain production 	10–12
<ul style="list-style-type: none"> • Demonstrates knowledge and understanding of options available to farmers to maintain production • The response is mainly logical and cohesive • Identifies relevant and current examples • Provides some discussion of the options available to farmers to maintain production 	7–9
<ul style="list-style-type: none"> • Demonstrates limited knowledge and understanding of options available to farmers to maintain production • The response is organised • Identifies some examples • Outlines options available to farmers to maintain production 	4–6
<ul style="list-style-type: none"> • Identifies some issues related to options available to farmers to maintain production <p>OR</p> <ul style="list-style-type: none"> • Makes a relevant point 	1–3

Answers could include:

- Change of enterprise
- Change of crop varieties
- Change of animal breeds
- Improved water catchment and storage
- Improved irrigation technology.

Question 30 (a) (i)

Criteria	Marks
<ul style="list-style-type: none"> • Outlines a reason for research and development of new technologies 	2
<ul style="list-style-type: none"> • Makes a relevant point 	1

Sample answer:

Research is required in the development of new technologies to ensure that they are efficient, safe, economically viable and sustainable.

Question 30 (a) (ii)

Criteria	Marks
• Describes in detail the role of patents AND plant breeders' rights in the research and development of new technologies	6
• Outlines the role of patents AND plant breeders' rights in the research and development of new technologies	4-5
• Describes the role of patents OR plant breeders' rights in the research and development of new technologies	2-3
• Makes a relevant point	1

Sample answer:

There are large costs in the research and development of new technologies. To protect this investment, patents are applied for. This process stops others using the technology without paying a licence fee.

Plant breeders' rights have a similar role to patents but they apply to the genotype of a plant and afford the plant breeder a similar financial protection.

Question 30 (b)

Criteria	Marks
<ul style="list-style-type: none"> • Demonstrates extensive knowledge and deep understanding of the uses and implications of computer technologies in Australian agriculture • The response is logical and cohesive throughout • Uses relevant examples which are current to Australian agriculture to support the answer • Comprehensively discusses the use of technologies such as computers and/or smart devices in Australian agriculture 	10–12
<ul style="list-style-type: none"> • Demonstrates knowledge and understanding of the use and implications of computer technologies in Australian agriculture • The response is mainly logical and cohesive • Identifies relevant and current examples • Provides some discussion of the use of technologies such as computers and/or smart devices in Australian agriculture 	7–9
<ul style="list-style-type: none"> • Demonstrates limited knowledge and understanding of the use and implications of computer technologies in Australian agriculture • The response is organised • Identifies some examples • Outlines the use of technologies such as computers and/or smart devices in Australian agriculture 	4–6
<ul style="list-style-type: none"> • Identifies some issues related to the use of technologies in Australian agriculture <p>OR</p> <ul style="list-style-type: none"> • Makes a relevant point 	1–3

Answers could include:

- Automated control systems
- Alerts and monitoring
- Remote access to control systems
- Cost of purchase and maintenance of technology
- Training
- Reduced labour costs.

2015 HSC Agriculture Mapping Grid

Section I Part A

Question	Marks	Content	Syllabus outcomes
1	1	Physical characteristics of soil	H1.1
2	1	Historical development of land use practices	H1.1
3	1	Pasture production systems	H2.1
4	1	Experimental design	H4.1
5	1	Beneficial relationships between microbes and plants	H2.1
6	1	Role of plant hormones	H2.1
7	1	Ruminant and monogastric digestion	H2.2
8	1	Constraints on plant growth	H2.1
9	1	Constraints on plant growth	H2.1
10	1	Breeding systems and their genetic basis	H2.2
11	1	Host pathogen environment interaction	H2.2
12	1	Plant breeding systems	H2.1
13	1	Gross margins	H3.1
14	1	Interpret a pesticide label	H2.2
15	1	Impact of financial pressures	H3.1
16	1	Calculate a mean	H4.1
17	1	Net assimilation rate	H2.1
18	1	Marketing strategies	H3.1
19	1	Sustainable soil management	H1.1
20	1	Chemical characteristics of soils	H1.1

Section I Part B

Question	Marks	Content	Syllabus outcomes
21 (a)	2	Role of hormones	H2.2
21 (b)	2	Breeding systems	H2.2
21 (c)	4	Factors affecting fertility	H2.2
22 (a)	2	Role of organic matter	H1.1
22 (b)	4	Sustainable soil management	H1.1
23 (a)	2	Physical characteristics of soils	H1.1
23 (b)	6	Whole farm planning	H1.1
24 (a)	4	Experimental design	H4.1
24 (b)	6	Perform a first hand investigation on density Experimental design	H2.1 H4.1

Question	Marks	Content	Syllabus outcomes
25 (a)	4	Plant breeding systems	H2.1
25 (b)	6	Plant breeding systems	H2.1
26 (a)	2	Marketing strategies	H3.1 H3.2
26 (b)	4	Value adding	H3.3
26 (c)	4	Supply and demand for a product	H3.1
27 (a)	4	Impact of technology	H3.3
27 (b)	4	Marketing strategies	H3.2

Section II

Question	Marks	Content	Syllabus outcomes
28 (a) (i)	2	Role of biosecurity	H5.1
28 (a) (ii)	6	Biofuel production	H5.1
28 (b)	12	Benefits and problems ... genetic engineering	H5.1
29 (a) (i)	2	Causes of climate variability	H3.4
29 (a) (ii)	6	Changes in climate ... human activity	H5.1
29 (b)	12	Management techniques available	H3.4
30 (a) (i)	2	Reasons for adopting technologies	H5.1
30 (a) (ii)	6	Issues relating to research and development	H5.1
30 (b)	12	Developments in agricultural technologies	H5.1