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CANDIDATE NAME

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0901782161

ENVIRONMENTAL MANAGEMENT **0680/23**

Paper 2 Management in Context **May/June 2026**

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. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

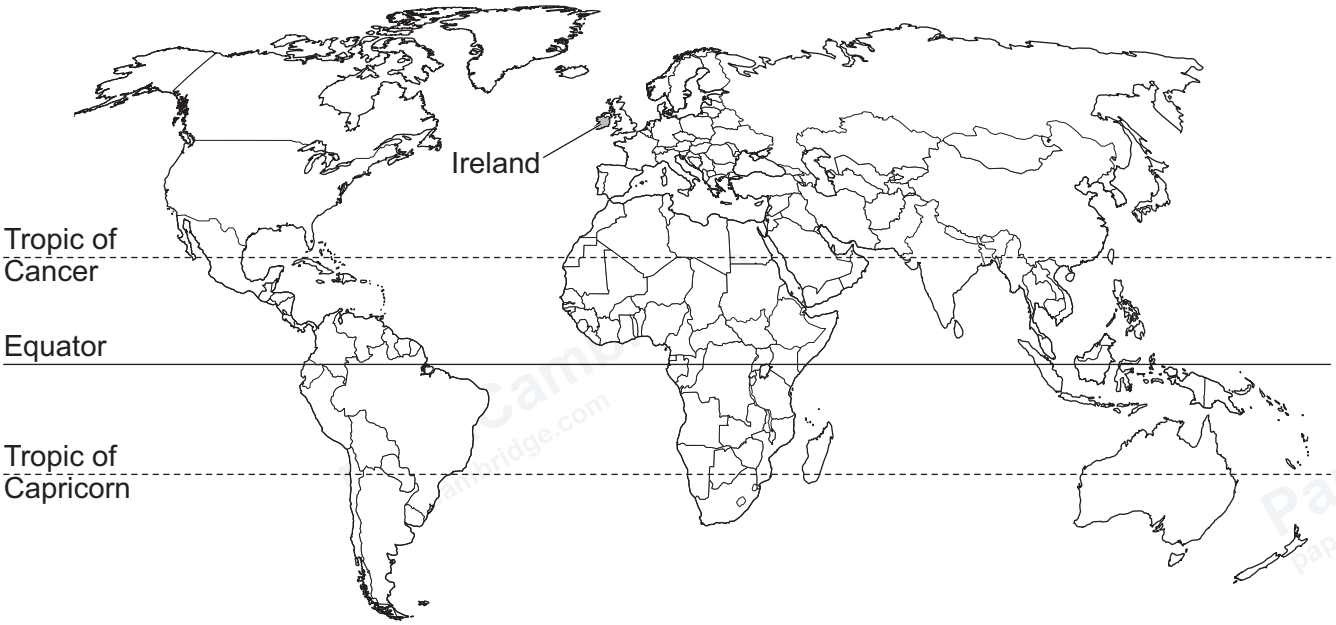
- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **24** pages. Any blank pages are indicated.

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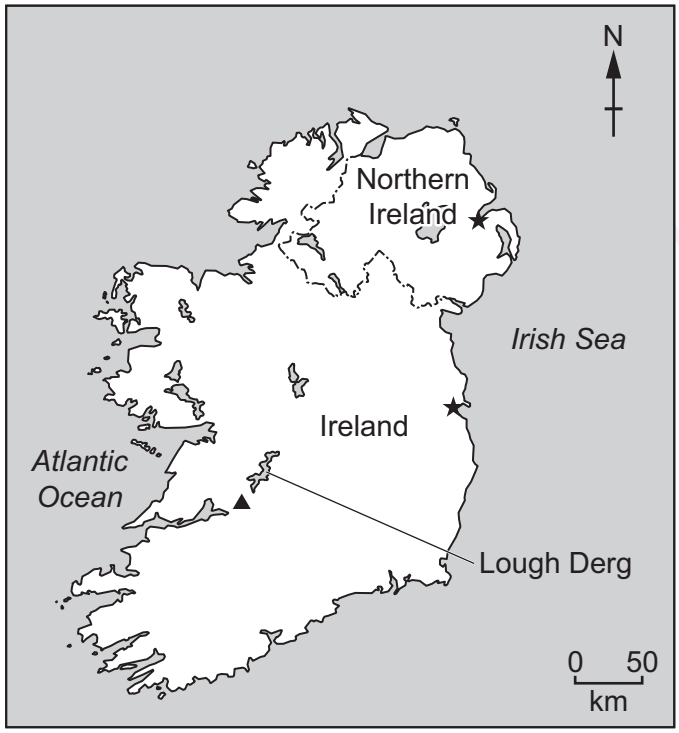
world map showing the location of Ireland



map of Ireland

key

- ★ capital city
- –·––· international boundary
- water bodies
- ▲ Ardnacrusha hydro-electric power plant



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Area of Ireland: 70 273 km^2

Population of Ireland: 5.2 million (in 2024)

Children per woman in Ireland: 1.72 (in 2024)

Life expectancy in Ireland: 82 years

Currency: Euro (0.93 Euro = 1 USD in 2024)

Language: English, Irish

Climate of Ireland: mild winters, cool summers, frequent rain and cloudy sky

Terrain of Ireland: mostly flat interior surrounded by hills and low mountains, sea cliffs on west coast

Main economic activities of Ireland: agriculture, fishing, tourism

Over 40% of the population live within 100 km of the capital city Dublin. 100% of the population has access to electricity. The majority of electricity comes from fossil fuels. There are no nuclear power stations. Ireland contains natural resources of natural gas, zinc, lead and limestone.

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1 **(a)** Calculate the number of people, in millions, that lived within 100 km of the capital city in 2024.

Give your answer to **one** decimal place.

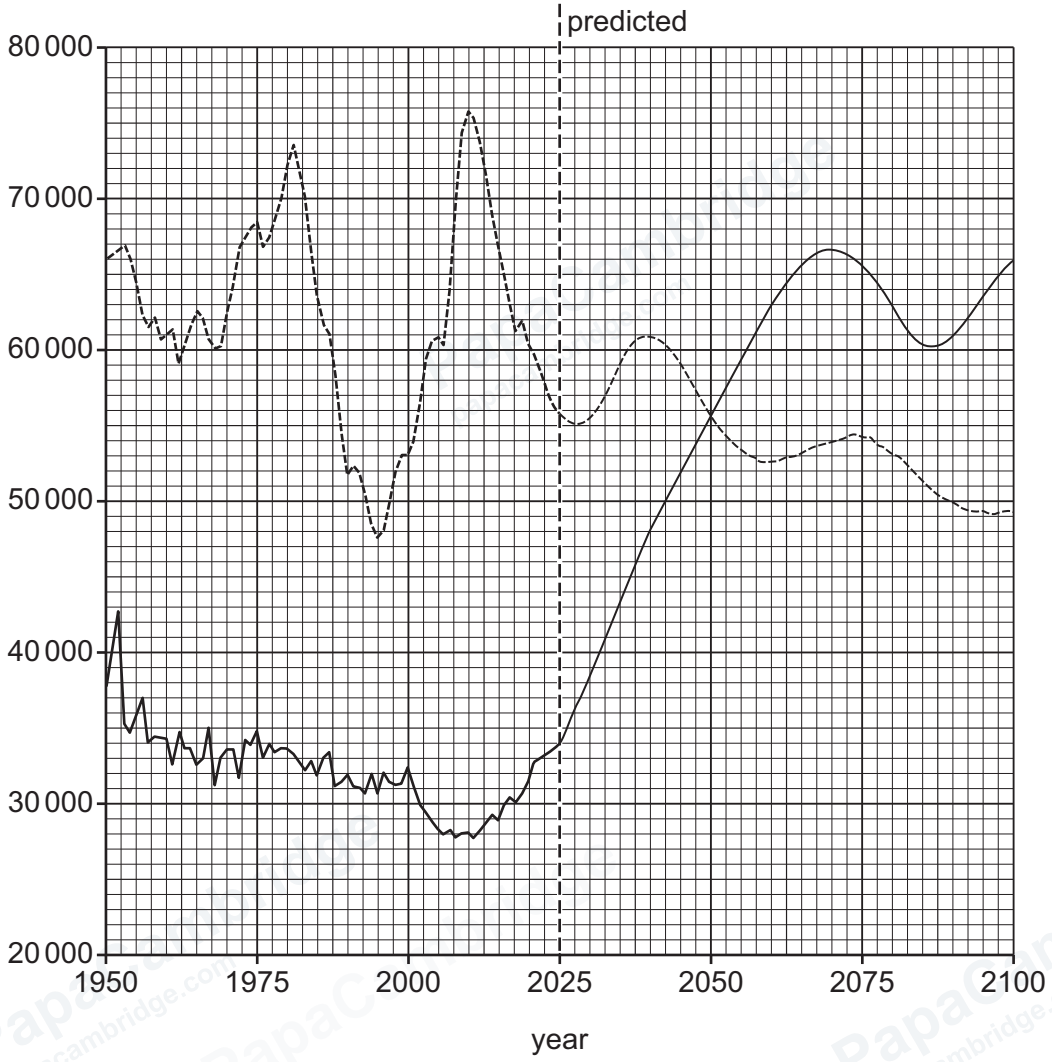
..... million people [2]

(b) The graph shows the births and deaths per year in Ireland from 1950 to 2025 and predicted values to 2100.

key

------ births

—— deaths



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(i) Describe the overall trend for births from 1950 to 2025 shown on the graph.

.....

..... [1]

(ii) A student concludes from the graph that the economy of Ireland will reduce after 2050.

Suggest **two** reasons for this conclusion.

1 .....

.....

2 .....

..... [2]

(iii) There is a change in the predicted number of births and deaths in Ireland from 2050 to 2100.

Suggest **two** reasons for this change.

1 .....

.....

2 .....

..... [2]

(c) The west of Ireland has more mountains than the rest of Ireland.

Suggest the impact this terrain has on population density in the west of Ireland.

Give **two** reasons for your answer in terms of the terrain.

impact .....

reason 1 .....

.....

reason 2 .....

..... [2]

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(d) The student draws a map to show different rock types in Ireland.

key

igneous:

granite

metamorphic:

quartzite

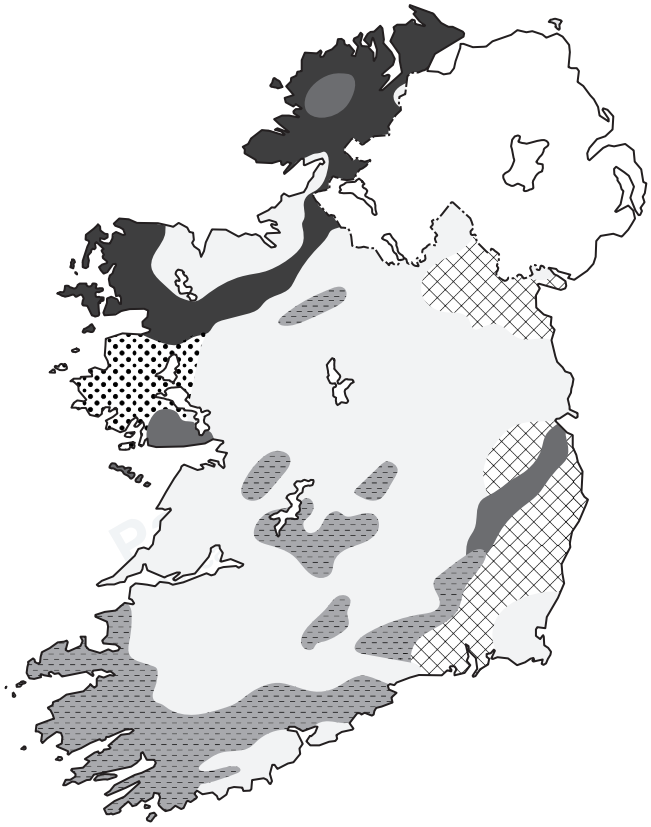
marble

sedimentary:

shale

limestone

sandstone



(i) Use the map to identify the most common rock type.
Circle your answer.

igneous **metamorphic** **sedimentary**

[1]

(ii) Use the map to estimate the percentage of rock that is marble.
Circle your answer.

5% **10%** **50%** **80%**

[1]

(iii) Quartzite and marble are metamorphic rocks.

Name **one** other metamorphic rock.

..... [1]

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(iv) Describe the formation of sedimentary rocks.

.....

.....

.....

.....

.....

.....

..... [4]

(e) A report states that 90% of soils in Ireland have low concentrations of phosphate ions and potassium ions.

(i) Suggest the impact this has on crop yield.

..... [1]

(ii) State **three** ways soil fertility can be improved.

1 .....

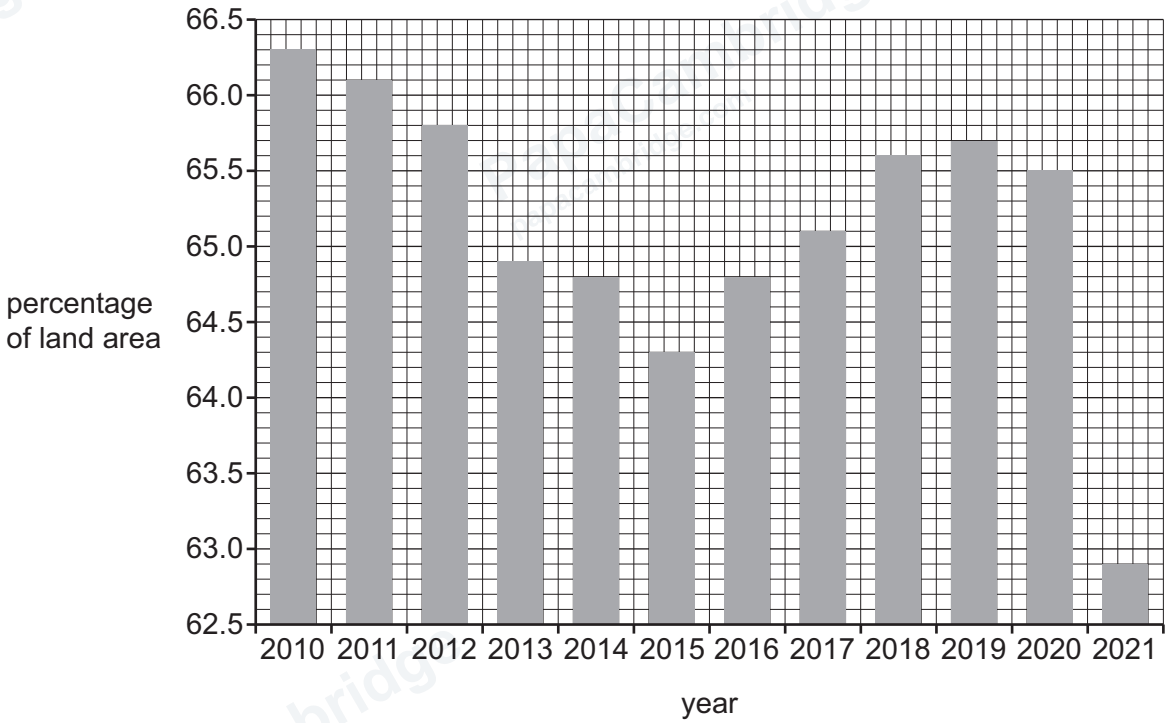
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(f) The bar chart shows the percentage of land area used for agriculture from 2010 to 2021 in Ireland.



(i) Determine the range for the percentage of land area in the bar chart.

.....% [2]

(ii) Suggest **one** reason why the percentage of land area used for agriculture decreases.

.....

..... [1]

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(g) Arable and subsistence are different types of agriculture.

Describe the meaning of these different types of agriculture.

arable .....

.....

subsistence .....

.....

[2]

(h) Many farmers in Ireland use contour ploughing and bunds.

(i) Describe how contour ploughing reduces soil erosion.

.....

.....

.....

.....

.....

..... [3]

(ii) Describe a bund.

.....

..... [1]

[Total: 29]

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2 The photograph shows a zinc and lead mine in Ireland.



The mine is a subsurface mine.

(a) Suggest **two** reasons why mineral extraction from a subsurface mine is more expensive than surface mining.

1 .....

.....

2 .....

..... [2]

(b) Suggest **one** reason why local infrastructure can improve when a mine opens in an area.

.....

..... [1]

(c) The price of zinc metal changes.

Suggest **one** impact of a decrease in the price of zinc metal on the mine.

.....

..... [1]

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(d) The mining company was required to carry out an environmental impact assessment, EIA, before the mine was developed.

As part of the EIA, the mining company was required to:

- plant trees around the mining site
- plan how to monitor noise and air pollution
- create a management strategy for dealing with solid mining waste
- plan how to safely store the water used in the mineral extraction.

(i) Suggest the benefit of planting trees around the mining site.

.....

..... [1]

(ii) Suggest **one** source of noise pollution from the mine.

.....

..... [1]

(iii) The solid mining waste is stored above ground.

Suggest **two** management strategies for dealing with solid mining waste to reduce its impact on the environment.

1 .....

.....

2 .....

.....

[2]

(iv) Water used in the mineral extraction is stored on the surface in artificial ponds. The ponds are surrounded by soil walls.

Suggest **two** ways contaminated water can enter ground water.

1 .....

2 .....

[2]

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(e) The waste water from another mine contains high concentrations of zinc ions.

The mining company treats the waste water with biochar.

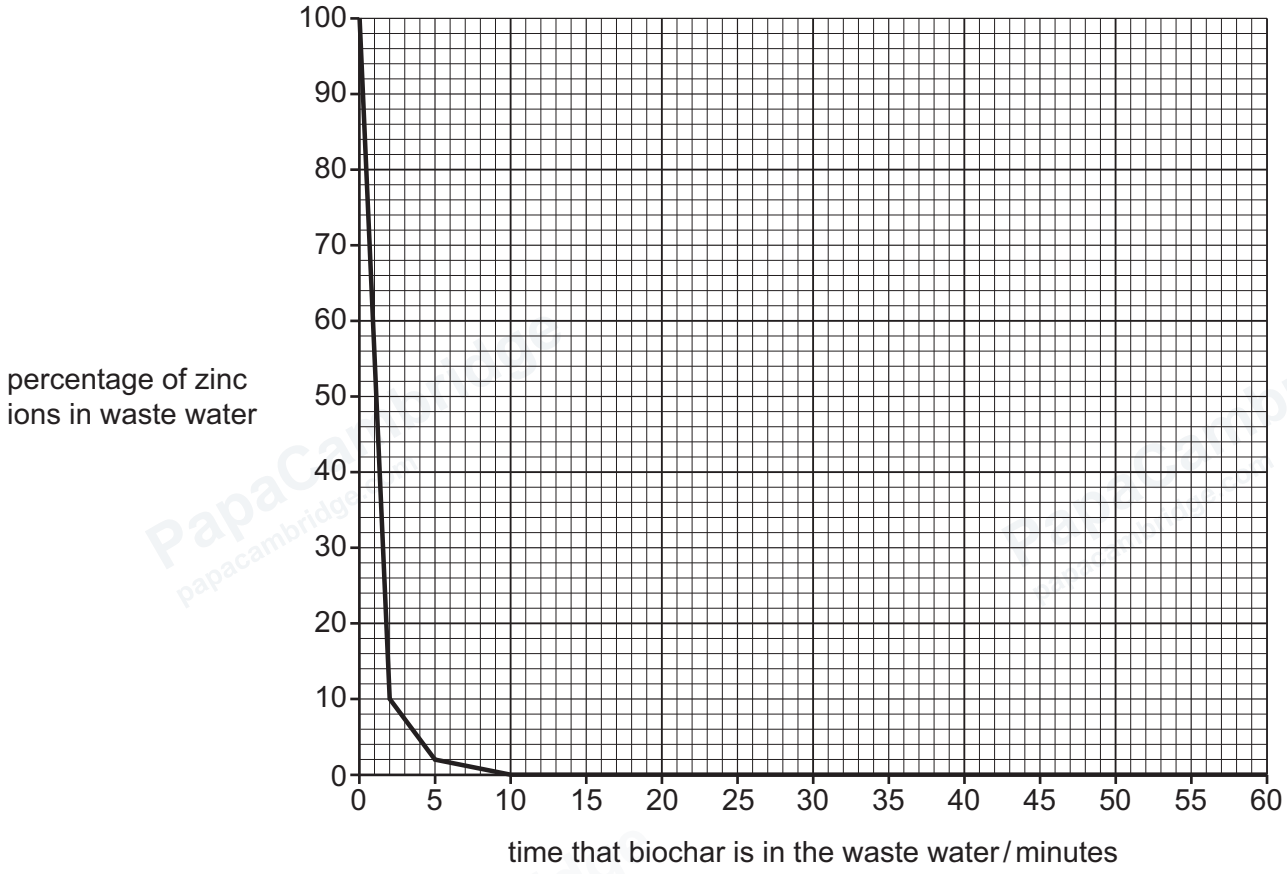
Biochar is a waste product from biomass energy generation.

(i) Suggest why using biochar to treat waste water is a sustainable strategy.

.....

..... [1]

(ii) The graph shows the results of adding biochar to waste water.



Describe the effectiveness of using biochar to treat waste water for zinc ions.

.....

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.....

..... [2]

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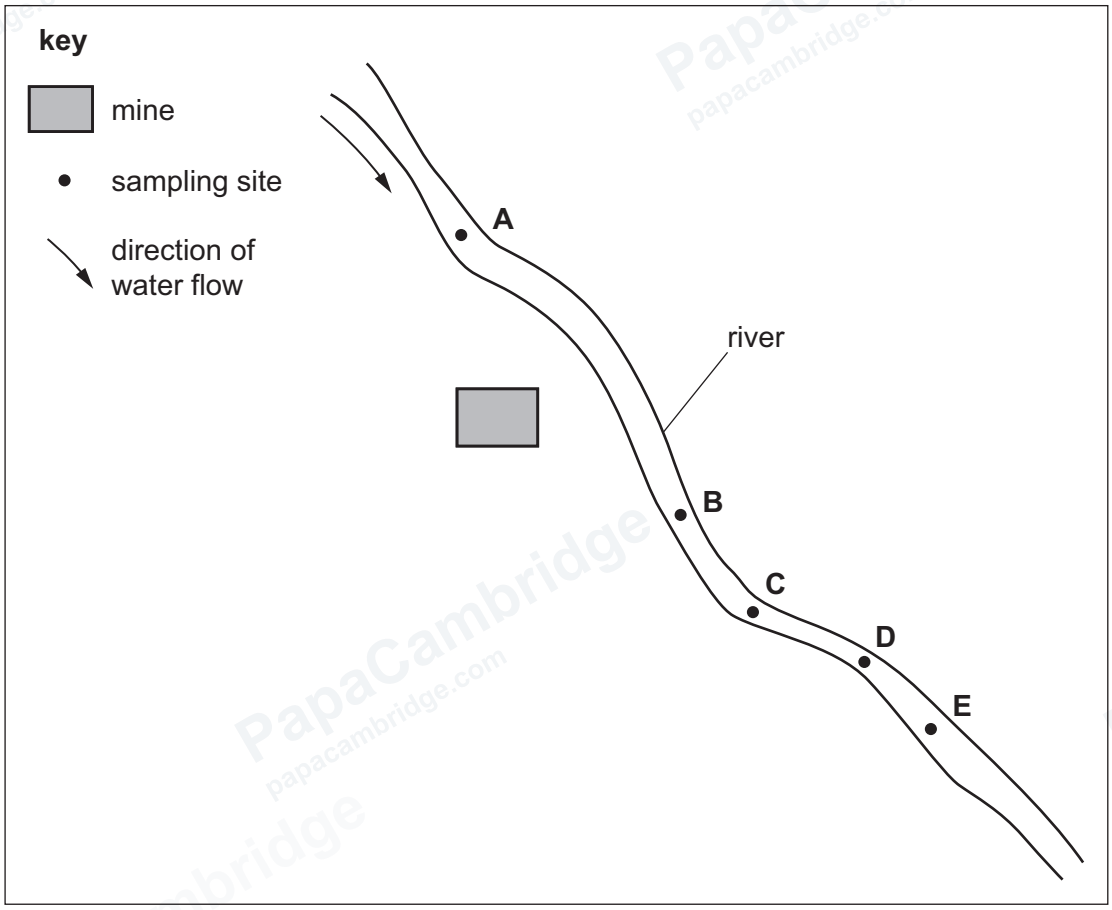
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(f) A scientist investigates whether a different mine is polluting a local river.

The scientist uses this method to sample the river water.

- Select 5 sampling sites, **A** to **E**.
- Collect 1 dm^3 of water at each sampling site for 7 days at 9:00 am each day.
- Repeat the sampling each month for 6 months.

The diagram shows the mine and sampling sites.



(i) Suggest why sampling site **A** is used.

.....

..... [1]

(ii) Suggest why the scientist samples from all 4 sites, **B**, **C**, **D** and **E**.

.....

..... [1]

(iii) Identify **two** variables that are controlled in this investigation.

1 .....

2 .....

[2]

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(iv) Suggest why the scientist repeats the sampling.

.....

..... [1]

(v) Suggest why the scientist records the rainfall in the area during the investigation.

..... [1]

[Total: 19]

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3 Lough Derg is a fresh water lake in Ireland.

(a) The photograph shows a layer of algae on the surface of the lake. This is called an algal bloom.



(i) State **one** nutrient responsible for increasing the growth of algae in water.

..... [1]

(ii) Explain why plants in the water die when algae form a bloom over the surface of the lake.

.....

.....

.....

..... [2]

(iii) Explain why fish die in water that is covered with an algal bloom.

.....

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.....

..... [3]

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(b) White-tailed eagles nest at Lough Derg.



(i) A food chain for the white-tailed eagle is shown.

algae → insects → fish → white-tailed eagle

State what the arrows indicate in the food chain.

..... [1]

(ii) Explain why water pollution in Lough Derg is a concern for white-tailed eagles.

Refer to the food chain in your answer.

.....

..... [1]

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(c) White-tailed eagles were reintroduced to Ireland in 2007.

Initially, 15 eagle chicks were brought from Norway to Ireland.

Between 2007 and 2012 a total of 100 eagle chicks were introduced.

(i) Suggest the benefits of introducing more eagle chicks each year from Norway to Ireland.

.....

.....

.....

..... [2]

(ii) Suggest how the population of white-tailed eagles can be monitored.

.....

..... [1]

(d) The photograph shows quagga mussels attached to rocks at Lough Derg.

The mussels are usually less than 3 cm in length.



This species of mussel is not native to Lough Derg. They are an invasive species.

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(i) Suggest **three** reasons why invasive species are a threat to native species.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(ii) Suggest **one** way quagga mussels entered Lough Derg.

..... [1]

(e) The population density of quagga mussels at Lough Derg was investigated.

The table shows the results.

sampling site	date	estimated number of individuals per m^2
W	July 2021	2173
	Jan 2022	4817
X	July 2021	4520
	Jan 2022	20233
Y	July 2021	4105
	Jan 2022	15612

(i) Identify the sampling site with the greatest increase in quagga mussels from 2021 to 2022.

..... [1]

(ii) Suggest why the number of individuals per m^2 is an estimate.

.....

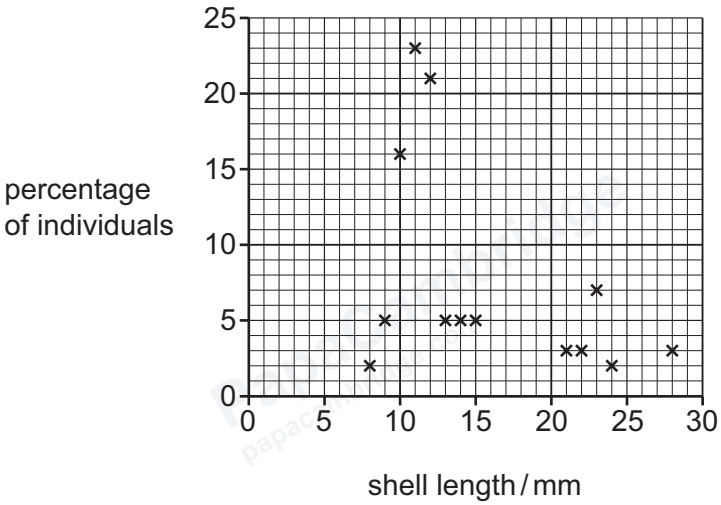
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(f) The shell length of quagga mussels is investigated. The shell lengths are recorded to the nearest mm.

The graph shows the results.



(i) Identify the maximum shell length.

.....mm [1]

(ii) Identify the percentage of individuals that have a shell length of exactly 12 mm.

.....% [1]

(g) The number of quagga mussels is predicted to reach carrying capacity in Lough Derg.

Explain what is meant by carrying capacity.

.....

.....

.....

..... [2]

[Total: 21]

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4 The Ardnacrusha power plant is a hydro-electric power station.



(a) Describe how a hydro-electric power station generates electricity.

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.....

.....

..... [4]

(b) The power a hydro-electric power station can generate is calculated using this equation.

power (in kW) = 6 × head (in m) × flow (in m^3/sec)

At Ardnacrusha:

- head = 28.5 m
- flow = 400 m^3/sec

Use the equation and data to calculate the power in kW available from the Ardnacrusha hydro-electric power plant.

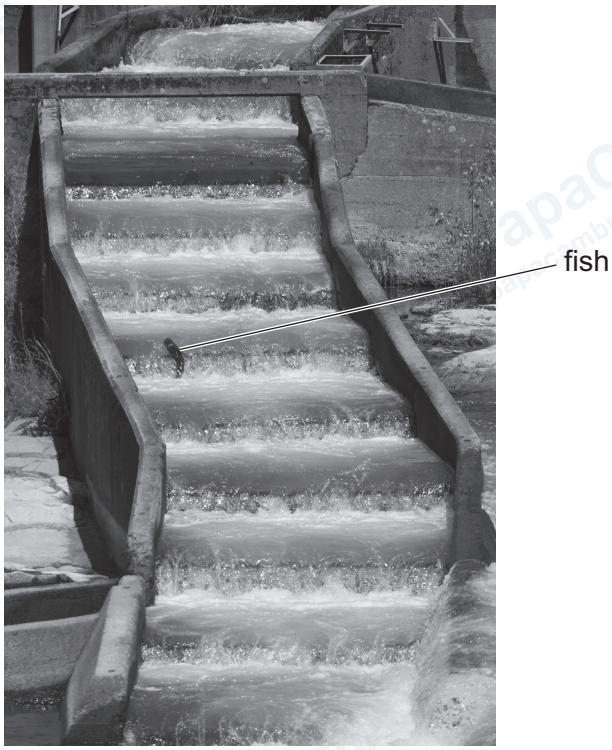
..... kW [1]

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(c) The photograph shows a fish ladder at a dam.



A fish ladder provides a route for fish to swim from water at the base of a dam to the reservoir at the top of the dam.

Suggest **one** way fish ladders help maintain the population of fish.

.....

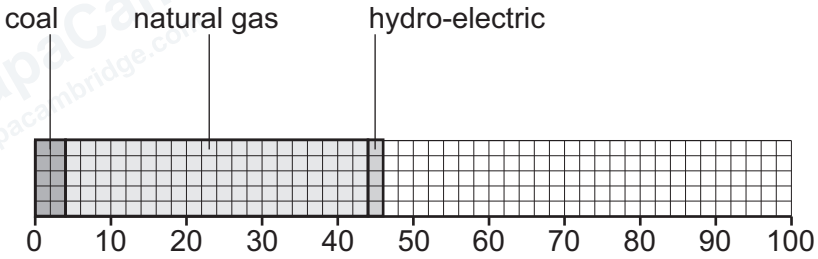
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(d) The divided bar chart shows the sources of domestic energy production in Ireland in 2022.



(i) Complete the divided bar chart to show 20% for biofuels and 34% for other renewables.

Label the bars. [1]

(ii) Suggest **one** renewable resource in the 'other renewables' category.

..... [1]

(e) A report states that Ireland's energy consumption from renewable resources is the lowest in the European Union.

Suggest **three** reasons for this.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

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