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ENVIRONMENTAL MANAGEMENT **0680/21**

Paper 2 Management in Context **May/June 2024**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

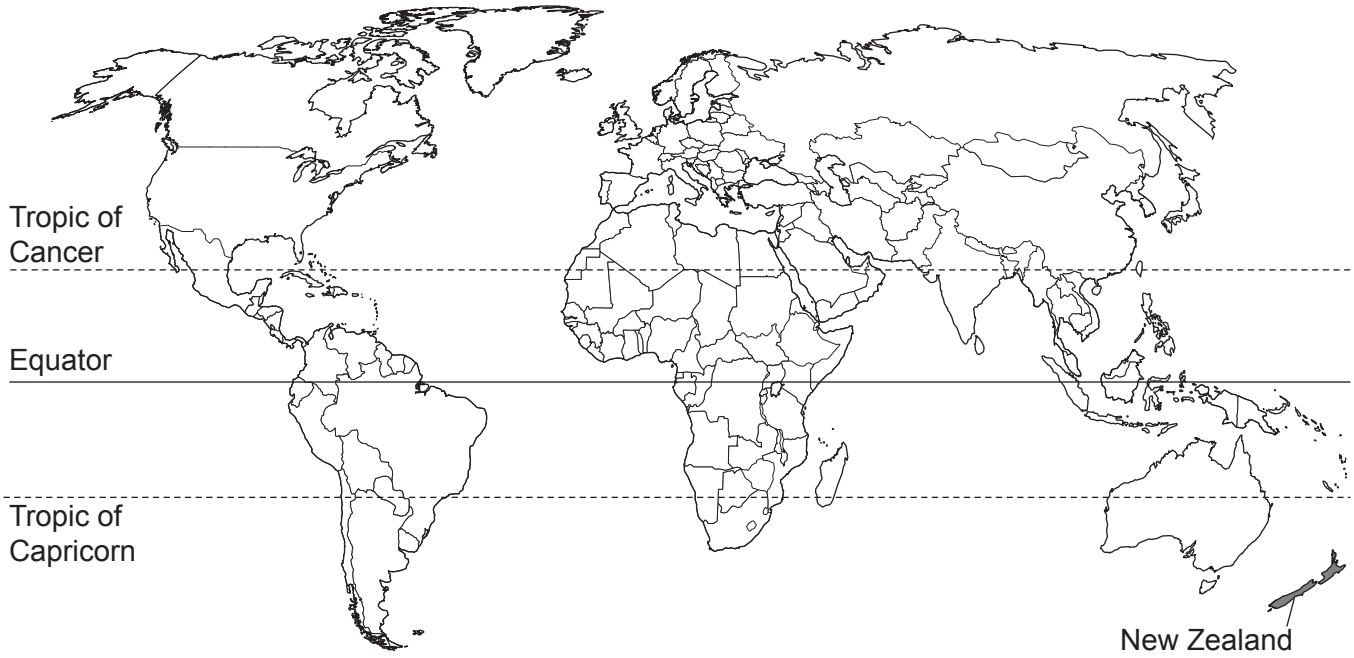
INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

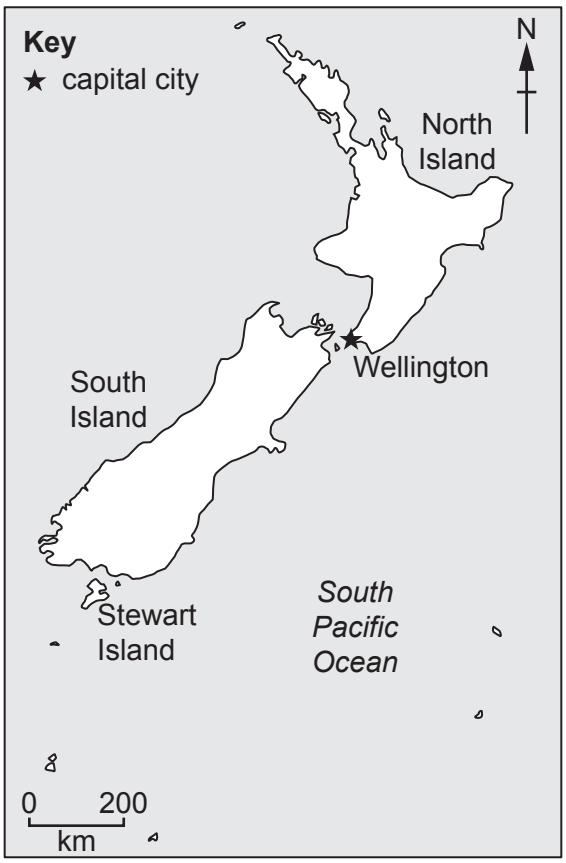
This document has **20** pages. Any blank pages are indicated.

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world map showing the location of New Zealand



map of New Zealand



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Area of New Zealand: 268 838 km^2

Population of New Zealand: 5.1 million (in 2022)

Children per woman: 1.86 (in 2022)

Life expectancy: 82.5 years

Currency: New Zealand dollar (1.47 NZD = 1 USD)

Language: English, Māori

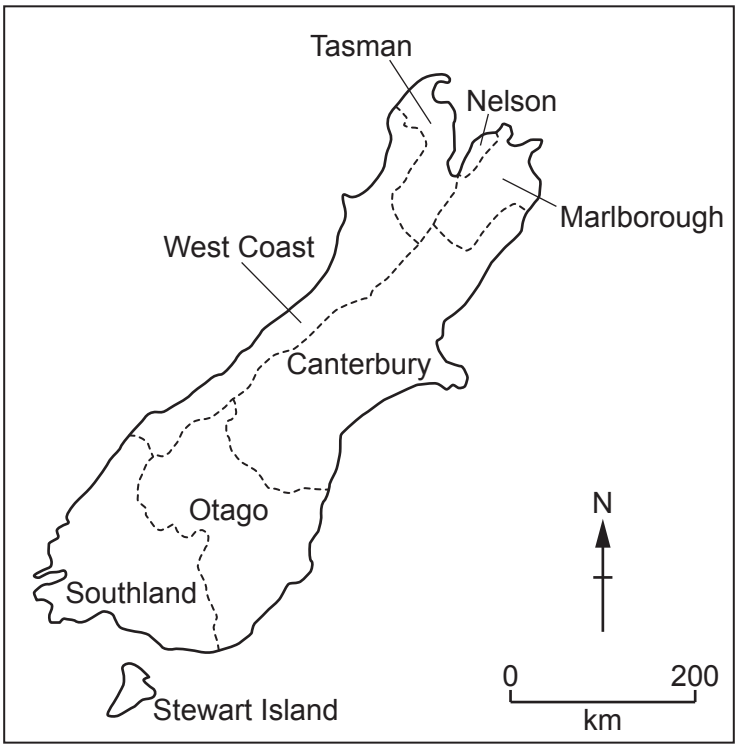
Climate of New Zealand: warm summers and cool winters with rainfall throughout the year

Terrain of New Zealand: mountains, low land along the coast

Main economic activities of New Zealand: agricultural production, silver and gold mining, services, consumer goods and tourism

New Zealand relies on exporting many agricultural products. Cereal crops, fruit and vegetables are mainly grown in the regions of Canterbury, Otago and Southland on South Island.

Map of South Island showing major regions



1 **(a)** **(i)** State **one** fact from the source information that indicates New Zealand is a more economically developed country (MEDC).

..... [1]

(ii) Describe the typical population pyramid of a MEDC.

.....

.....

.....

.....

.....

..... [3]

(iii) 25% of the population of New Zealand live on the South Island.

Calculate the number of people living on the South Island in 2022.

..... [1]

(iv) Circle the best estimate for the percentage of the total area of land of South Island occupied by the regions of Canterbury, Otago and Southland.

35 **50** **75** **90**

[1]

(b) Canterbury, Otago and Southland are the main regions for growing crops in New Zealand.

Farmers grow wheat, barley and oats. Other crops are then grown to feed livestock. Wheat is mainly grown for human consumption.

Explain why changing the crops grown in fields each year is a sustainable method of farming.

.....

.....

.....

.....

.....

..... [3]

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(c) The table shows the mean temperature and rainfall recorded at a farm in Canterbury.

month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
mean temperature / °C	17.5	17.0	16.5	13.0	10.0	8.0	7.5	8.5	10.0	13.0	14.0	16.0
mean rainfall / mm	41	37	54	52	54	64	77	67	45	51	42	47

Calculate the total annual rainfall.

..... mm [1]

(d) The photograph shows part of a farmer's field in drought conditions.



(i) The farmer expects drought conditions to occur on South Island.

Explain how climate change may cause drought.

.....

.....

.....

.....

.....

..... [3]

(ii) Identify **two** pieces of evidence in the photograph that suggest drought conditions.

1 .....

.....

2 .....

.....

[2]

(iii) State **three** ways the impact of drought can be managed on farms.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(e) Some farmers plant different varieties of apple trees at high density to give high yields.

(i) Pollination of flowers is needed for apple fruits to develop.

Describe the process of pollination.

.....

.....

.....

..... [2]

(ii) Fertilisers are used to maintain high yields of apples.

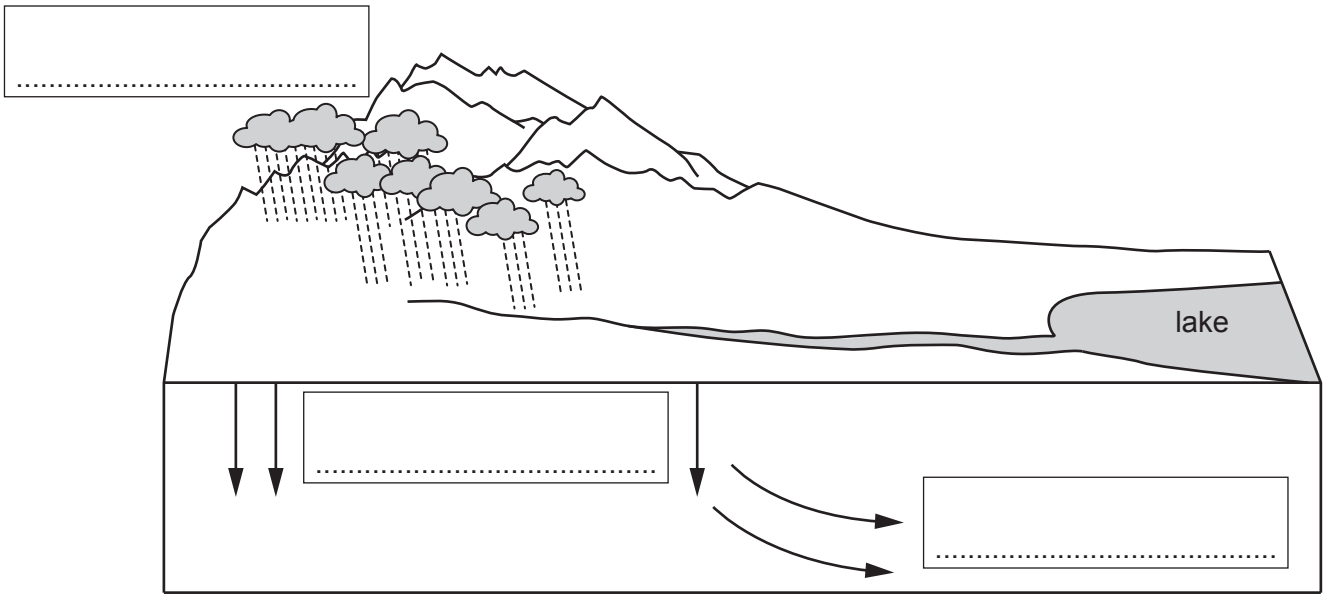
State **two** mineral ions in fertilisers.

1 .....

2 .....

[2]

(f) The diagram shows the water cycle for part of the Canterbury region.



Complete the diagram using terms from the list.

evaporation	**infiltration**	**ground water flow**
precipitation	**surface run-off**	**condensation**

[3]

(g) Suggest how farmers prevent fertilisers entering streams and rivers.

.....

.....

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.....

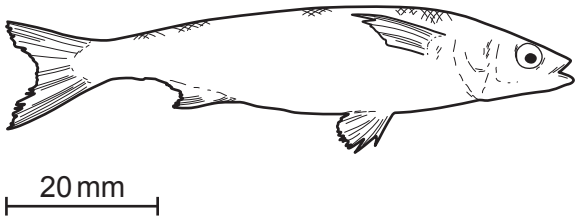
.....

..... [3]

[Total: 28]

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2 The diagram shows a yellow eye mullet fish.



This fish lives in the ocean around New Zealand.

(a) Use the scale to estimate the actual length of the fish shown in the diagram.

.....mm [1]

(b) A food chain for the yellow eye mullet is shown.

algae → shrimp → small fish → yellow eye mullet

(i) Explain why algae are producers.

.....

.....

.....

..... [2]

(ii) Identify the secondary consumer in this food chain.

..... [1]

(iii) Explain the meaning of the arrows in a food chain.

.....

..... [1]

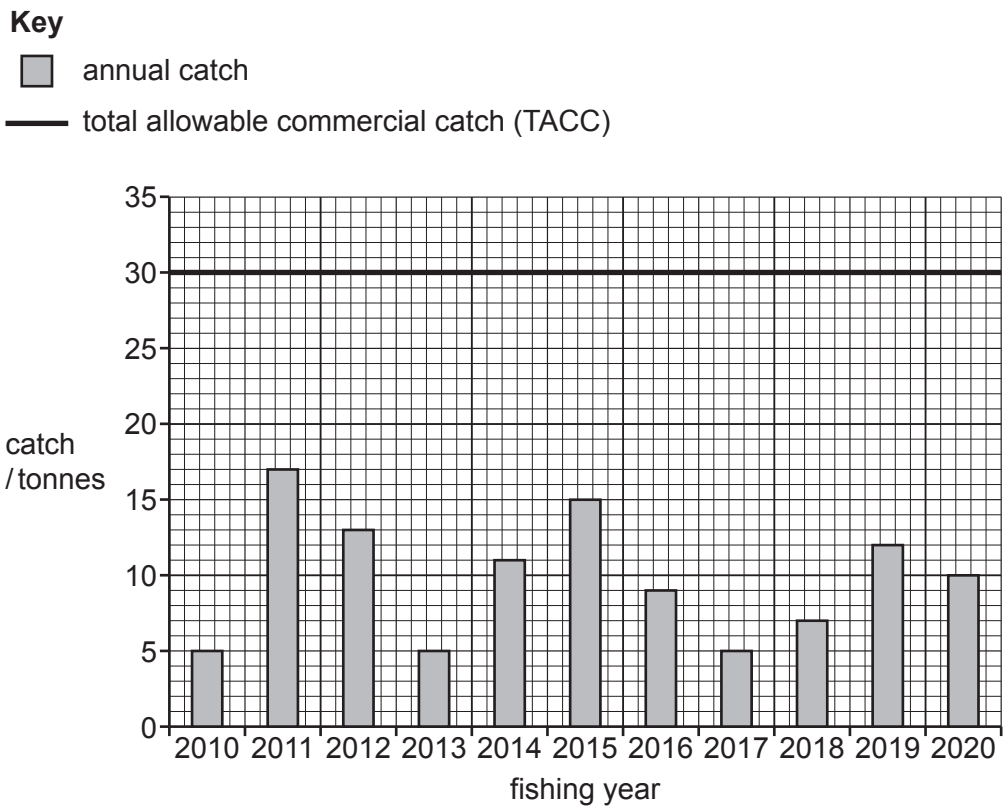
(iv) Explain the difference between a food chain and a food web.

.....

..... [1]

(c) The total allowable commercial catch (TACC) is the total quantity of each fish species that the commercial fishing industry can catch in a given year.

The bar chart shows the catch of yellow eye mullet for an 11-year period from one fishing area.



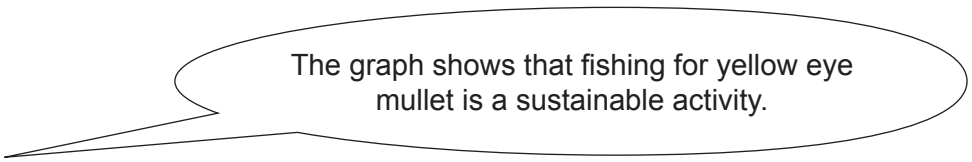
(i) Complete the sentences.

The highest annual catch was ..... tonnes.

The lowest annual catch was ..... tonnes.

[1]

(ii) A scientist said:



Describe **one** piece of evidence from the graph that supports this view.

.....

..... [1]

(iii) Another scientist considers three management options to support sustainable fishing.

option one
Reduce the TACC to 29 tonnes per year.

option two
Reduce the TACC to 17 tonnes per year.

option three
Reduce the TACC to 10 tonnes per year.

Suggest **one** reason why the scientist recommends **option three** to manage this fishing area.

.....

..... [1]

(d) Quotas are one strategy for managing this fishing area.

State **three** other management strategies that can keep a fishing area sustainable in the future.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(e) There is salmon fish farming in the cold water around Stewart Island.

The photograph shows sea cages full of salmon.

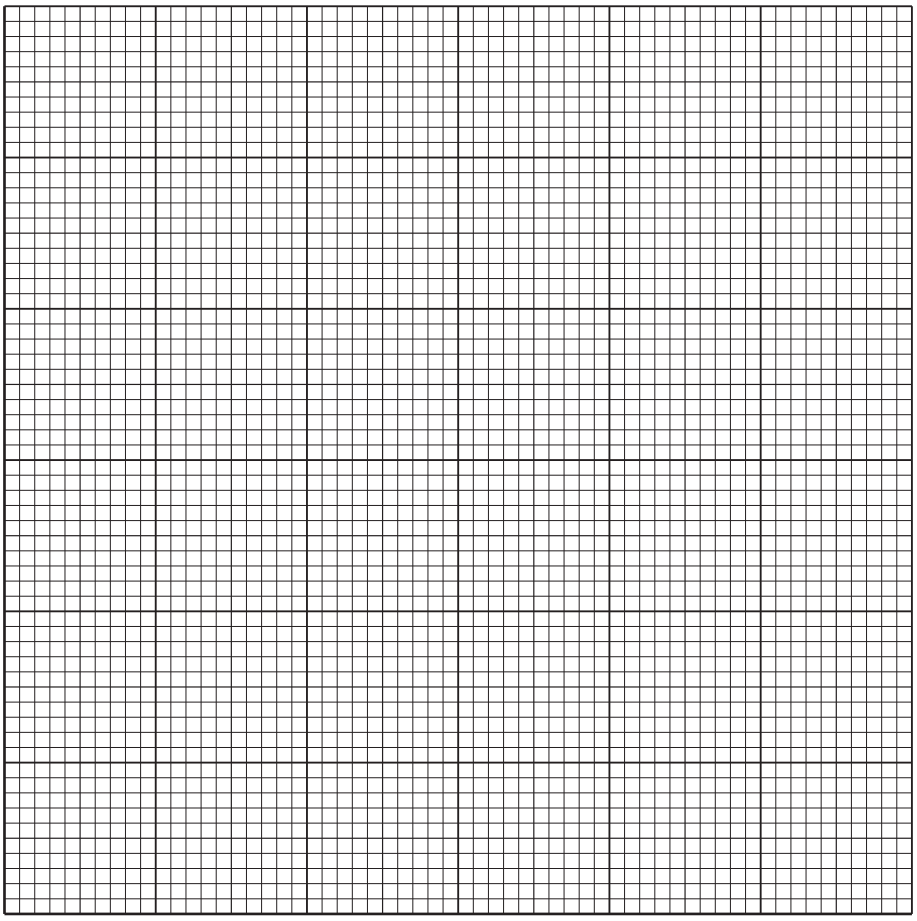


The table shows the exports of salmon from New Zealand between 2016 and 2020.

year	mass of salmon exported / thousand tonnes
2016	3.8
2017	4.4
2018	5.0
2019	5.3
2020	4.6

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(i) Plot a bar chart of the data.



[4]

(ii) Calculate the percentage increase in the mass of exported salmon from 2016 to 2020.

..... [2]

(iii) In 2020, the sea around Stewart Island was 6 °C above the mean temperature.

Suggest **one** reason why the mass of salmon exports decreased in 2020.

.....

..... [1]

(f) Increased ocean temperatures around New Zealand are predicted to be more frequent in the future.

Explain how the enhanced greenhouse effect can cause this change.

.....

.....

.....

.....

.....

..... [3]

(g) The demand for fish exported from New Zealand increases every year.

A company applies for a licence to build a new fish farm.

A licence is only given if an environmental impact assessment shows that the impacts to the local environment can be managed effectively.

Suggest **three** possible impacts of a fish farm.

1 .....

2 .....

3 .....

[3]

[Total: 25]

3 The photograph shows a gold and silver mine on North Island. This mine is expected to close in 2030.



(a) (i) State the type of mining shown in the photograph.

..... [1]

(ii) Suggest **one** risk to miners working in this mine.

..... [1]

(iii) The rock at this mine is igneous. Gold and silver can be found in other rock types.

State the names of **two** other rock types.

1 ……..……..

2 ……..……..

[2]

(iv) The waste from this mine contains rock and soil.

Complete the table to show the components of soil.

components of soil
mineral particles
living plants
.....
.....
.....

[3]

(b) A scientist investigates grass growth in waste rock around the mine.

The scientist collects seeds from one species of grass growing on waste rock.

This species of grass can only grow in a pH range of 4.7 to 8.5.

The scientist uses this method:

- fill 5 pots with soil
- fill 5 pots with waste rock
- put 10 seeds in each pot
- water each pot every 5 days
- measure the height of the tallest leaf and count the number of flowers in each pot at 30, 60 and 90 days.

The table shows the results of the investigation.

	soil			waste rock		
days after planting	30	60	90	30	60	90
mean height of the tallest leaf / cm	4.8	9.3	13.9	1.5	2.8	5.7
mean number of flowers	1	4	8	0	0	0

(i) Explain why the scientist includes pots with soil in this investigation.

.....

..... [1]

(ii) Suggest **three** factors the scientist should keep the same in this investigation.

1 .....

2 .....

3 .....
[3]

(iii) Write **two** suitable conclusions for this investigation.

1 .....

.....

2 .....

.....
[2]

(iv) The scientist wants to use genetic modification (GM) to produce a grass that is resistant to insect pests.

Describe how the scientist uses GM to produce grass that is resistant to insect pests.

.....

.....

.....

.....

.....

..... [3]

(c) The photograph shows part of a mine that closed several years ago.



There has been some bioremediation of this mine.

(i) Suggest how bioremediation can be used to restore this mine.

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..... [4]

(ii) This mine is going to become a nature reserve.

Describe **two** benefits of nature reserves.

1 .....

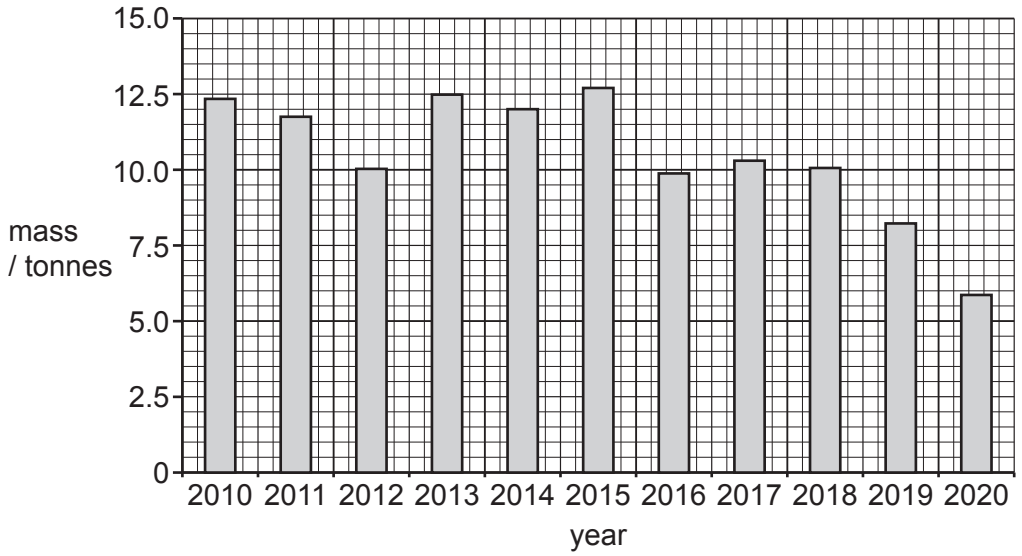
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2 .....

.....

[2]

(d) The bar chart shows gold production in New Zealand from 2010 to 2020.



Describe the trends shown in the bar chart.

.....

.....

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..... [2]

(e) A new gold mine is planned in New Zealand.

Suggest reasons why some people object to a new gold mine.

.....

.....

.....

.....

.....

..... [3]

[Total: 27]

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