1 **(a)** The photograph shows wind turbines.

(i) Describe the landscape in the photograph where the wind turbines are located.

.....

.....

.....

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.....

..... [3]

(ii) State what is unusual about the location of these wind turbines. Give a reason for your answer.

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.....

.....[2]

(iii) Suggest advantages and disadvantages of the area shown in the photograph for the location of a nuclear power station.

advantages .....

.....

.....

.....

disadvantages .....

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.....

.....
[3]

(b) Describe features of a climate that are beneficial to hydro-electric power production.

.....

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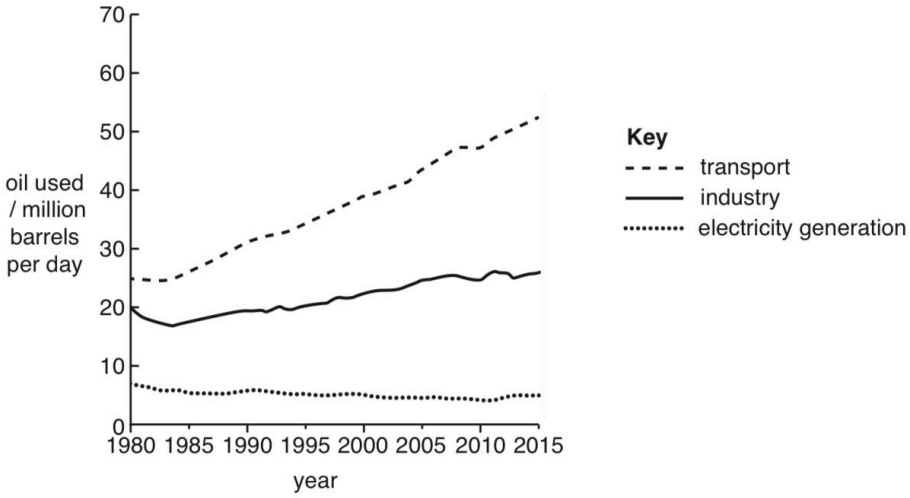
.....[2]

Section A

Answer **all** the questions.

1 The graph shows some changes in the use of oil in the world from 1980 to 2015.



(a) (i) Calculate the quantity of oil used per day in 1980.

..... million barrels per day [1]

(ii) Compare the trends in the use of oil for industry and for generating electricity between 1980 and 2015.

.....

.....

.....

.....[2]

(iii) Suggest reasons for the trend in the use of oil for generating electricity since 1980.

.....

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.....[2]

(iv) Suggest **one** reason why the use of oil for transport has increased so greatly.

.....

.....[1]

(b) (i) Describe how oil is formed.

.....

.....

.....

.....[2]

(ii) Describe methods used to search for oil deposits.

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.....[2]

7 **(a)** Describe the formation of oil.

.....

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.....

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..... [3]

(b) Describe the advantages and disadvantages of oil as an energy resource.

advantages .....

.....

.....

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disadvantages .....

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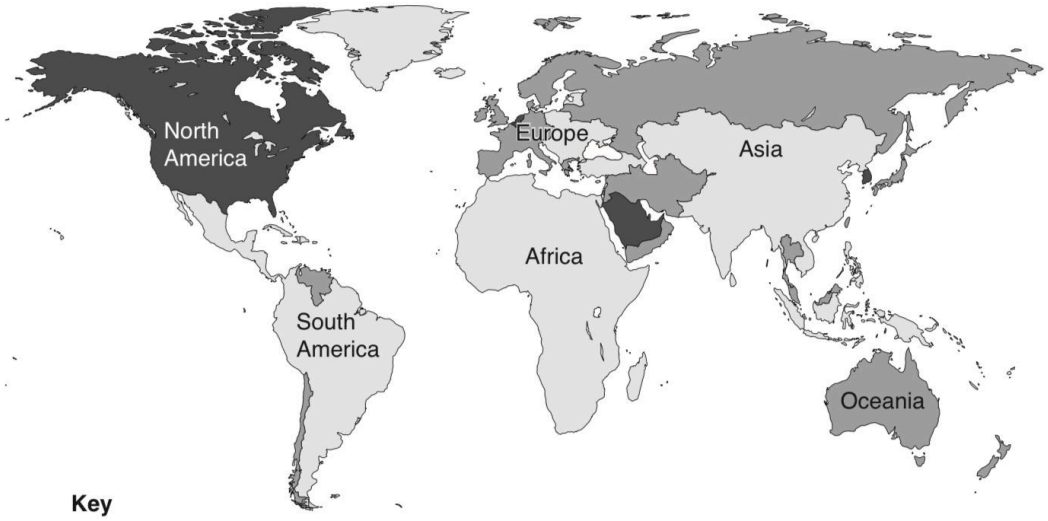
[4]

(c) The map shows average oil consumption per person in 2015.



Key

- low oil consumption per person
- medium oil consumption per person
- high oil consumption per person

(i) State the continent where oil use per person is low in all countries.

..... [1]

(ii) State the continent with high oil use per person.

..... [1]

(iii) Explain why oil use per person is much higher in some countries than in others.

.....

.....

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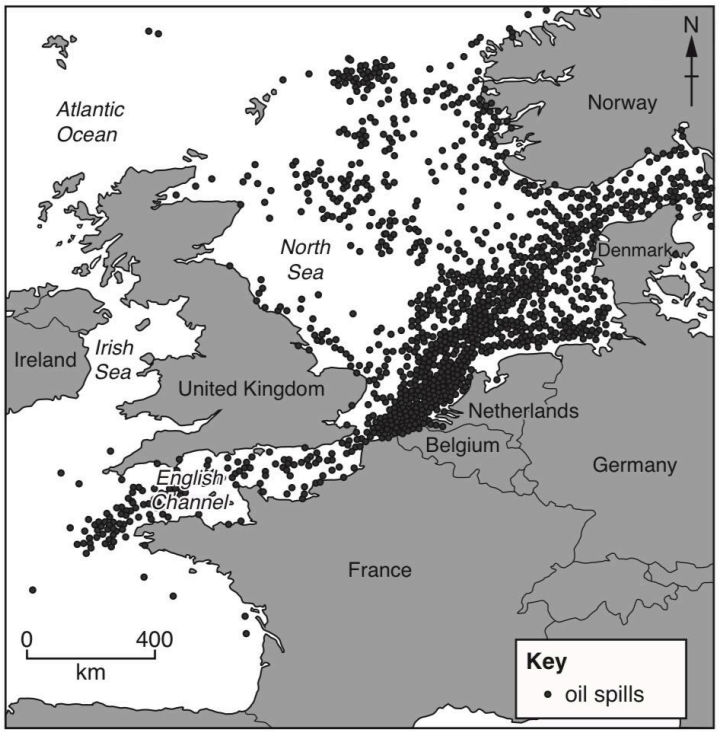
..... [3]

(d) The map shows the location of oil spills in a seven-year period in the seas around part of north-west Europe.



(i) Describe the distribution of the oil spills shown on the map.

.....

.....

.....

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.....

..... [3]

(ii) Discuss strategies for minimising the impact of oil spills at sea.

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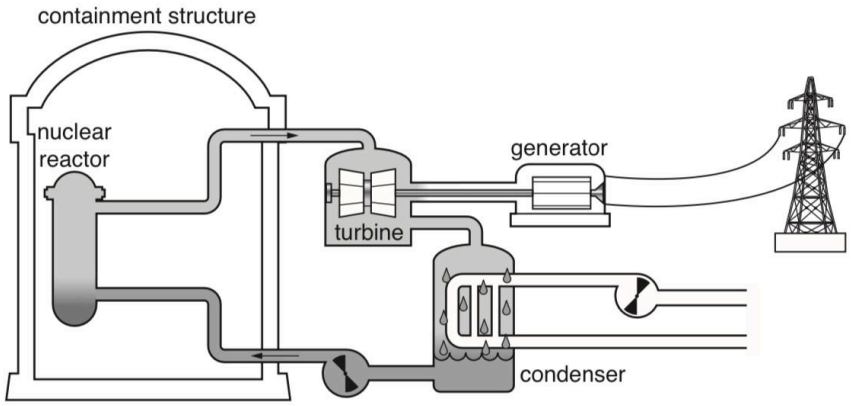
..... [3]

[Total: 18]

5 The diagram shows some of the processes used to generate electricity in a nuclear power station.



(a) Use the diagram to describe how electricity is generated within a nuclear power station.

.....

.....

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.....

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..... [4]

(b) Describe **three** reasons why using nuclear power to generate electricity is better for the environment than using coal.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) Describe ways a country can reduce its energy demand without damaging its economy.

.....

.....

.....

.....

.....

..... [3]

(d) Building a nuclear power station is expensive. The table shows the percentage costs for building a new nuclear power station.

costs		percentage costs
equipment costs	steam supply system	12
	generating equipment	12
	mechanical equipment	16
	instrumentation and control system	8
other costs	building materials	12
	labour	.....
	design	10
	fuel	3
	total	100

(i) Complete the table by calculating the percentage cost for labour. [1]

(ii) The power station is predicted to cost 14 billion USD to build.

Calculate the total equipment costs for building the power station.

..... USD [2]

(iii) A nuclear power station creates radioactive waste. The management of this waste is expensive and difficult.

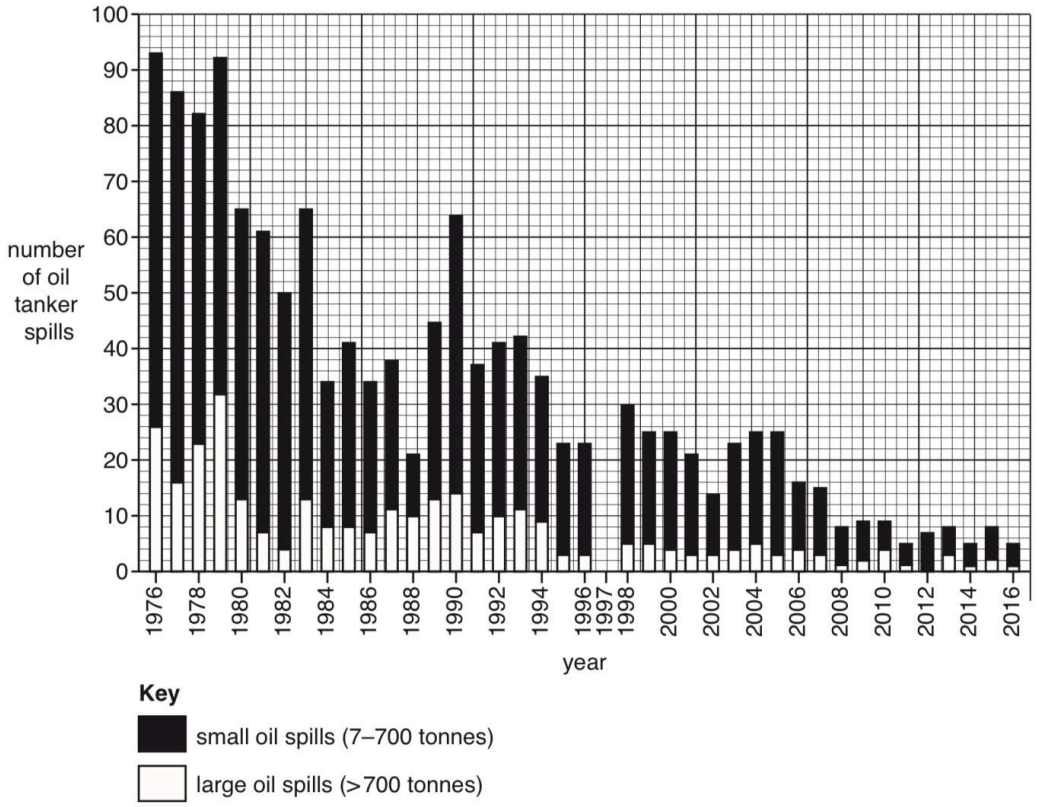
The most dangerous waste costs 93 000 USD per m^3 to manage. It is estimated that the power station will produce 12 m^3 of the most dangerous waste each year.

Calculate the estimated cost of managing this waste per year.

..... USD [1]

[Total: 14]

7 The bar chart shows the number of oil tanker spills in the world's oceans between 1976 and 2016.



(a) (i) Complete the bar chart using the data in the table for 1997.

	number of oil tanker spills in 1997
small oil spills (7–700 tonnes)	10
large oil spills (>700 tonnes)	18

[2]

(ii) Identify the year with the highest number of large oil spills.

..... [1]

(iii) Identify the number of small oil spills in 1988.

..... [1]

(iv) Describe the trends in oil tanker spills between 1976 and 2016.

.....

.....

.....

.....

.....

..... [3]

(v) Suggest **two** reasons for the differences in the number of oil tanker spills between 1976 and 2016.

1 .....

.....

2 .....

.....

[2]

(b) Explain ways oil spills can impact marine organisms.

.....

.....

.....

.....

.....

..... [3]

(c) Transportation of oil by tankers is a major source of oil pollution.

State **one** other major source of oil pollution.

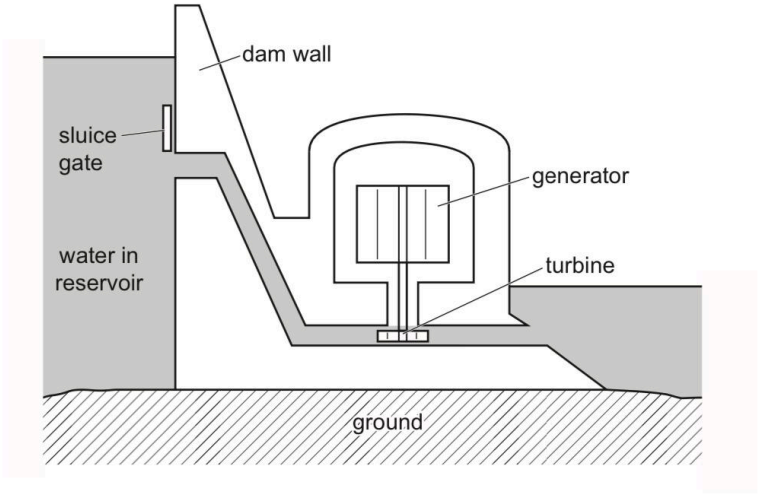
.....

..... [1]

[Total: 13]

Section A

1 The diagram shows how electricity can be generated using hydroelectric power.



(a) Use the diagram to explain how electricity is generated using a hydroelectric power station.

.....

.....

.....

.....

.....

..... [3]

(b) State **one** impact of a hydroelectric power station on the environment.

.....

..... [1]

(c) Other than impact on the environment, suggest reasons why some countries do **not** have any hydroelectric power stations.

.....

.....

.....

..... [2]

[Total: 6]

7 **(a)** Some environmental scientists investigated sources of marine oil pollution.

The table shows their results.

(i) Complete the table by calculating the total estimated mass of oil.

source of marine oil pollution	estimated mass of oil / tonnes per year
sea bed	600 000
large ships	457 000
ports	115 000
small boats	53 000
oil rigs	20 000
total	.....

[1]

(ii) Calculate the percentage of oil that enters the marine environment from the sea bed.

..... % [1]

(iii) Suggest **one** reason why the mass of oil is estimated.

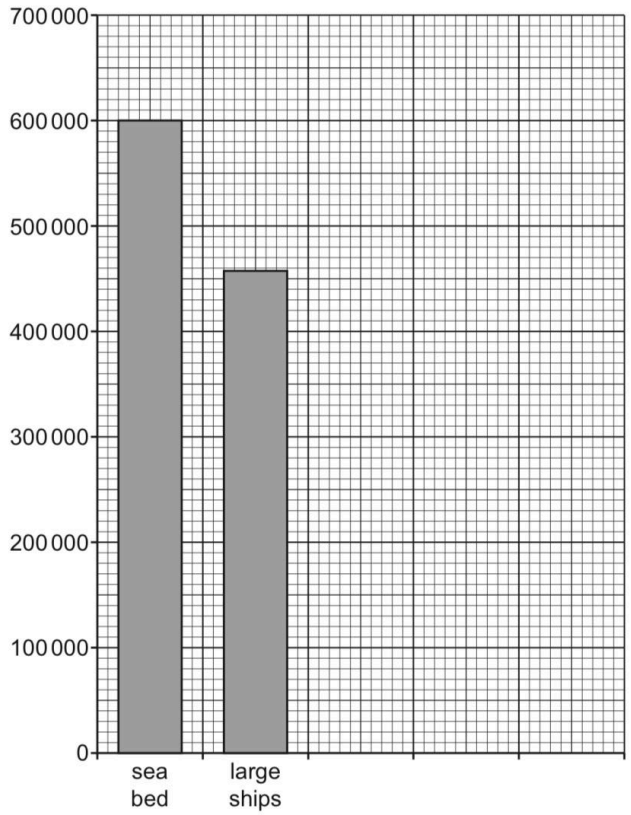
.....

..... [1]

(iv) Use the data from the table to complete the bar chart of the sources of marine oil pollution.

Label both axes.

.....



.....

[3]

(b) Describe the impacts of an oil spill on a marine ecosystem.

.....

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..... [4]

(c) Oil tankers are a major source of marine oil pollution.

Describe strategies to reduce the risk of oil spills.

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.....

.....

..... [3]

[Total: 13]

8 The table shows vehicle emissions from cars with different types of engines.

engine type	carbon dioxide / arbitrary units	carbon monoxide / arbitrary units
electric	10	22
hybrid (electric and petrol)	50	176
diesel	160	408
petrol	120	221

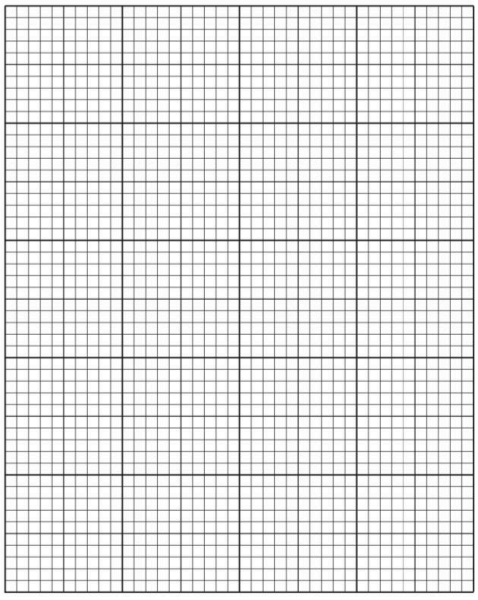
(a) (i) Calculate the difference in carbon monoxide emissions between a hybrid and a petrol engine.

..... [1]

(ii) Use the data to determine which engine type causes most harm to the environment.

..... [1]

(iii) On the grid, plot a bar chart of carbon **dioxide** emissions for each engine type.



[4]

(b) Suggest ways that governments can encourage the use of electric vehicles.

.....

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..... [3]

(c) Explain why reducing carbon dioxide emissions is of **global** importance.

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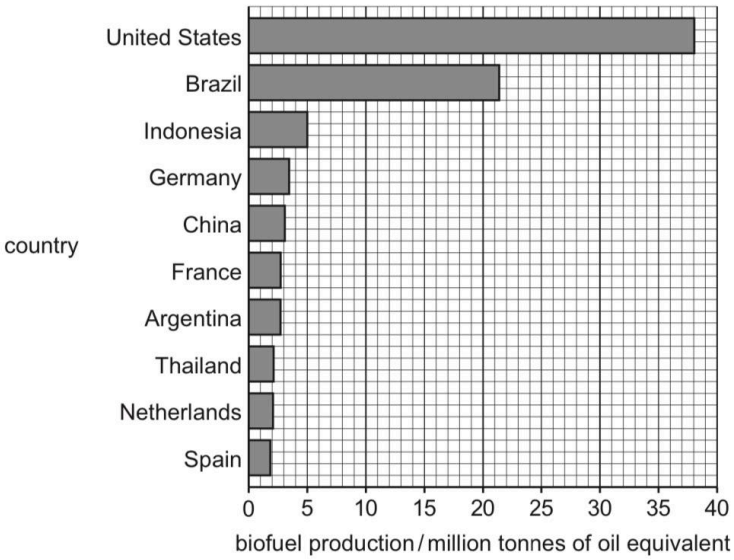
..... [4]

[Total: 13]

6 **(a)** The bar chart shows the leading countries for biofuel production in 2018 (in million tonnes of oil equivalent).



(i) Use the bar chart to determine the biofuel production for Indonesia.

..... million tonnes of oil equivalent [1]

(ii) Suggest **two** advantages of using biofuel as an energy resource.

1 .....

.....

2 .....

.....

[2]

(iii) Suggest **one** disadvantage of using biofuel as an energy resource.

.....

..... [1]

(iv) It is predicted that the U.S. will use approximately 36 billion gallons of biofuels and 140 billion gallons of gasoline for transport in 2022.

Suggest whether biofuels are a realistic replacement for gasoline in transport. Give reasons for your answer.

.....

.....

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.....

..... [3]

(b) A student reads an internet article on electric vehicles.

> Worldwide, the use of electric vehicles has increased rapidly.
>
> In 2013, there were approximately 250 000 electric cars in the world.
>
> In 2018, there were more than 5.1 million electric cars in the world. The number of electric two-wheelers was 260 million, and there were 460 000 electric buses. In freight transport, there were 250 000 light-commercial vehicles (LCVs) and 1000 electric trucks.

(i) Present the data from the article in a suitable table to show the number of each type of electric vehicle in 2018.

[3]

(ii) Suggest why there has been a rapid increase in the worldwide use of electric vehicles.

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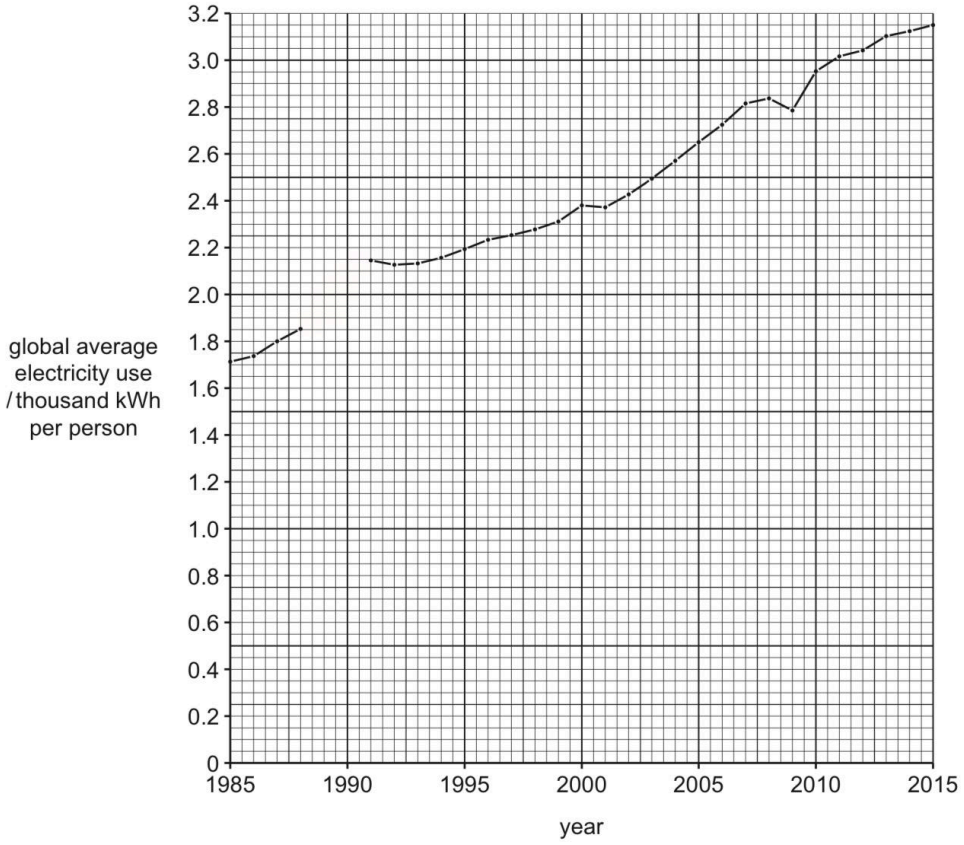
..... [4]

[Total: 14]

5 The graph shows the global average electricity use per person from 1985 to 2015.



(a) (i) Complete the graph by including the information in the table.

year	**global average electricity use / thousand kWh per person**
1989	1900
1990	2100

[2]

(ii) Describe the trend in global average electricity use per person from 1985 to 2015.

.....

.....

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..... [2]

(iii) Suggest reasons why average electricity use per person varies between countries.

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..... [4]

(b) Describe ways to reduce domestic energy use.

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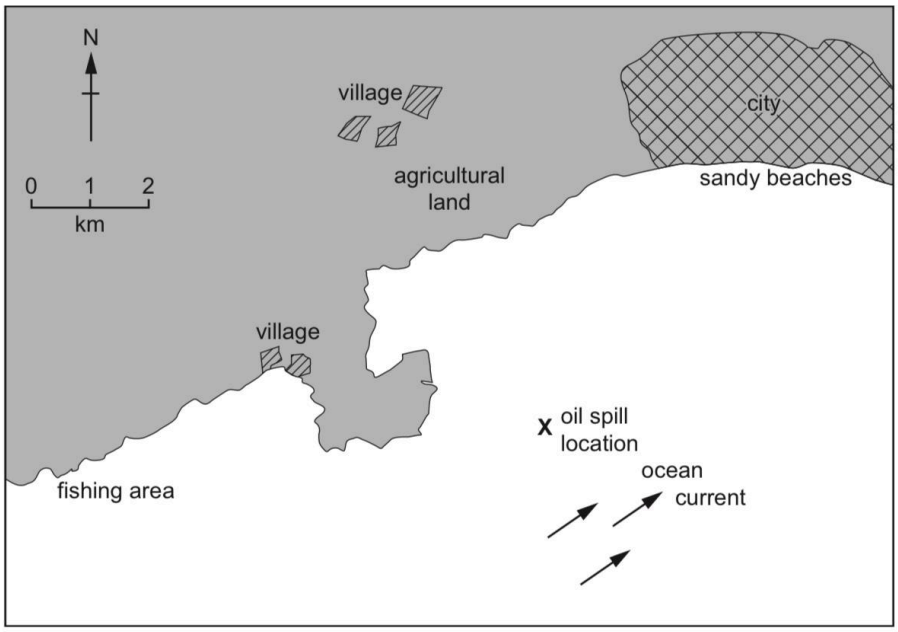
..... [4]

[Total: 12]

2 The map shows some features of a coastal area of a country.



(a) An oil spill occurs in the sea at location **X**.

(i) Determine the distance between the oil spill and the nearest land.

..... km [1]

(ii) Suggest which local industry will be affected first by the oil spill.

Give a reason for your answer.

.....

.....

.....

..... [2]

(b) Describe how each of the following equipment reduces the impact of an oil spill.

booms .....

.....

detergent sprays .....

.....

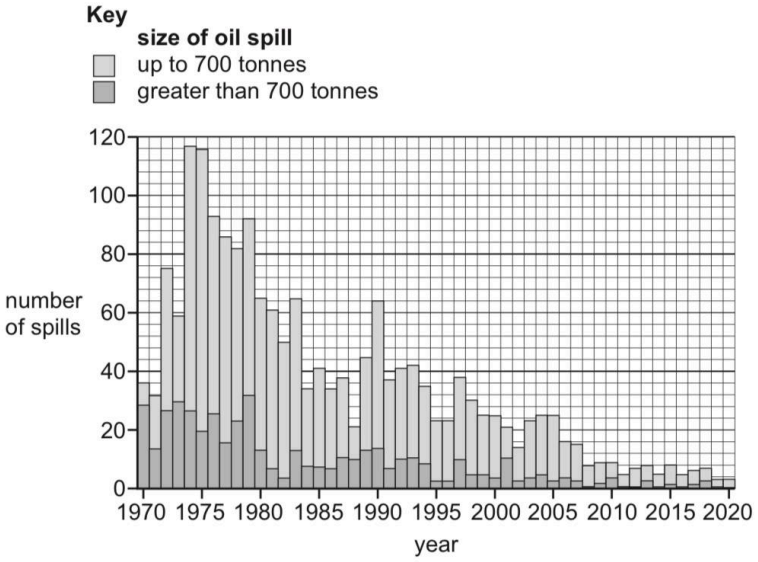
skimmers .....

.....

[3]

[Total: 6]

6 The bar chart shows the number of oil spills at sea between 1970 and 2020.



(a) (i) State the year with the highest number of oil spills greater than 700 tonnes.

..... [1]

(ii) Describe the trends shown by the bar chart.

.....

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.....

..... [3]

(b) (i) Describe the impact of oil pollution on coastal ecosystems.

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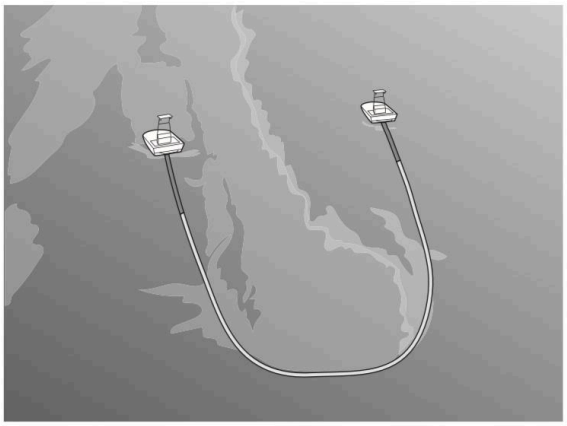
..... [3]

(ii) The diagram shows a boom being used to reduce the impact of an oil spill.



Discuss the effectiveness of using a boom as a strategy for reducing the impact of oil spills at sea.

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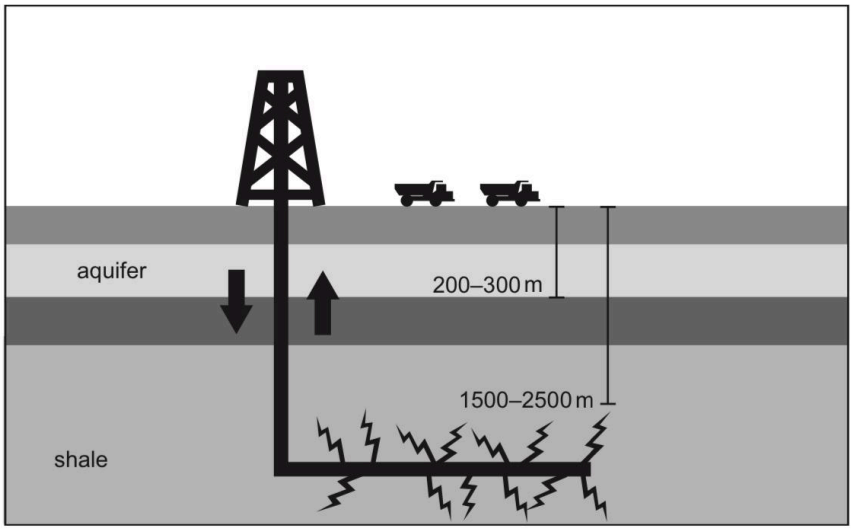
..... [4]

(c) The diagram shows the process of fracking.



(i) Describe the process of fracking as a means of extracting oil.

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..... [3]

(ii) Suggest why some people are concerned about fracking.

.....

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..... [3]

[Total: 17]

2 **(a)** The table shows the year that reserves of fossil fuels are predicted to be used up.

fossil fuel	year the reserve will be used up
oil	2052
coal	2090
natural gas	2060

(i) Calculate the number of years the reserves of coal are predicted to last.

..... years [1]

(ii) State **two** reasons why the reserves of fossil fuels might be used up before the predicted year.

1 .....

.....

2 .....

.....

[2]

(b) Describe the formation of coal.

.....

.....

.....

.....

.....

..... [3]

(c) State **two** renewable energy resources.

1 .....

2 .....

[1]

[Total: 7]