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International Examinations Papers

Mob: +974 55373670 / 33787500

E-mail: chymrc.muhammad@gmail.com

ENVIRONMENT MANAGEMENT

**TOPIC-Extraction of Rocks
And Minerals, Affecting factors**

3 The newspaper report is about an oil discovery under the Arctic Ocean.

OIL FOUND IN THE ARCTIC OCEAN

Oil has been found under the Arctic Ocean close to the Russian Arctic National Park. Over half of the national park is ocean. Tourists come to see the wildlife such as polar bears, reindeer, walruses and birds. Rare animals include the narwhal and the bowhead whale. There are also many rare plants.

The temperature in winter can reach minus 45°C. The ocean is covered in one metre thick ice for nine months of the year.

Scientists think that there could be more oil and gas under the Arctic Ocean.

(a) (i) Explain, using information in the report and your own knowledge, why searching for oil under the Arctic Ocean is difficult and expensive.

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..... [3]

(ii) Explain how the wildlife in the Russian Arctic National Park might be affected by oil spills.

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..... [4]

(b) Describe **three** ways of reducing the impacts of oil spills.

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
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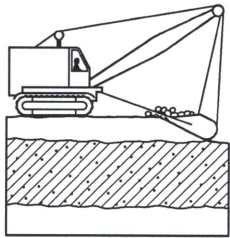
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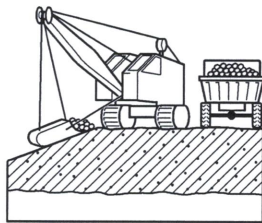
6 (a) (i) The diagrams show 4 stages in the extraction of a mineral, such as coal, from the ground. They are not in the correct order. Put the letters **A**, **B**, **C** and **D** in the correct order and state the type of mining.

Key

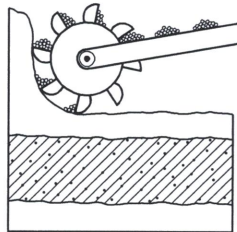
 seam of a mineral such as coal



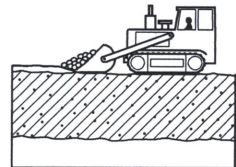
A



B



C



D

correct order

type of mining

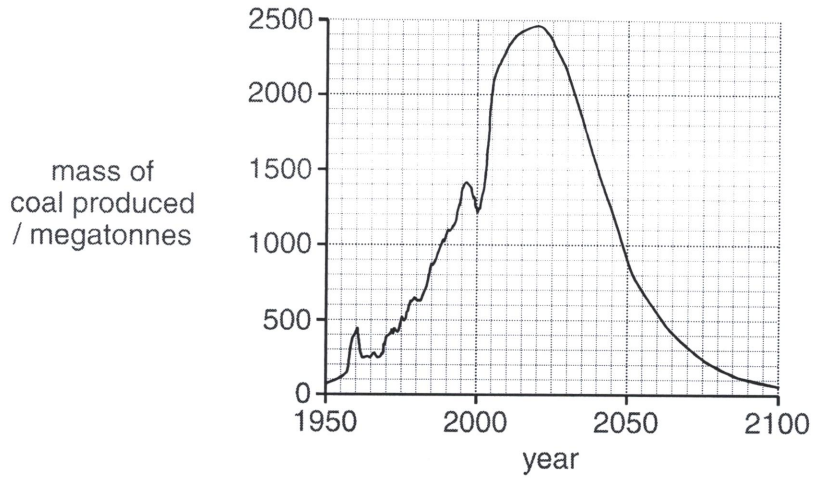
[3]

(ii) Describe how land could be restored after such mining.

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(b) The graph below shows past and expected coal production for China.

For
Examiner's
Use



(i) Give the date of the expected peak production from this graph.

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[1]

(ii) What could be done to extend the life of the known coal reserves in China?

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 [3]

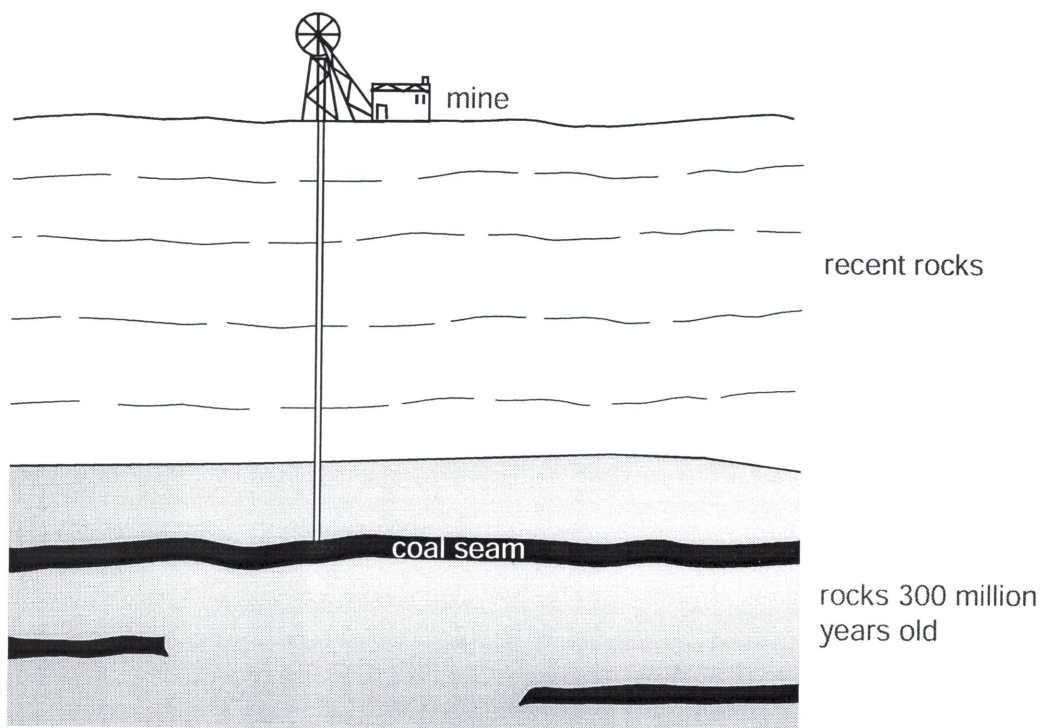
[Total: 10]

2 (a) The coal that is mined today was formed millions of years ago.

300 million years ago



today



(i) Explain how coal is formed.

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.....[3]

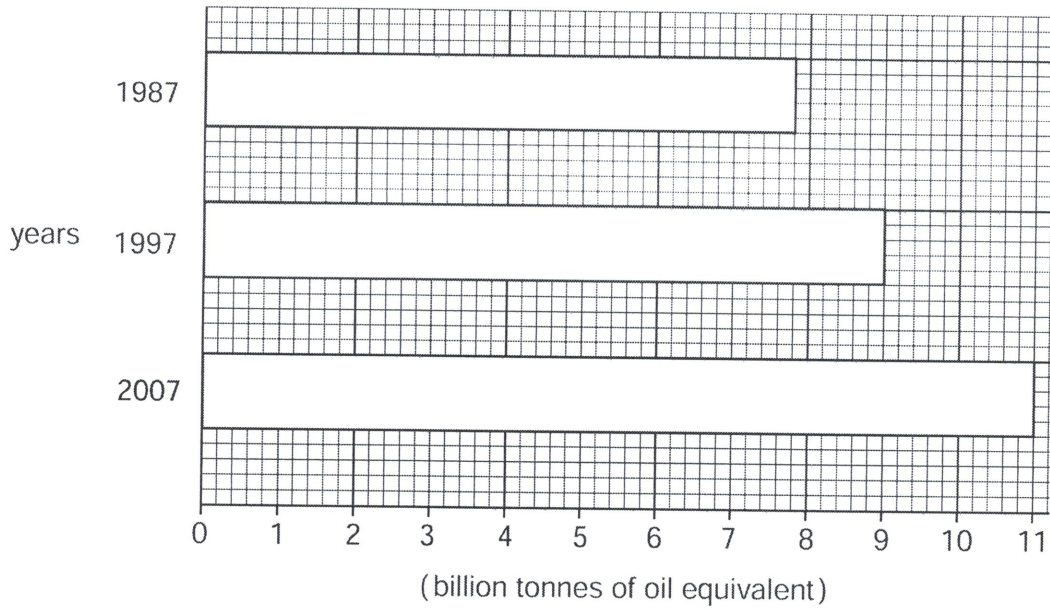
(ii) State **two** reasons why coal is called a fossil fuel.

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.....[2]

(iii) Why is carbon dioxide released into the atmosphere when coal is burnt?

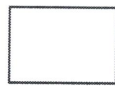
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(b) The bar graph shows total world energy consumption in 1987, 1997 and 2007.

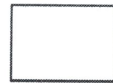


For
Examiner's
Use

key



oil



coal



natural gas



HEP



nuclear

(i) **World energy consumption in 2007**

(billion tonnes of oil equivalent)

Oil	4.0
Coal	3.1
Natural gas	2.6
HEP	0.7
Nuclear	0.6

Divide up the bar for 2007 to show the values of these five different energy sources.

Complete the key to show the shading or colours used.

[4]

(ii) Describe how the bar graph shows total world energy consumption has changed since 1987.

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..... [2]

(ii) How do the values for 2007 show the great importance of fossil fuels in world energy supply?

For
Examiner's
Use

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.....[3]

(c) Describe the advantages of oil over coal for

(i) extraction from the ground,

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(ii) transporting to place of use,

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(iii) ease of use.

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[6]

(d)

Two energy sources in the UK

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coal burning
power station



wind turbines



full output of an average station
32,000 megawatts of energy a day

full output of one standard sized wind turbine
32 megawatts of energy a day

average output achieved
30,000 megawatts a day

average output achieved
8 megawatts a day

percentage of full output achieved
on average – 94%

percentage of full output achieved
on average –

(i) In the space, fill in the average percentage of the full output achieved by a standard wind turbine in the UK. [1]

(ii) Explain the advantages of using coal fired power stations instead of wind turbines for generating electricity in the UK.

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.....[4]

(iii) State the environmental damage caused by coal fired power stations.

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 [2]

(iv) Explain why the air pollution that results is both a local and an international problem.

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 [3]

(e) **World top 10 producers of nuclear power (2007)**
 (million tonnes of oil equivalent for energy produced)

Rank	Country	Amount	Continent
1	USA	192	North America
2	France	100	Europe
3	Japan	63	Asia
4	Russia	36	Europe / Asia
5	South Korea	32	Asia
6	Germany	31	Europe
7	Canada	21	North America
8	Ukraine	20	Europe
9	Sweden	15	Europe
10	China	14	Asia

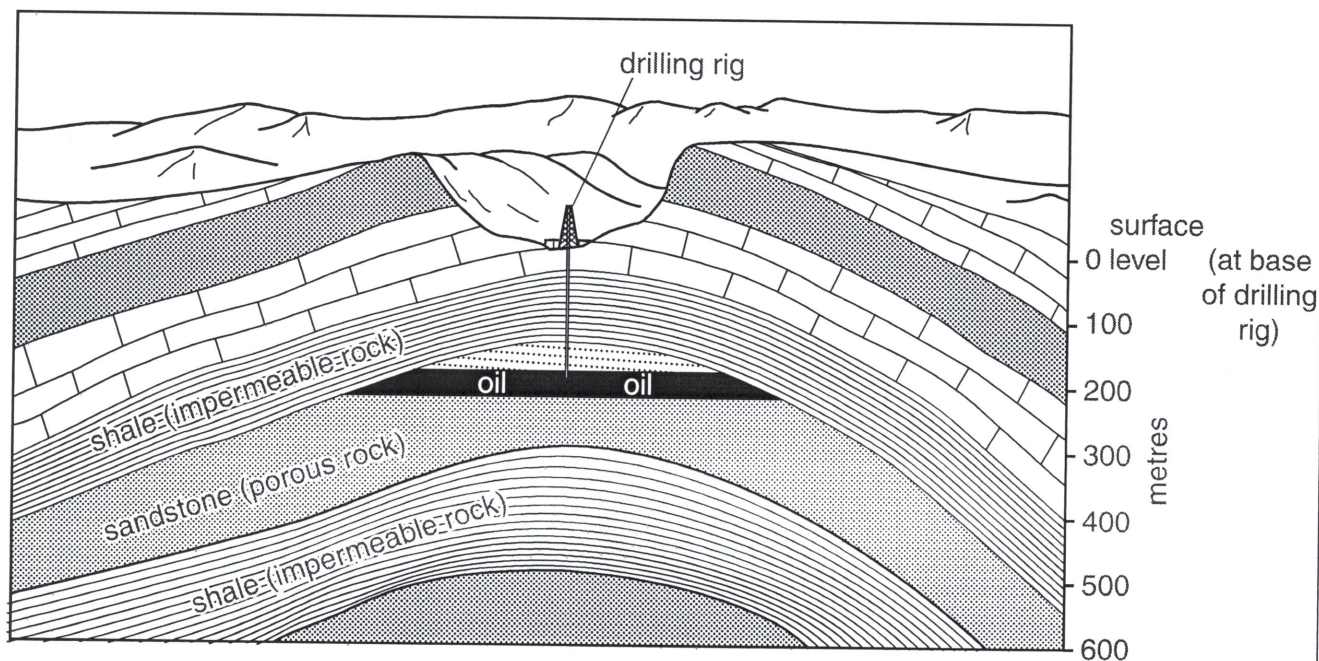
Source BP Statistical Review of World Energy June 2008

(i) Describe what the table shows about the world distribution of nuclear power production. (You should refer to continents without nuclear power production as well as those with production).

.....

 [3]

1 (a) Look at the diagram showing an oil well. Wells like this are common in major oil producing areas of the world such as the Middle East.



(i) On the diagram, label the place where gas is most likely to be present. [1]

(ii) How long is the underground pipe reaching down to the oil?

..... [1]

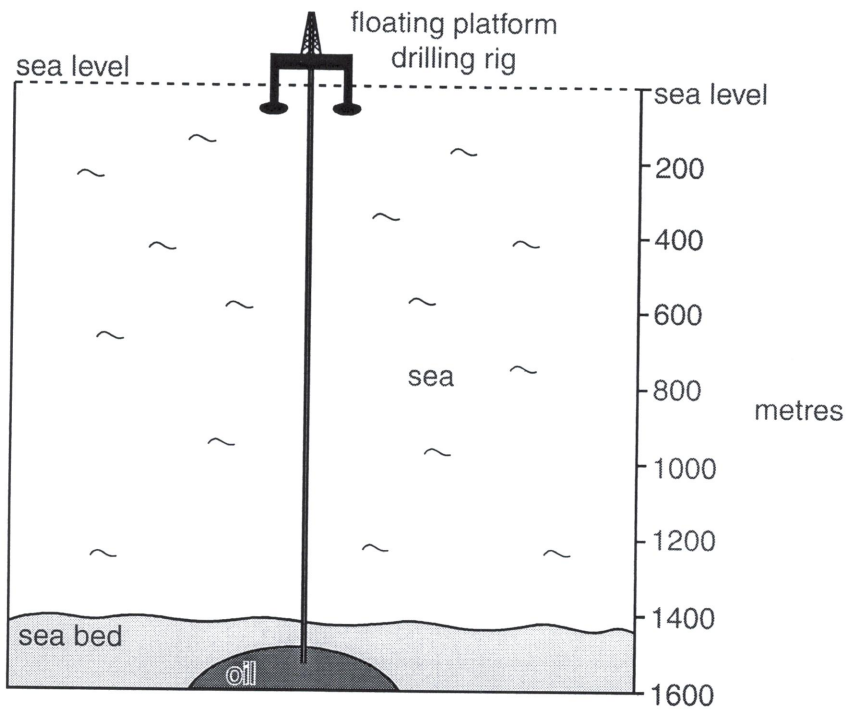
(iii) Look at the type and arrangement of the rocks. Explain why oil has been trapped here.

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 [3]

- (iv) The diagram below shows another oil well. Wells like this are used to obtain oil from below the sea in locations such as the Gulf of Mexico.

For
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Use



How deep is the oil deposit below sea level?

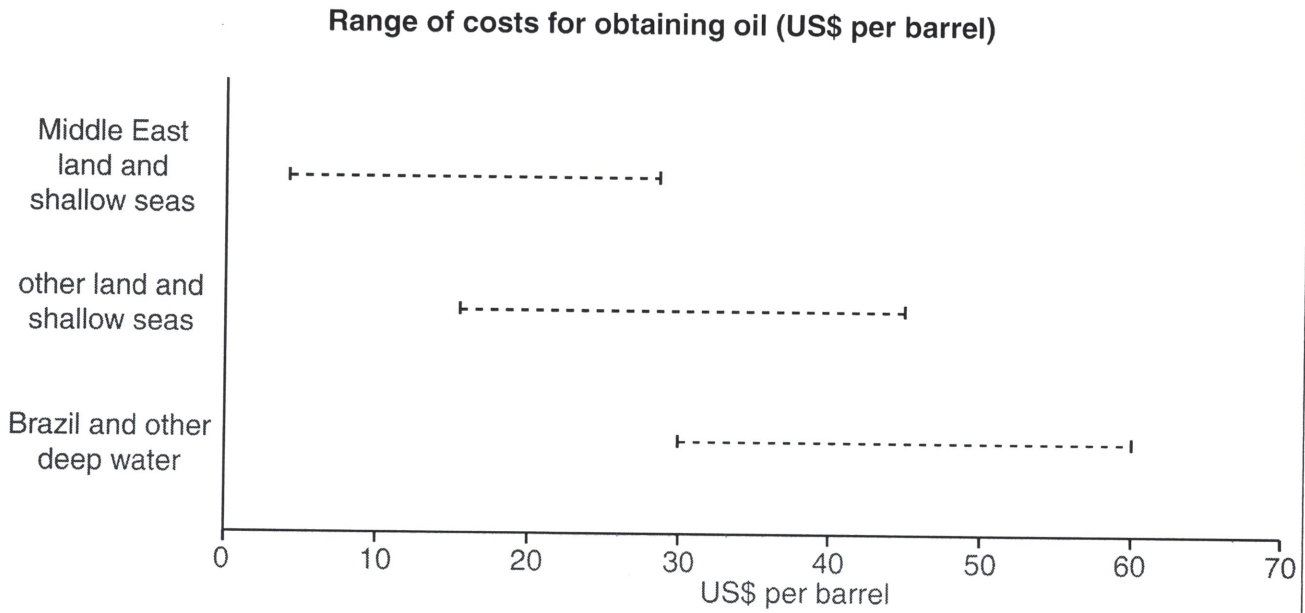
.....[1]

- (v) Why is there always a risk of oil spills from wells like this?

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.....[2]

(b) The costs of drilling for oil vary greatly between different areas of the world and different types of locations.

For
Examiner's
Use



(i) Describe what the graph shows about the costs of oil production in the Middle East compared with other locations.

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..... [2]

(ii) Suggest reasons why the costs of oil production are higher in some locations than in others.

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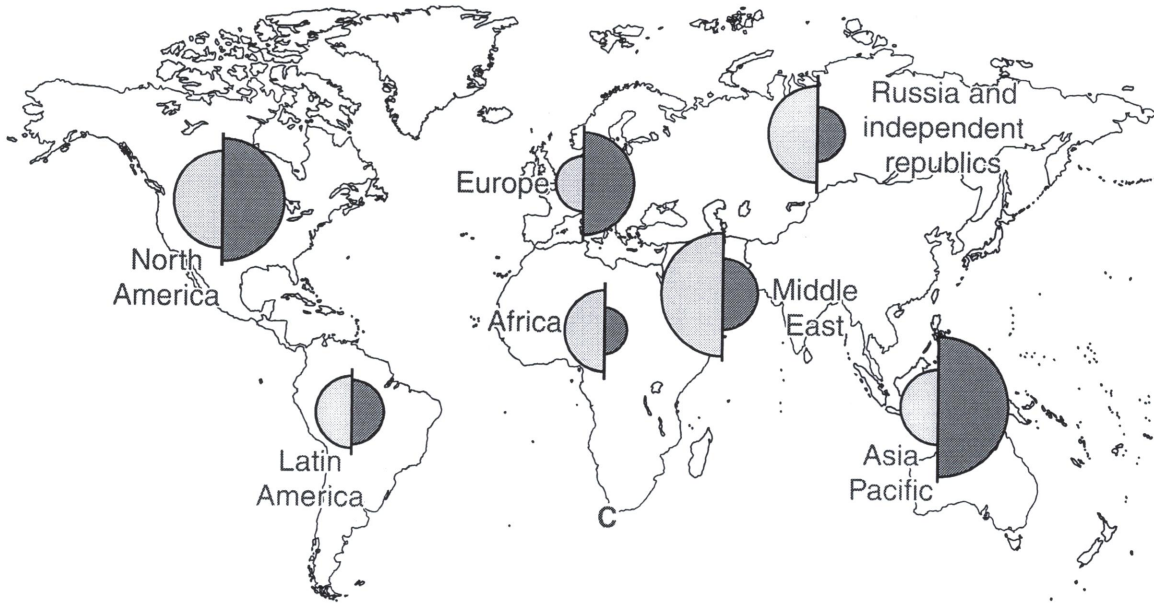
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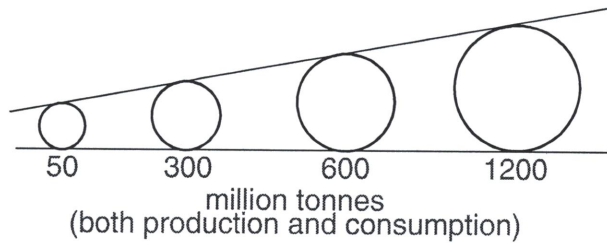
(c) Look at the map of world oil production and consumption in 2009.

For
Examiner's
Use

World oil production and consumption 2009 (million tonnes)



Key:
production  consumption



(i) Which are the world's largest oil producing and consuming regions?

largest production

largest consumption

[1]

(ii) List the seven world regions according to whether they are oil exporters or importers.

exporters

importers

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[2]

(iii) Why is world trade in oil so great?

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For
Examiner's
Use

(iv) Many large supertankers carrying up to 500 000 tonnes of crude oil follow the Cape route around South Africa (marked **C** on the world map). Explain why this is one of the world's busiest tanker routes.

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- (d) Every year the coast of South Africa is battered by strong winter storms. Since the year 1500, over 2000 ships have been wrecked off these rocky coasts. Sea birds such as the African penguin are in constant danger of spills from oil tankers. Read this newspaper report about the African penguin.

African penguins in peril

Only 180000 remain today compared with 1.45 million in 1910. They are now an endangered species. They are comical creatures at high risk from spills. This is because they are sociable birds breeding in large colonies, mainly on islands. They cannot fly, so they need to swim long distances to feed.



Oil is deadly for sea birds. Oiled feathers lose their waterproofing. The birds become cold and too weak to fish. In a spill, many of the fish on which they feed hide under the surface oil.

The good news is that the penguin's short wings and feathers make them easier to clean than other sea birds. Penguins are easy to round up in large groups and catch. They can be hand fed with fish. They are cleaned using warm water, detergents, a tooth brush and a special solution made from cooking oil. They survive well being handled by people, because they have robust bodies, strong bones and food reserves.

The other good news is that penguin survival rates are improving.

Tanker Apollo disaster off Cape Town in 1994 10000 penguins affected 5000 cleaned and saved

Tanker Treasure oil spill off Cape Town in 2000 40000 penguins affected 36000 cleaned and saved

- (i) How many times greater were African penguin numbers in 1910 than today?
Circle one answer.

5 times 8 times 10 times 14 times [1]

- (ii) Choose **two** reasons from the newspaper report to explain why the African penguin is at high risk from oil spills. Explain why the risk to penguins is greater than for many other sea birds.

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..... [3]

(iii) State the percentage survival rates for the penguins after each of the two tanker disasters in 1994 and 2000.

1994 % 2000 % [1]

(iv) Suggest reasons to explain the improvement in survival rates over time.

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For
Examiner's
Use

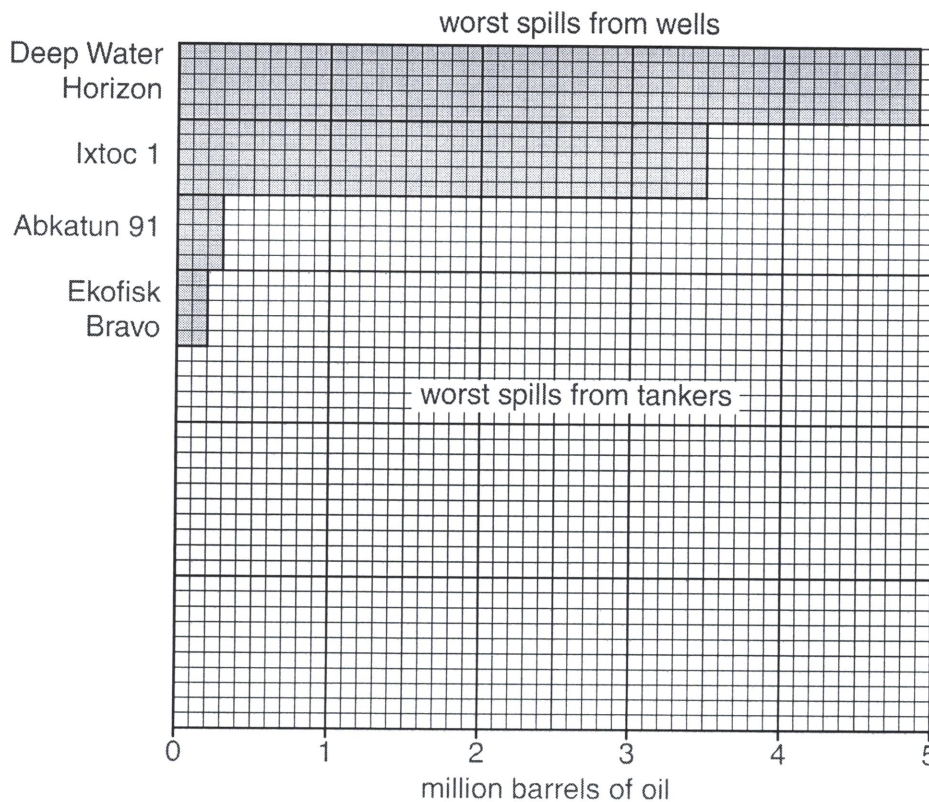
(e) Look at the data about the world's largest marine oil spills.

Worst four oil spills in the sea from wells and tankers

For
Examiner's
Use

	rank	date	name	location	amount (million barrels)
A wells	1	2010	Deep Water Horizon	USA: Gulf of Mexico	4.9
	2	1979	Ixtoc 1	Mexico: Gulf of Mexico	3.5
	3	1986	Abkatun 91	Mexico: Gulf of Mexico	0.3
	4	1977	Ekofisk Bravo	Norway: North Sea	0.2
B tankers	1	1983	Castillo de Beliver	South Africa	1.9
	2	1978	Amoco Cadiz	France	1.6
	3	1988	Odyssey	Canada	1.1
	4	1979	Atlantic Empress	Trinidad and Tobago	1.0

(i) Complete the bar graph by plotting the four worst oil spills from tankers.



[2]

(ii) Suggest reasons why the size of some of the oil spills from wells is much larger than from tankers.

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[2]

(f) Listed below are some of the international measures taken, to try to prevent and reduce the effects of marine oil spills from tankers.

- since 1993 all new tankers must have double hulls
- old tankers when 25 years old must be upgraded to these standards
- the polluter pays for the clean-up costs of any oil spills
- ships are forbidden from cleaning out their tanks at sea

Explain how these measures can help to

(i) prevent more oil spills from happening;

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(ii) increase the speed of the clean-up once an oil spill has happened.

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..... [4]

(g) Do you think it will ever be possible to prevent more marine oil spills from happening in the future? Explain your view.

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..... [3]

[Total: 40 marks]