Assessment Schedule – 2019

Agricultural and Horticultural Science: Demonstrate understanding of land use for primary production in New Zealand (91297)

Assessment Criteria

Question ONE: Pip fruit production

Achievement	Achievement with Merit	Achievement with Excellence
Explains environmental factors that make the Hawke's Bay and Otago regions suitable for pip fruit production.	**Explains in detail** why these regions are suitable for pip fruit production in terms of economic and workforce factors.	**Justifies** a future land use in the Hawke's Bay or Otago regions in terms of environmental and political factors.

N1	N2	A3	A4	M5	M6	E7	E8
Partially describes, but does not explain why environmental factors make the Hawke's Bay and Otago regions suitable for pip fruit production.	**Partially describes** but gives insufficient explanation of why environmental factors make the Hawke's Bay and Otago regions suitable for pip fruit production.	**Explains** why ONE environmental factor makes the Hawke's Bay and Otago regions suitable for pip fruit production.	**Explains** why TWO environmental factors make the Hawke's Bay and Otago regions suitable for pip fruit production.	**Explains in detail**, what economic OR workforce factors make these regions suitable for pip fruit production.	**Explains in detail** what economic AND workforce factors make these regions suitable for pip fruit production. BOTH factors explained in detail.	**Justifies** land use in the Hawke's Bay or Otago region in terms of environmental and political factors. Comprehensive evidence given for ONE factor, with the other factor well supported.	**Justifies** land use in the Hawke's Bay or Otago region in terms of environmental and political factors. Comprehensive evidence given for BOTH factors.
N0 = No response; no relevant evidence.							

Sample Evidence

Q1	Sample Evidence
(a)	**Explains** TWO environmental factors that make the Hawke's Bay and Otago regions suitable for pip fruit production. • Pip fruit require a winter chill to break dormancy and to stimulate flower buds to open. Without sufficient winter chill, fruiting is poor and flowering is irregular. Both Hawke's Bay and Central Otago have winters that provide enough hours below 7°C for winter chilling. • It is essential to have warm days and cold nights to enhance fruit colour. • Hawke's Bay and Central Otago both have long, dry summers that allow fruit to ripen and prevent outbreaks of disease. • Both regions have fertile, free-draining soils, which pip fruit require. Pip fruit require free-draining soils to prevent disease. • Orchards also need high soil fertility, as each crop takes up a lot of nutrients. • High sunshine hours allow the trees to increase photosynthesis and therefore brix levels. Fruit colour is improved.

(b)	**Explains in detail**, what economic and workforce factors make these regions suitable for pip fruit production. *Economic* • As both Hawke's Bay and Central Otago have traditionally been used for growing apples, the infrastructure needed to process pip fruit such as packing sheds and harvesting equipment, is already in place. This existing infrastructure makes it easier to intensify and develop existing orchards. • Apple exports have seen strong growth, and are currently worth NZ$700 million. This value is forecast to reach $1 billion dollars by 2022. New Zealand fruit is in high demand. *Workforce* • Both Central Otago and Hawke's Bay are areas of extensive pip fruit growing, as well as other types of orchards. This allows the area to be a destination for seasonal employees, allowing staff to move from orchard to orchard as the season progresses. Both regions are established with regards to attaining RSE workers. • As there are different types of fruit harvested in these areas, it increases the length of the season. Therefore, orchard maintenance can provide almost year-round employment.
(c)	**Justifies** a type of land use in Hawke's Bay or Otago in terms of environmental and political factors. • Apple / pip fruit exports are seeing annual growth rates of 5% and have more than doubled since 2012 from NZ$341 million to over $700 million in 2017. • World demand, especially from Asia, for high-quality applies is strong. The development of proprietary varieties of apples such as Jazz and Envy have created new markets. • Both Hawke's Bay and Central Otago have established packhouses, and staff trained in managing pip fruit orchards. Due to the concentration of orchards in the area, finding workers can be an issue. However, orchards have access to the Recognised Seasonal Employer (RSE) scheme. • Converting from one land use to another is expensive. *The environment* • Hawke's Bay's climate and soil are excellent for pip fruit, but could easily support viticulture and / or dairy if sufficient water was available. • Both pip fruit and viticulture provide net carbon sinks, while dairying is a significant source of New Zealand's carbon emissions. • Orchards and vineyards have the option of using more efficient irrigation systems (drip / micro sprinkler) than dairying (sprinkler / central pivot). • Both Hawke's Bay and Central Otago are susceptible to summer drought and rely on irrigation. *Political* • Due to negative publicity about the damage to the environment, councils are under pressure to limit dairy numbers in their regions. Councils are also applying strict nitrogen loss limits to farms. This can make new conversions difficult. • Otago is setting new water take limits with the expiry of the mining right in 2021. Without water for irrigation and cleaning, high water demand such as dairying activities are not viable. • Councils and central government have become opposed to investing in large-scale irrigation schemes. This can be seen in the failure of the Ruataniwha irrigation scheme. • New future taxes to be introduced in 2025 with regards to emissions may impact on the use of Nitrogen based fertilisers on orchards.

Question TWO: Dairy cattle numbers

Achievement	Achievement with Merit	Achievement with Excellence
Explains why Auckland has seen a decrease in dairy cattle numbers.	**Explains in detail** why the South Island has seen an increase in dairy cattle numbers.	**Justifies** whether the increases in South Island dairy numbers are sustainable in the future.

N1	N2	A3	A4	M5	M6	E7	E8
Partially describes some details, but does not explain why Auckland has seen a decrease in dairy cattle numbers.	**Partially describes**, but insufficient description of why Auckland has seen a decrease in dairy cattle numbers.	**Explains** ONE reason why Auckland has seen a decrease in dairy cattle numbers.	**Explains** TWO reasons why Auckland has seen a decrease in dairy cattle numbers.	**Explains in detail** why the South Island has generally seen a much greater increase in dairy cattle numbers than the North Island, making reference to technological *OR* environmental factors.	**Explains in detail** why the South Island has generally seen a much greater increase in dairy cattle numbers than the North Island, making reference to technological, *AND* environmental factors.	**Justifies** whether the increases in South Island dairy numbers are sustainable in the future, making reference to political, environmental, and workforce factors. Comprehensive evidence given for ONE factor, with another factor well supported.	**Justifies** whether the increases in South Island dairy numbers are sustainable in the future, making reference to political, environmental, and workforce factors. Comprehensive evidence given for TWO factors.
N0 = No response; no relevant evidence.							

Sample Evidence

Q2	Sample Evidence
(a)	**Explains** two reasons why the greater Auckland region has seen a decrease in dairy cattle numbers. • Increased urban area development since 1996 on flat, fertile areas previously suitable for dairy. • Economic pressures – land values have increased, so farmers have been economically better off subdividing land or converting to lifestyle blocks. Examples are Pukekohe and Kaipara. • Due to high value of land, council rates can be very high and in times of low payouts can make dairy farms non-viable. • Social pressures – population increase has made carrying out common dairy management practices more difficult, i.e. disposal of effluent and moving stock across roads when surrounded by lifestyle blocks.

(b)	**Explains** in detail why the South Island has seen a much greater increase in dairy cattle numbers than the North Island. *Technological* • Canterbury is in the rain shadow of the Southern Alps, and without irrigation is not suitable for intensive dairy production. • Improvement in irrigation technology – border strip irrigation, centre pivot irrigation – has allowed an increase in production and stocking rates, making diary viable. • The establishment of large-scale irrigation schemes based on submersible pump technology has allowed large-scale extraction of water from aquifers. *Environment* • Region is flat, fertile and well-draining – all requirements for high-intensity dairying. However, lack of sufficient water is still a limiting factor for dairying in Canterbury. • When water is supplied through irrigation, Canterbury is well suited to dairying. • High sunshine hours along with irrigation has increased the grass growth rate and therefore milk production.
(c)	**Justifies** whether the increases in South Island dairy numbers are sustainable in the future. *Unsustainable* • Unlikely the South Island can sustain same gain in dairy numbers that occurred between 1994 and 2015 in the future, using current farming practices. Both Southland and Canterbury have seen dairy cattle gains in excess of 400%. • Stress placed on environment, especially water. • Land values have also seen a dramatic rise, meaning further conversions are less economically viable. • Recent fall in dairy payouts means the return on investment is less. • Increased pressure on councils and government to set high environmental standards increases the cost of compliance. • Finding skilled workers in rural areas is difficult. Employers having to resort to sourcing workers from overseas. Change of government has seen pressure to reduce the reliance on overseas workers. • Proposed future taxes on emissions and water may put people off from buying. Social pressures from the public, anti-dairy, may mean less people are inclined to convert to dairy. *Sustainable* • Adoption of industrial farming techniques could see further increases in dairy numbers. • Winter housing of cattle has meant that farms can be protected through the winter months. This is also beneficial as effluent is captured and put onto paddocks when the weather is more favourable. • New value added products such as cream cheese for drinks, A2 milk, may mean the pay-out increases. • Chinese investment in milk factories may mean farmers have more confidence in investment. • New technologies which decrease the impact on the environment, e.g. genetics, pasture species, and machinery.

Question THREE: Viticulture

Achievement	Achievement with Merit	Achievement with Excellence
Explains why a region is suitable for vineyards.	**Explains in detail** why a region is suitable for vineyards.	**Justifies** the conversion from another land use to viticulture.

N1	N2	A3	A4	M5	M6	E7	E8
Partially describes some details, but does not explain the impact of vineyards on a named region.	**Partially describes**, but response insufficient as it does not explain the impact of vineyards on a named region.	**Explains** why a named region is suitable for vineyards in terms of workforce *OR* social factors.	**Explains** why a named region is suitable for vineyards in terms of workforce *AND* social factors.	**Explains in detail** the impact of vineyards on a named region in terms of workforce *OR* social factors.	**Explains in detail** the impact of vineyards on a named region in terms of workforce *AND* social factors.	**Justifies** the conversion from another land use to viticulture in terms of environmental and economic factors. Comprehensive evidence given for ONE factor, with the other factor well supported.	**Justifies** the conversion from another land use to viticulture in terms of environmental and economic factors. Comprehensive evidence given for BOTH factors.
N0 = No response; no relevant evidence.							

Sample Evidence

Q3	Sample Evidence
(a)	**Explains** the impact of vineyards on a named region in terms of workforce and social factors. Named regions could include, but are not limited to Marlborough, Otago, Gisborne, Hawke's Bay and Nelson. *Workforce* • Marlborough is New Zealand's largest wine region, with over 24,000 ha in vineyards. • Having a large number of vineyards in one area means that the area is a destination for seasonal workers. It allows workers to move from vineyard to vineyard as the season progresses. • A concentration of vineyards within a region allows infrastructure for workers to develop, such as worker housing and labour coordinators. • A high density of vineyards can also mean there is a shortage of seasonal workers, with heavy demand during harvesting. This can result in having to rely on overseas workers. *Social* • The concentration of vineyards and their associated workers leads to the development of numerous secondary industries within a region – accommodation providers, retail outlets, schools, and hospitals have expanded to serve the people who work and visit the vineyards. • Wine tourism can develop – wine tours and festivals.

(b)	**Justifies** the conversion from another land use, such as sheep, beef, or pipfruit, to viticulture in terms of environmental and economic factors. *The environment* • Region has good growing conditions for wine grapes, e.g. hot summer days and cool nights. • The soil conditions are good, with free draining stony loams. • Water supply is limited in some areas, and competes with other land uses and urban supply. • Disposal of waste products such as marc (wine skins and pips) is becoming an issue. *Economic factors* • Demand for New Zealand wine is high in overseas markets, with double-digit annual growth. Wine is New Zealand's second-biggest horticultural export at $1.66 billion in 2017. • Land value for land suitable for vineyards is high, which makes other land uses unviable. • Converting to viticulture is expensive, which can make conversions risky. Converting to vineyards can cost up to $50 000 ha, while converting to dairy could cost up to $40 000 ha. • Labour costs are high due to the intense demand around harvest time. • Labour shortages already exist, and this would be exacerbated if there is further expansion in particular areas. • Further conversion from other land uses to vineyards might be difficult because of a lack of suitable land that has not already been converted. • The value of land that is suitable for viticulture has increased, which has made other less profitable land uses, such as sheep and beef, less viable. • Over-reliance on one crop could lead to issues, e.g. a global financial crisis or introduction of plant pests, such as the brown marmorated stink bug.

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 12	13 – 18	19 – 24