



2011 Agriculture HSC Examination 'Sample Answers'

When examination committees develop questions for the examination, they may write 'sample answers' or, in the case of some questions, 'answers could include'. The committees do this to ensure that the questions will effectively assess students' knowledge and skills.

This material is also provided to the Supervisor of Marking, to give some guidance about the nature and scope of the responses the committee expected students would produce. How sample answers are used at marking centres varies. Sample answers may be used extensively and even modified at the marking centre OR they may be considered only briefly at the beginning of marking. In a few cases, the sample answers may not be used at all at marking.

The Board publishes this information to assist in understanding how the marking guidelines were implemented.

The 'sample answers' or similar advice contained in this document are not intended to be exemplary or even complete answers or responses. As they are part of the examination committee's 'working document', they may contain typographical errors, omissions, or only some of the possible correct answers.

Section I

Part B

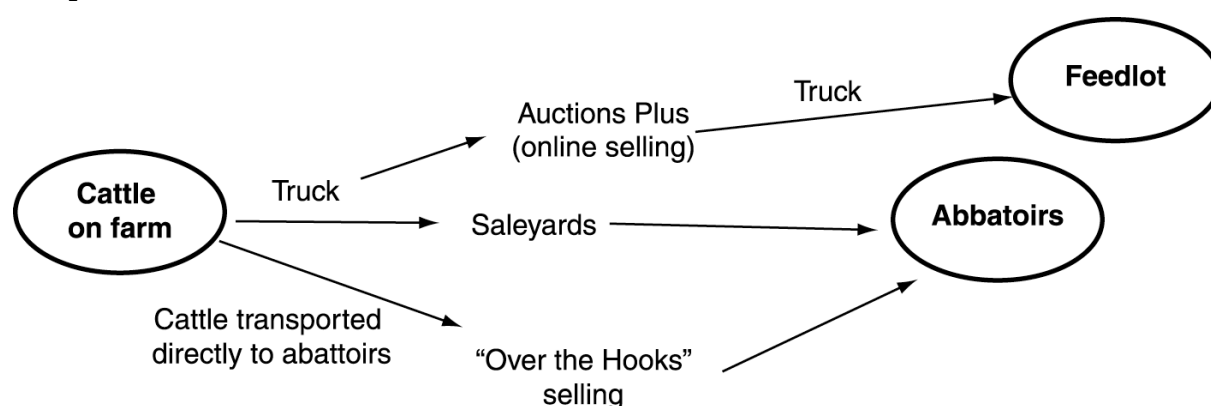
Question 21 (a)

Sample answer:

Lamb: 50 kg live-weight lambs to meet the heavy export market.

Question 21 (b)

Sample answer:



Question 21 (c)

Sample answer:

The 'Spring Lamb' promotion produced by Meat and Livestock Australia involves point-of-sale posters, pamphlets with recipes and television and magazine advertisements to encourage increased consumption of Australian lamb. It was a highly successful campaign that increased sales by 20%, providing greater returns to lamb producers and others in the marketing chain.

Question 22 (a)

Sample answer:

Fluctuation can occur in interest rates over time. Because most farmers operate on borrowed money (high levels of debt), interest rates become an important decision-making factor in the risk management/uncertainty of a farm business – eg money borrowed in one year may have a higher repayment in later years, leaving less money for other farm operations. This can then inform a farmer's decisions, such as purchasing new equipment or opting to borrow at fixed rates of interest.

Question 22 (b)***Sample answer:***

The Australian agribusiness sector is composed of a variety of components, including small family farms, larger family farms, corporate or company-owned farms, livestock, plant and animal-related companies (involved in the development, wholesale and retail of various allied industry products), processing companies and large corporations or multinational companies involved in agricultural production and marketing. There are approximately 150 000 businesses involved with agricultural activity in Australia and upwards of 350 000 people employed in farming across Australia. While not as extensive as its peak in the 1970s, farms still occupy around 60% of all the land in Australia. While the number of farming families is declining, they continue to dominate the agribusiness sector, with around 100 000 families in Australia.

With the gross value of agricultural commodities in the vicinity of \$41 billion per annum, the production generated on farms forms the basis for other components of the sector. Transport, managers, agents, wholesalers and retailers all benefit from the processing and marketing of these commodities, as well as providing a living for those families involved with the farm business itself.

Agribusiness companies are often the lifeblood of rural communities, creating employment opportunities and generating business and spending for other rural businesses. Livestock transport companies, for example, will need to purchase trucks, fuel, tyres etc and employ people to drive and maintain trucks, provide accountants etc. All components interact and relate to each other, either directly or indirectly with the family farm central to this interaction.

Question 23***Sample answer:***

Land capability classification is a scheme used to determine suitable land use practices for differing landforms. While a farmer may not choose to cultivate a piece of land classified as non-arable, this may affect the short-term profitability of the farm. However, long-term sustainability of the soil systems on the farm will be improved. The farmer may use such areas of land for alternative purposes to generate income and therefore increase the overall profitability of the farm. For example, using non-arable classified land for grazing or farmstay activities can generate income from that piece of land and increase overall farm profitability.

Question 24 (a)***Sample answer:***

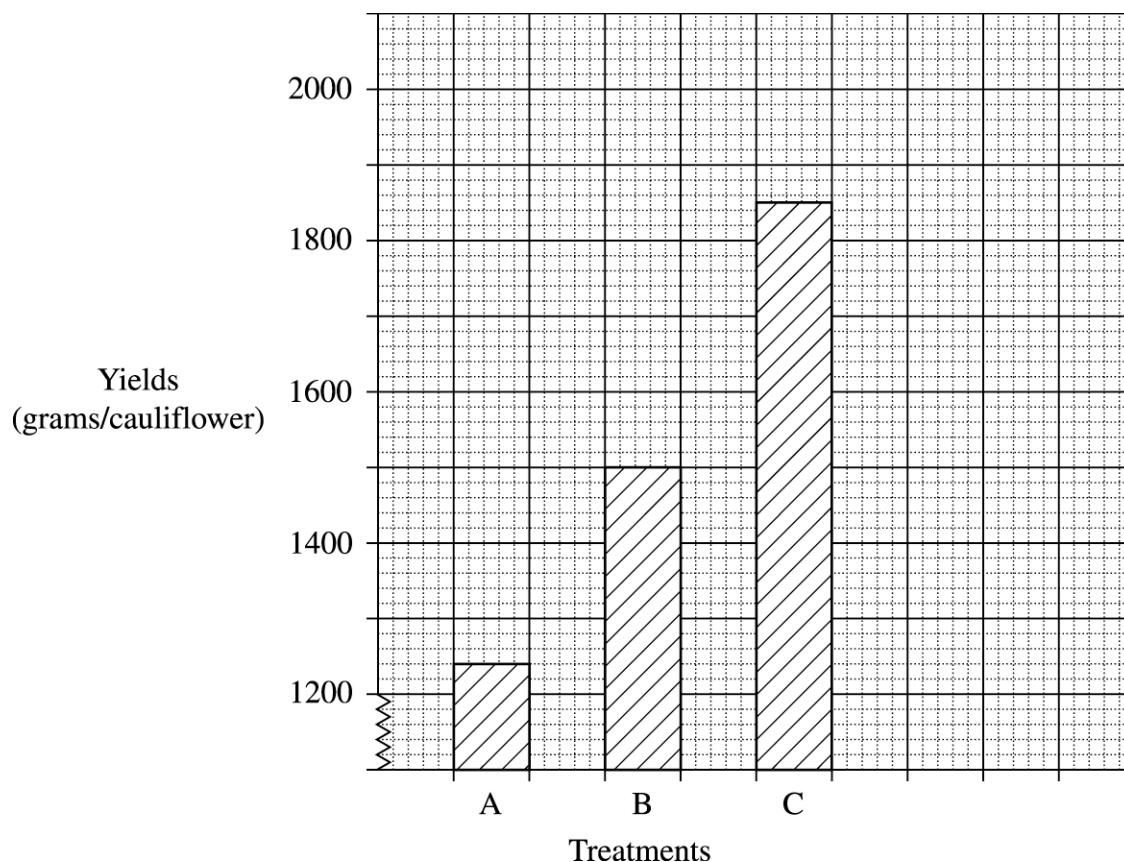
Treatment A

Answers could include:

The treatment with the 20 cm spacing between plants.

Question 24 (b)

Sample answer:



Question 24 (c)

Sample answer:

The researcher should randomise the treatments across the entire paddock, eg completely randomised design or randomised complete-block design. This will reduce environmental influences, such as slope, sunlight or soil type on a particular treatment and ensure that the results obtained are due to the effect of the treatment (planting density) only and not due to the position where a favourable or unfavourable environmental effect may affect all replicates for a treatment, eg soil texture or gradient as shown for this experiment.

Question 25 (a)***Sample answer:***

The lower grain yield of the inorganic fertiliser compared to the unfertilised treatment (control) may be a result of a nutrient toxicity effect of the inorganic fertiliser that may directly or indirectly affect grain formation and therefore reduce the overall yield of grain.

Answers could include:

- Excessive vegetative growth of inorganic fertilised maize may have led to nutrient depletion for grain filling.
- Increased vegetative growth may have harboured pests or diseases and affected grain yield.

Question 25 (b)***Sample answer:***

Although biosolid fertiliser produced the highest vegetative and grain yield in the study, farmers may decide not to use it given that it may be more expensive to purchase or apply than other alternatives. This increase in yield and associated additional income may not be greater than the extra expense involved in purchasing and applying the biosolid fertiliser. Therefore, it may not be an economically viable alternative for some maize producers, particularly if grain prices are low that season.

Answers could include:

- availability of biosolid locally
- expense in purchase, transport or application
- inconsistent quality of biosolid
- food safety reasons/withholding periods
- pathogen introduced with biosolid
- difficulty in storage or application.

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

Pigs are monogastrics, whereas cattle, sheep and goats are ruminants. Ruminants produce more methane due to the process of biofermentation – in the rumen and reticulum – that is required to digest feeds high in cellulose.

Monogastrics also tend to consume more concentrated feedstuffs that are more rapidly digested.

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

A pregnant ewe carrying twin lambs will have a higher energy and protein requirement than when carrying a single lamb. Requirements will also increase during the early stages of lactation. These additional energy and protein requirements may be supplied via grazing on improved pastures or by supplementary feeding with grains such as oats (energy) and lupins (protein). Ewes may even be divided into single- and twin lamb-carrying flocks to manage the adjusted feed regime.

Question 27***Sample answer:***

Sheep blowfly (*Lucilia cuprina*)

The management strategies to control sheep blowfly may include strategies that either make the host (sheep) less susceptible, the environment less accommodating for the pest or eliminate the pest. Most successful prevention or control of this pest will be where strategies are implemented in each of these areas, for example, farmers may breed sheep with less wrinkled skin, ensure adequate nutrition for flock and shear, crutch or wig to make the host less susceptible.

Sheep may also be treated with various chemicals (dipping and jetting) to kill blowfly larvae and repel adult flies. Flytraps can also be used to eliminate the pest from farms. The breeding and release of sterile male flies, to reduce the potential egg loads in female flies, has had limited success. Mulesing of sheep, involving the removal of skin from the breech area of sheep, is also a method used to reduce the incidence of flystrike in sheep. However, this method continues to be surrounded in controversy and the value of this method may reduce with time. An overall integrated approach becomes more valuable and successful when diverse strategies are used in prevention or control of the pest.

Question 28 (a)***Sample answer:***

Farmers can develop a farm plan that includes the construction of contour banks, drains and channels that capture water in dams to maximise water-use efficiency. This planning and construction strategy results in the capture of water that would otherwise be lost from the farm system and leads to more sustainable farming and water harvesting systems.

Answers could include:

- grassed waterways
- protecting riparian zones
- minimising fertiliser usage
- efficient irrigation methods, such as trickle or drip rather than furrow, sprinkler or flood irrigation.

Question 28 (b)***Sample answer:***

Soil salinity has become a serious degradation problem in many areas. The clearing of trees and/or over irrigation of farmland are the main causes of salinity. These types of practices are intended to increase farm productivity and the area available for agricultural production. However, they actually cause the water table to rise in soil with the result that salts are pushed towards the surface into the rhizosphere, where they cause toxicity to plants and 'scalding' of the surface soil. A procedure to alleviate the problem may include planting of salt-tolerant plant species or strategic tree planting that aims to reduce excess soil water there by lowering the watertable, therefore reducing salinity.

Answers could include:

- soil erosion
- soil acidity
- soil structural decline
- loss of soil organic matter.

Section II**Question 29 (a) (i)****Sample answer:**

Bioalcohols, eg ethanol, can be produced by the action of microorganisms and enzymes through the fermentation of sugars from wheat, corn or sugarcane. Green diesel is a form of diesel fuel that is derived from a variety of oils, including canola oil.

Question 29 (a) (ii)**Sample answer:**

Biofuel production is the process of extracting a fuel from some form of biomass. Suitable sources of biomass (feedstock) from agricultural systems include crops such as sugar, maize and wheat as well as trees, grasses and animal fats.

In terms of the sustainable and efficient use of carbon, biofuel production may have positive or negative effects. If the feedstock is produced very efficiently (eg sugar cane in Brazil) the CO₂ emitted during the life cycle of biofuel production (in this case ethanol) is substantially less than that emitted during the production of the fuel (gasoline) it replaces. However, if the feedstock is produced inefficiently or if its production supplants a human or animal food crop – that must be produced less efficiently somewhere else – the net effect on carbon use will be negative.

As technologies continue to advance, it is likely that the efficiency of biofuel production will improve, thereby improving the sustainability and efficient use of carbon. However, the provision of sufficient feedstock for increasing biofuel production looms as a big issue.

Question 29 (b)**Answers could include:**

A thorough description of a research project and its aims, including a discussion of:

- study design
- methodology
- data collection
- presentation of data
- analysis of data
- conclusions
- recommendations.

The relationship of the research components to reach the conclusion, recommendations and the implications for the development or implementation of the technology will also be made clear.

Agricultural biotechnology could include projects on:

- Bollguard II®
- smart gene (gene markers)
- embryo splitting
- biofuel development
- rumen modifiers.

Question 30 (a) (i)

Sample answer:

The SOI is an index based on the difference in air pressure between Darwin and Tahiti. It may be a positive or negative value and can be based on monthly or seasonal fluctuations in air-pressure differences between Tahiti and Darwin.

Question 30 (a) (ii)

Sample answer:

The climate events of La Niña and El Niño are initiated by changes in sea-surface temperatures in the Pacific Ocean. An increase in sea-surface temperature (1.5–2.5°C equatorial above average) in the equatorial Pacific creates above average air pressure across northern Australia, leading to suppressed rainfall across many parts of eastern Australia. This is an El Niño climatic event.

If the sea-surface temperature of the equatorial Pacific decreases (1–2° below average), average air pressure in northern Australia decreases, leading to enhanced rainfall across many parts of eastern Australia. This is a La Niña climatic event.

Question 30 (b)

Answers could include:

- growing new plant varieties with greater drought resistance as an effective strategy for dryland cropping in areas of unreliable rainfall
- adopting efficient irrigation strategies as an effective and profitable way of maintaining crop yields where rainfall is unreliable
- conservative management practices (soil moisture conservation, fodder conservation) may be useful to mitigate against drought in the short to medium-term, but may be ineffective over a long-term climatic event (drought)
- manipulation of production intensity (reducing crop density, reducing stocking density) may be a useful strategy for minimising losses during a period of drought, but leaves the farmer less able to take advantage of improved weather conditions.

Question 31 (a) (i)***Answers could include:***

- need for new product formulations/higher yields, ie feed rations, more efficient plant and animal species
- cost/saving devices – ie labour, such as robotic dairies
- need for monitoring systems, ie NLIS tags
- need for sustainability/environmental management, ie control truck farming, satellite imaging.

Question 31 (a) (ii)***Sample answer:***

Genetically modified (GM) cottonseeds are roughly four times more expensive than 'normal' seeds. In developing countries (India) farmers have been told that, if they use the GM seeds, they will not need to buy expensive pesticides and will have higher crop yields. What the farmers are not told is that GM cottonseed may require twice as much water. The GM strain is also susceptible to bollworm, which means spraying may still be necessary. Because GM strains don't produce (viable) strains, seed has to be purchased each year. This example illustrates why farmers might be reluctant to adopt a new technology, even though it is available to them.

Answers could include:

- | | |
|---|---------------------------------------|
| • cost of ongoing research | • simplicity of use/complexity of use |
| • demand for the newly developed technology | • availability |
| | • suitability to current production. |

Question 31 (b)***Answers could include:***

- computer modelling technologies with weather/climate forecasting
- computer laser-guided tractors
- computer technology in irrigation systems
- computer record-keeping systems/tracking systems, ie NLIS database
- computer-feeding system for beef feedlots/poultry industry
- computer technology in glasshouse environmental management.