

Geography

2023 examination

Section 1 (Questions 1 and 2) 27 marks
Answer **all** questions
Allow approximately 60 minutes

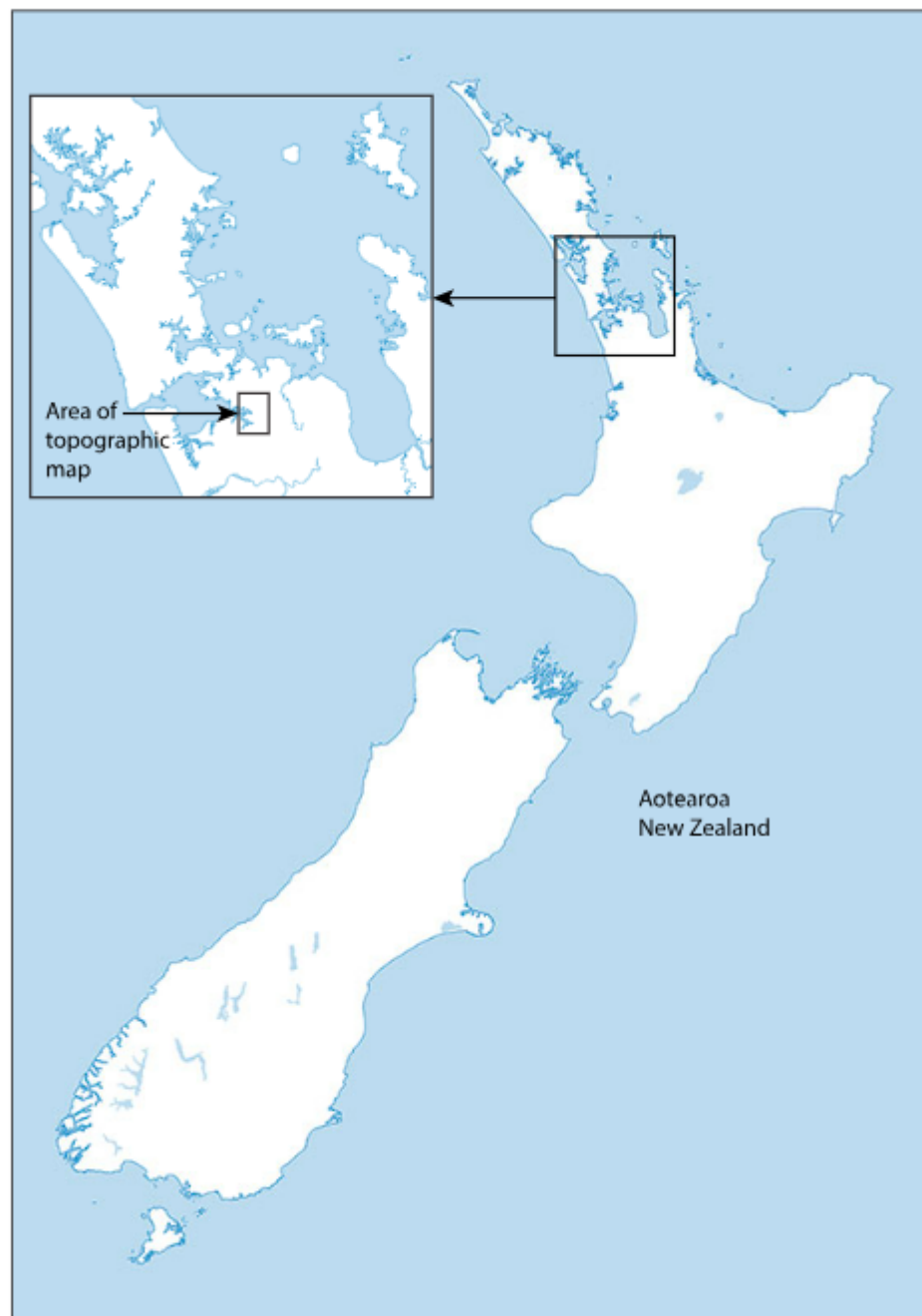
Section 2 (Questions 3 to 6) 33 marks
Answer **all** questions
Allow approximately 70 minutes

Approved calculators may be used

Total time: 130 minutes

Total marks: 60

Locator map



Source: map adapted from Land Information New Zealand 2021, Topographic Services, LINZ CC-BY 4.0, © Crown Copyright Reserved; and © Rainer Lesniewski | iStockphoto.com

Question 1 (a) to (d)

Refer to the topographic map of Papatoetoe, Southern Auckland, on the separate map sheet, when answering parts (a) and (b).

(a) Identify **two** sources of water pollution that could be found upstream of grid reference 739945.

(i) Source 1

ABC	B	I	U	x ²	x ₂	≡	≡	≡	≡	≡	≡	↶	↷

(1 mark)

(ii) Source 2

ABC	B	I	U	x ²	x ₂	≡	≡	≡	≡	≡	≡	↶	↷

(1 mark)

(b) Explain how the physical landscape has influenced the distribution of human settlement in the area shown on the topographic map. Provide specific map evidence using area references and/or compass directions.

ABC	B	I	U	x ²	x ₂	≡	≡	≡	≡	≡	≡	↶	↷

(3 marks)

Refer to both the topographic map and the satellite image on the map sheet when answering part (c).

(c) (i) Identify the scale closest to that used in the satellite image. Select your answer from the list below.

- ☐ 1:13 000
☐ 1:25 000
☐ 1:50 000
☐ 1:100 000

(1 mark)

(ii) Identify the feature marked T on the satellite image.

(1 mark)

- (iii) For a council considering land use in the area, suggest **two** advantages of using the satellite image compared to using the topographic map.

(1) Advantage 1

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(1 mark)

(2) Advantage 2

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(1 mark)

- (d) Southern Auckland is experiencing increasing levels of housing development.

Using only evidence from the topographic map, analyse similarities and differences in the suitability for this type of development of the locations chosen in:

- **Box A** (area references 7397, 7398, 7497, 7498, and 7598)
- **Box B** (area references 7192 and 7292).

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(5 marks)

Source 1

Auckland Council's sustainability targets

The council for Auckland, the largest city in Aotearoa New Zealand, has set several sustainability targets, with the aim of creating a liveable, resilient, and low-carbon city. The list includes:

- **Zero waste:** Auckland Council aims to send zero waste to landfill by 2040, by reducing waste at the source, and increasing recycling and composting.

Source: adapted from Auckland Council 2022, 'Waste management and minimisation plan 2018, amended 2022', viewed 29 May 2023, aucklandcouncil.govt.nz, © CC BY 4.0

Source 2

How does bin tagging work?

Bin-tagging programs are designed to educate households in the correct use of general waste bins, whose contents go to landfill (commonly known as landfill bins). Councils place notices on bins after inspecting them during collection. The tags provide feedback on the use of the bin for food waste, as shown below.

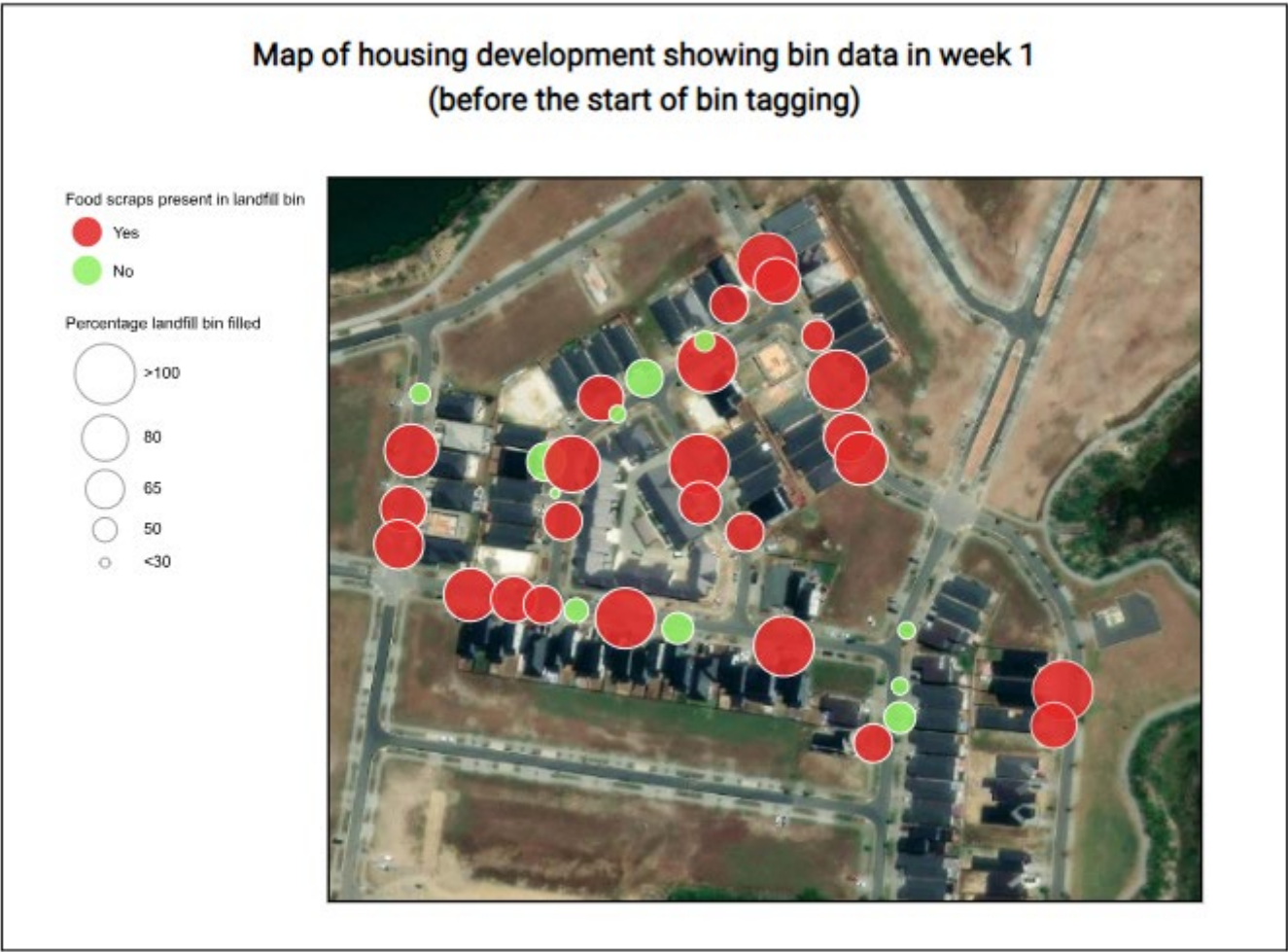


no food scraps present in landfill bin



food scraps present in landfill bin

Source 3



Source: image created in arcgis.com, using map data © LINZ | LINZ, Stats NZ, Esri, HERE, Garmin, retrieved 26 April 2023

Source 4



Source: image created in [arcgis.com](https://www.arcgis.com), using map data © LINZ | LINZ, Stats NZ, Esri, HERE, Garmin, retrieved 26 April 2023

Source 5

Further Auckland Council sustainability targets

Auckland Council's plan for sustainable development includes numerous other targets, two of which are summarised below.

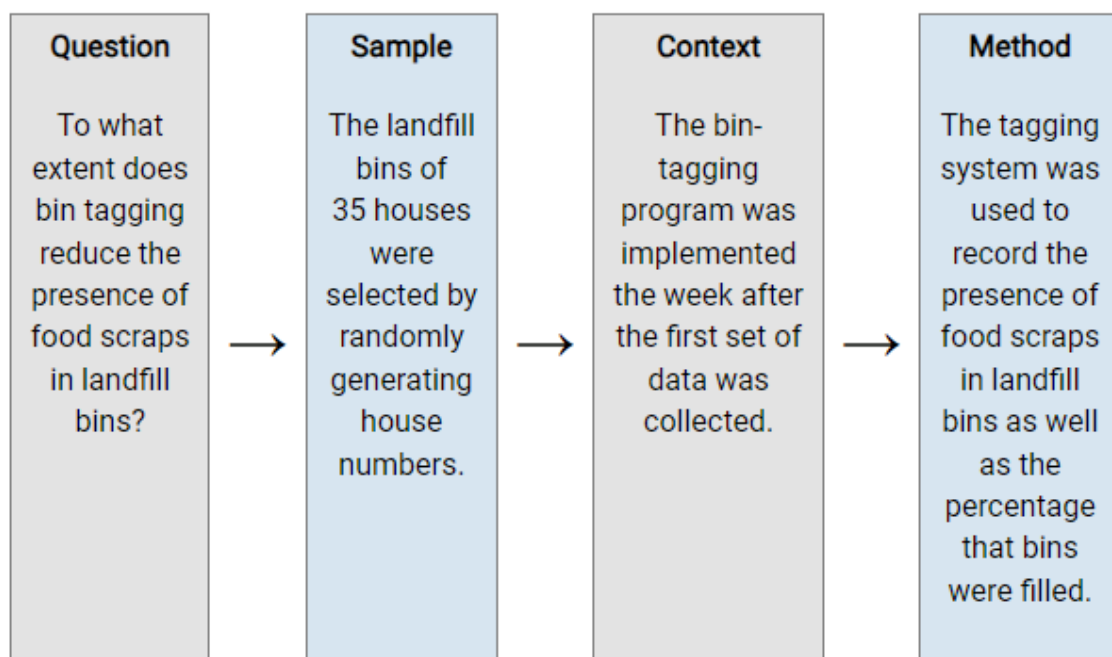
- **Biodiversity:** Auckland aims to protect and enhance the city's biodiversity, by restoring native habitats, protecting natural areas, and promoting sustainable land practices.
- **Active transport:** Auckland aims to promote the use of 'active' transport – such as walking and cycling – to reduce greenhouse gas emissions and improve public health.

Source: adapted from Auckland Council 2012, 'Indigenous biodiversity strategy', and Auckland Council 2018, 'Auckland Plan 2050 (Outcome: Transport and Access)', both viewed 29 May 2023, aucklandcouncil.govt.nz

Question 2 (a) to (d)(ii)

Student researchers set up a field study to investigate whether a new housing development within Box B on the topographic map was meeting Auckland Council's target of zero waste to landfill by 2040 (see Source 1).

The following fieldwork process for evaluating bin tagging (see Source 2) was adopted.



- (a) Explain how the process outlined above is an effective way to collect fieldwork data.

[illegible]

(4 marks)

Examine Sources 3 and 4, which show the results of the field study, and then answer parts (b) and (c).

- (b) Evaluate the effectiveness of Sources 3 and 4 as a way of displaying bin data.

[illegible]

(3 marks)

- (c) Based on the data shown in Sources 3 and 4, justify why bin tagging in the new housing development in Box B has been successful in working towards Auckland Council's target of zero waste to landfill by 2040.

[illegible]

(2 marks)

Read Source 5 and then answer part (d).

- (d) For each of the **two** targets outlined in Source 5, identify and justify a distinctly different fieldwork technique.

- (i) Fieldwork technique for biodiversity

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(2 marks)

- (ii) Fieldwork technique for active transport

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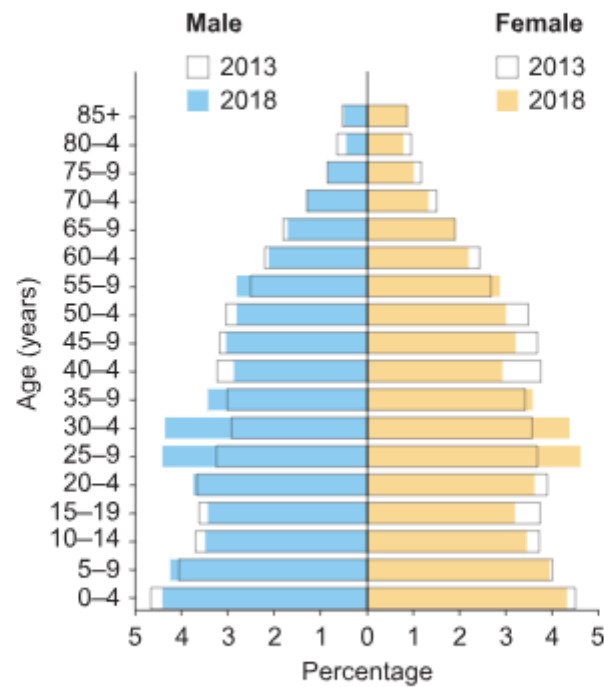
≡ ▹▹▹

↶ ↷

(2 marks)

Source 1

Population structure of Papakura, Auckland, in 2013 and 2018



Source: adapted from Auckland Council research and evaluation unit 2019, 'Papakura age structure' population tree, in '2018 census results, Papakura local board', viewed 8 May 2023, censusauckland.co.nz

Source 2

Central and South Auckland, and surrounds



Source: adapted from © Google n.d., 'Central and South Auckland, and surrounds', retrieved 26 April 2023, [google.com/maps](https://www.google.com/maps)

Source 3

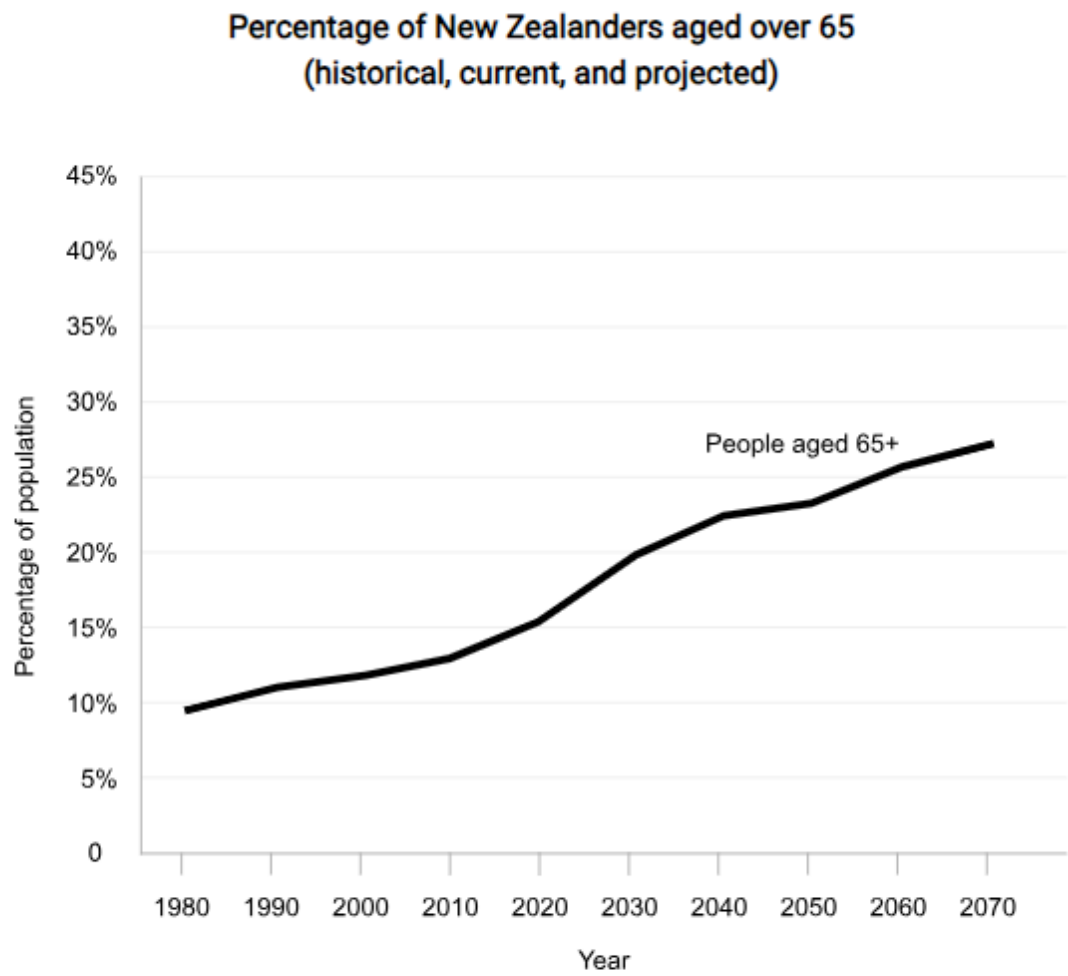
Some details about the Papakura area

				
Population growth	Jobs growth	Southern Motorway upgrade	Median house price¹	Prosperity index²
Positive growth from 2013 to 2018	4.3% growth from 2013 to 2018	Additional lanes in both directions, and a cycle path	Papakura: \$806 374 (Auckland: \$1.18m)	Papakura: 2.4 (Auckland: 4.7)

¹ For houses sold in March 2023² The higher the prosperity index, the more prosperous the region

Source: adapted from Auckland Council Research and Evaluation Unit 2019, '2018 census results, Papakura local board', viewed 9 May 2023, censusauckland.co.nz; Auckland Tourism, Events, and Economic Development (ATEED) 2020, 'Papakura local board economic overview', viewed 9 May 2023, knowledgeauckland.org.nz; NZ Transport Agency n.d., 'Southern corridor improvements', viewed 9 May 2023, nzta.govt.nz; Barfoot & Thompson 2023, 'March 2023 housing market update: House buyers return to Auckland market', viewed 9 May 2023, barfoot.co.nz; Realestate.co.nz n.d., 'Papakura market insights for the last 12 months', suburb trend graph for March 2023, viewed 9 May 2023, realestate.co.nz; ATEED and Infometrics 2018, Auckland prosperity index, viewed 9 May 2023, industry.aucklandnz.com

Source 4



Source: adapted from Stats NZ 2022, 'Age distribution of the population, based on the median projection, year ended June 1953–2073' graph, in 'One million people aged 65+ by 2028', viewed 8 May 2023, stats.govt.nz

Question 3 (a) to (c)

- (a) With reference to Source 1, describe how the population structure of Papakura, in southern Auckland, changed from 2013 to 2018.

ABC	B	<i>I</i>	<u>U</u>	$\times^2$	$\times_z$										

(2 marks)

- (b) With reference to Sources 2 and 3, suggest pull factors that might attract people to relocate to Papakura from other parts of Auckland.

ABC	B	<i>I</i>	<u>U</u>	$\times^2$	$\times_z$										

(4 marks)

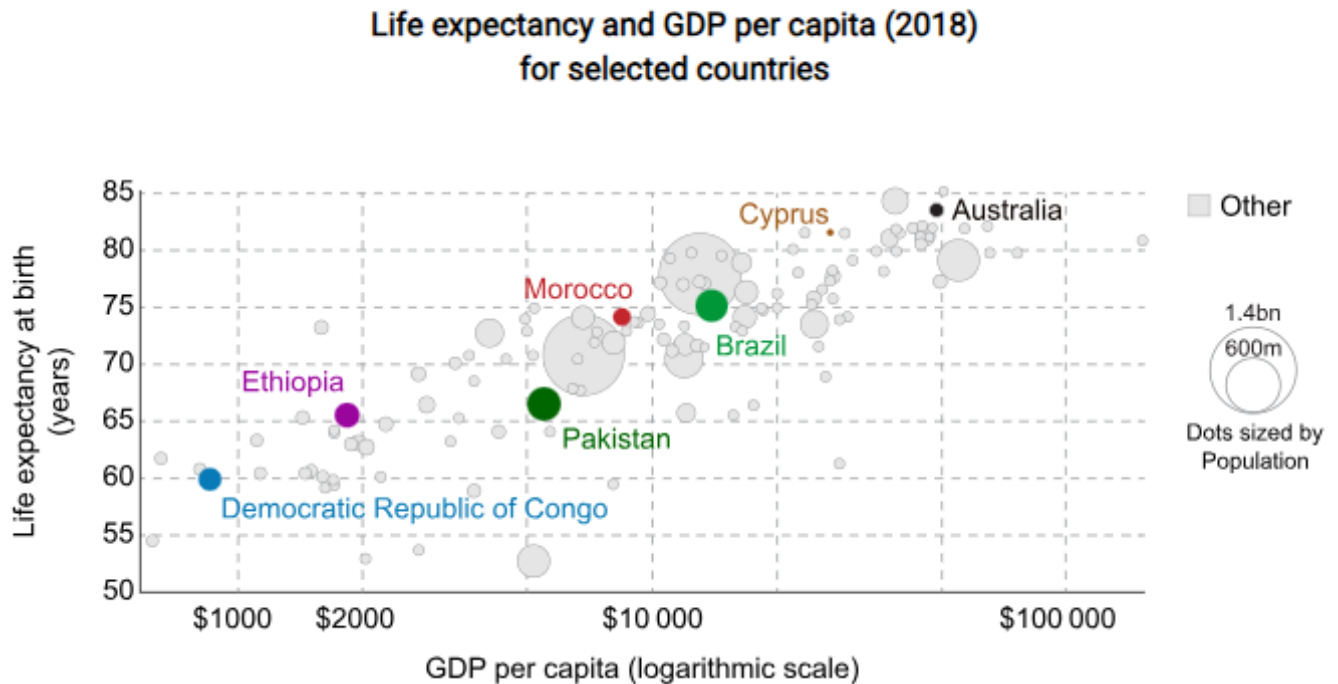
- (c) New Zealand has an ageing population, as shown in Source 4.

With reference to New Zealand, or any example from your studies, discuss the implications of an ageing population.

ABC	B	<i>I</i>	<u>U</u>	$\times^2$	$\times_z$										

(5 marks)

Source



\$ = US dollars

Source: adapted from Maddison Project database 2020, UN world population prospects 2022, and Zijdemann et al 2015, 'Life expectancy vs GDP per capita 2018', ourworldindata.org, viewed 5 May 2023, published under a CC-BY licence

Question 4 (a) and (b)

(a) State the relationship between life expectancy and GDP per capita shown in the source.

ABC B I U x² x₂ ☰ ☷ ☰ ☷ ☰ ☷ ☰ ☷ ☰ ☷ ↶ ↷

(1 mark)

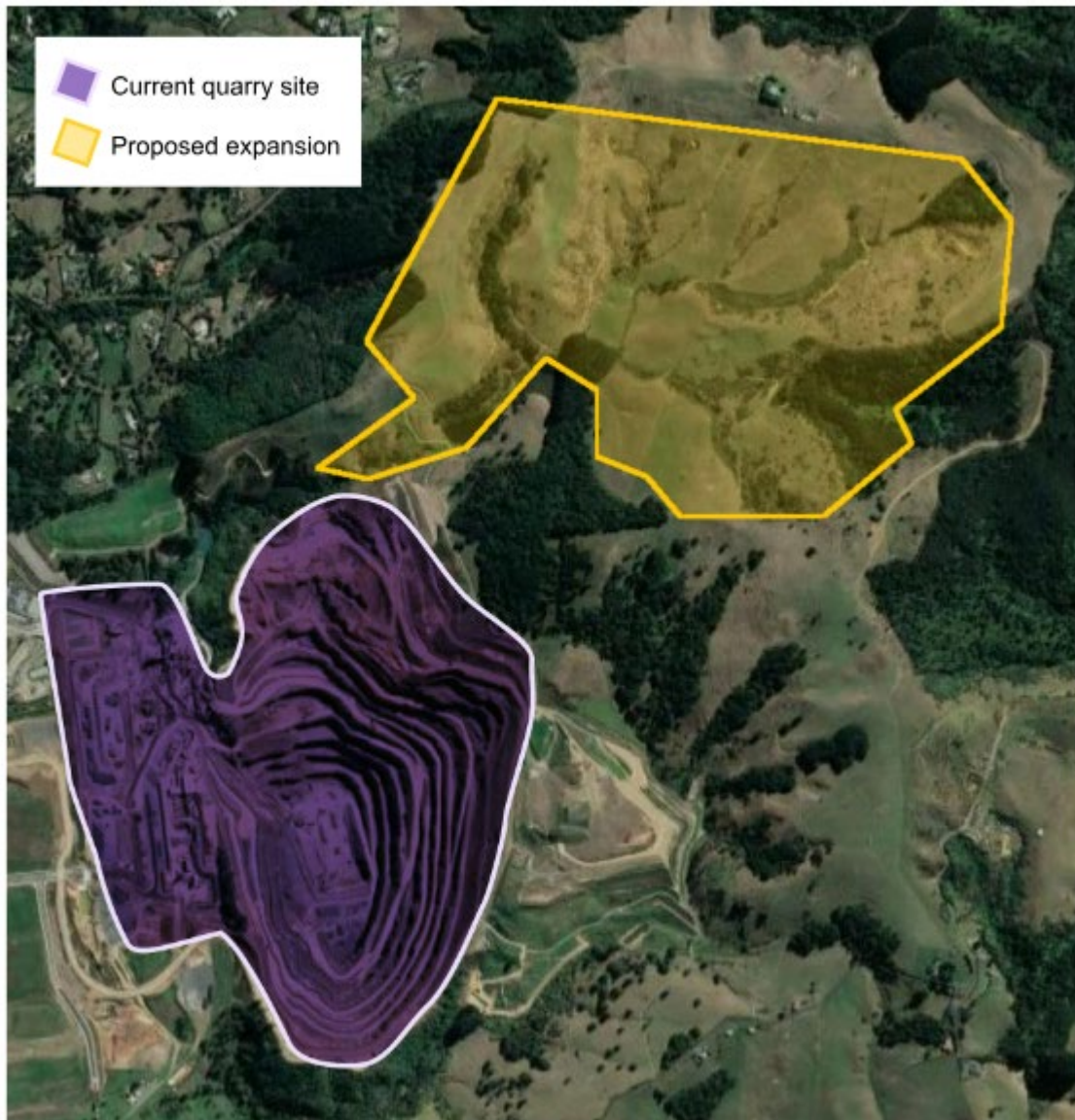
(b) With reference to the source and/or examples from your studies, explain the reason for the relationship between life expectancy and GDP per capita.

ABC B I U x² x₂ ☰ ☷ ☰ ☷ ☰ ☷ ☰ ☷ ☰ ☷ ↶ ↷

(5 marks)

Source 1

Current extent and proposed expansion of Drury Quarry site



Source: image created using map data © 2023 Google My Maps, retrieved 6 May 2023, mymaps.google.com

Source 2

View of current site of Drury Quarry



Source: image adapted from Stevenson n.d., Stevenson Drury, viewed 9 May 2023, [stevenson.co.nz](https://www.stevenson.co.nz)

Source 3

A New Zealand copper skink, a lizard native to the country's North Island



Source: adapted from Chlidonias 2012, 'Copper skink (*Oligosoma aeneum*)', www.zoochat.com/community, viewed 19 April 2023, © ZooChat

Source 4

Fenced, 2500 m² release site for skinks, and surrounds

Source: image adapted from Straterra n.d., Drury quarry (case study), viewed 9 May 2023, straterra.co.nz

Question 5 (a) to (d)

Drury Quarry (marked Q on the topographic map on the map sheet) is a major quarry in New Zealand. It produces more than 3 million tonnes of crushed rock annually, supplying road construction and concrete markets in the Auckland region.

- (a) Use the topographic map to identify the approximate area of the quarry. Select your answer from the list below.

- ☐ 0.3 km²
- ☐ 0.5 km²
- ☐ 1 km²
- ☐ 1.4 km²

(1 mark)

The section of Drury Quarry currently being worked is nearing the end of its lifespan. A proposal has been put forward for local consultation to expand the quarry into areas north-east of the current site.

Refer to Sources 1 and 2 when answering part (b).

(b) Outline how the land-cover change in the proposed expansion could affect the following components of the ecosystem.

(i) Water

ABC	B	<i>I</i>	<u>U</u>	x^2	x_2										

(1 mark)

(ii) Soil

ABC	B	<i>I</i>	<u>U</u>	x^2	x_2										

(1 mark)

(iii) Flora

ABC	B	<i>I</i>	<u>U</u>	x^2	x_2										

(1 mark)

(iv) Fauna

ABC	B	<i>I</i>	<u>U</u>	x^2	x_2										

(1 mark)

Refer to Sources 3 and 4 when answering part (c).

To offset the quarry's environmental impact, the mine has introduced strategies to protect and restore local habitats. One such strategy is a conservation plan for copper skinks (a type of lizard) in the area. This conservation plan includes maintaining a fenced, 2500 m² release site for skinks. Any skinks found in areas where quarry work is taking place will be transferred to this release site.

- (c) Suggest **one positive** and **one negative** effect of the skink conservation plan on the ecosystem shown in Source 4.

(i) Positive effect

ABC	B	I	U	x ²	x ₂										

(1 mark)

(ii) Negative effect

ABC	B	I	U	x ²	x ₂										

(1 mark)

- (d) Population growth leads to land-cover change in a variety of ways.

Excluding mining activity, use examples from your studies to explain **two** ways that population growth can cause land-cover change.

ABC	B	I	U	x ²	x ₂										

(4 marks)

Source 1

Couple 1: Tanya and Paul, who live at grid reference 732954



Tanya and Paul's typical weekly food shop is similar to that shown in the picture above.



Tanya and Paul own a hybrid vehicle (with both an electric motor and an internal combustion engine using fossil fuel). Average fuel consumption is 4 litres per 100 km.



Tanya and Paul both travel by train to Auckland and back each day for work.



Tanya and Paul live in a townhouse like the one pictured above.

Source: adapted from McFarland, F 2022, 'Nice Hauldi', *The US Sun*, viewed 5 June 2023, the-sun.com; © Goce Risteski | dreamstime.com; © SACE Board of South Australia 2023; 'Row of just finished new brown townhouses' | freepik.com

Source 2

Couple 2: Retirees Dawn and Tom, who live at grid reference 759903



Dawn and Tom’s typical weekly food shop includes many fresh vegetables, as pictured above.



Dawn and Tom’s sports utility vehicle (SUV) runs on diesel fuel; the vehicle’s average fuel consumption is 10.1 litres per 100 km.



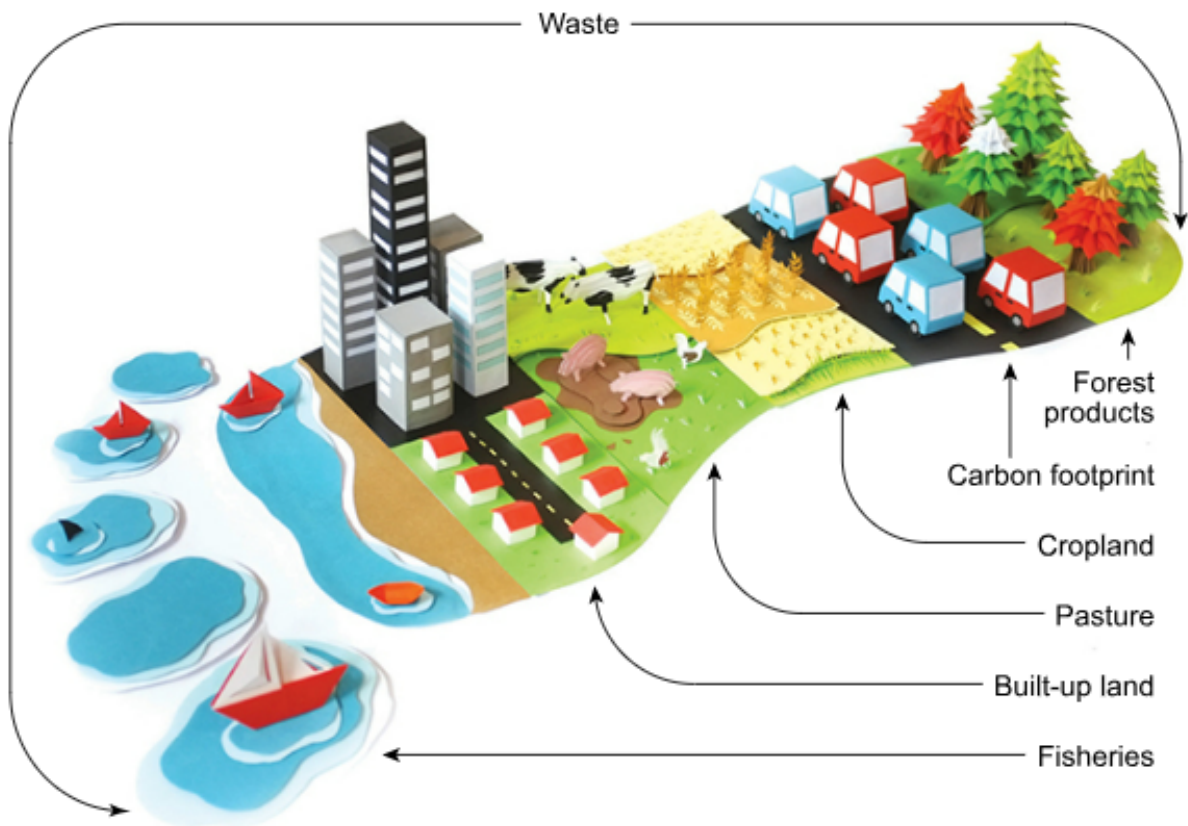
Dawn and Tom travel to Manurewa East (grid reference 709039) four times a week to babysit their grandchild.



Dawn and Tom live in a freestanding house like the one pictured above.

Source: adapted from Lewin, J 2020, ‘What does organic mean?’, BBC Good Food, viewed 5 June 2023, [bbcgoodfood.com](https://www.bbcgoodfood.com); © rozi81 | [dreamstime.com](https://www.dreamstime.com); © SACE Board of South Australia 2023; ‘White and brown concrete bungalow under clear blue sky’ | [pixabay.com](https://www.pixabay.com), published under a CC0 licence

Components of the ecological footprint



Source: adapted from Almazora, CMH, Dela Rama, T, and Malonzo, R, 'The ecological footprint', © 2015 WWF Japan and Global Footprint Network, viewed 9 May 2023, footprintnetwork.org

Refer to Sources 1 to 3, and to the topographic map on the map sheet, when answering Question 6.

Question 6

Explain the likely differences between the two couples' ecological footprints. Refer to different components of the ecological footprint in your answer.

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(5 marks)

Final checklist

- ☐ I have reviewed my work
- ☐ I understand that by selecting 'Next' I cannot return to the examination

Next